

Full SAP Calculation Printout



Property Reference	Plot 1			Issued on Date	27/08/2025
Assessment Reference	Plot 1	Prop Type Ref			
Property	Flat 1, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.08	TER	11.08
Environmental	98 A	% DER < TER			72.20
CO ₂ Emissions (t/year)	0.16	DFEE	20.23	TFEE	24.70
Compliance Check	See BREL	% DFEE < TFEE			18.13
% DPER < TPER	44.06	DPER	32.63	TPER	58.33
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.8200	(17)
Infiltration rate	0.1410	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1093 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1393	0.1366	0.1339	0.1202	0.1175	0.1038	0.1038	0.1011	0.1093	0.1175	0.1229	0.1284 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2793	0.2766	0.2739	0.2602	0.2575	0.2438	0.2438	0.2411	0.2493	0.2575	0.2629	0.2684 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			62.0000	0.1100	6.8200	75.0000	4650.0000 (28a)
External Wall	22.2100	7.8700	14.3400	0.1900	2.7246	150.0000	2150.9999 (29a)
Total net area of external elements Aum(A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.6454		(33)
Main dwelling							
Corridor			44.1500	0.0000	0.0000	180.0000	7947.0003 (32)
Party Wall			11.7100	0.0000	0.0000	180.0000	2107.8000 (32)
Party Ceiling 1			62.0000			30.0000	1860.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 19579.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							315.8061 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622	
E3 Sill	4.7700	0.0260	0.1240	
E4 Jamb	9.9000	0.0300	0.2970	
E5 Ground floor (normal)	9.3700	0.0810	0.7590	
E8 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687	
P1 Party wall - Ground floor	23.5700	0.1600	3.7712	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.0822 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		20.7275 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.5446	13.4121	13.2796	12.6173	12.4848	11.8225	11.8225	11.6900	12.0874	12.4848	12.7497	13.0147 (38)
Average = Sum(39)m / 12 =	34.2721	34.1396	34.0072	33.3448	33.2123	32.5500	32.5500	32.4175	32.8149	33.2123	33.4773	33.7422 (39)
												33.3117
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5528	0.5506	0.5485	0.5378	0.5357	0.5250	0.5250	0.5229	0.5293	0.5357	0.5400	0.5442 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)										Total = Sum(45)m =		2153.9058
Distribution loss (46)m = 0.15 x (45)m												
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)												2471 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	101.3413	112.1993	101.3413	104.7194	101.3413	104.7194	101.3413	101.3413	104.7194	101.3413	104.7194	101.3413 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
	432.6678	442.8954	422.4830	405.0374	382.5049	367.1625	351.5766	353.2123	365.3411	379.5999	405.9391	423.4067 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
Northwest	7.8700											
Solar gains	16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009 (83)
Total gains	449.0774	476.2977	482.6633	503.8708	515.3563	508.7962	484.0720	458.8392	438.6717	420.4201	426.5867	436.8076 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	158.6971	159.3129	159.9335	163.1103	163.7609	167.0932	167.0932	167.7760	165.7441	163.7609	162.4649	161.1892	
alpha	11.5798	11.6209	11.6622	11.8740	11.9174	12.1395	12.1395	12.1851	12.0496	11.9174	11.8310	11.7459	
util living area	0.9864	0.9698	0.9305	0.7887	0.5988	0.4094	0.2959	0.3250	0.5161	0.8063	0.9557	0.9889 (86)	
MIT	20.7965	20.8620	20.9308	20.9904	20.9996	21.0000	21.0000	21.0000	20.9999	20.9899	20.9092	20.7875 (87)	
Th 2	20.4727	20.4746	20.4766	20.4863	20.4882	20.4980	20.4980	20.4999	20.4941	20.4882	20.4843	20.4805 (88)	
util rest of house	0.9821	0.9614	0.9138	0.7589	0.5661	0.3773	0.2621	0.2897	0.4783	0.7718	0.9427	0.9853 (89)	
MIT 2	20.2442	20.3256	20.4074	20.4782	20.4879	20.4980	20.4980	20.4999	20.4940	20.4802	20.3914	20.2401 (90)	
Living area fraction									fLA = Living area / (4) =				0.3702 (91)
MIT	20.4486	20.5241	20.6011	20.6678	20.6773	20.6838	20.6838	20.6850	20.6813	20.6689	20.5831	20.4427 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.4486	20.5241	20.6011	20.6678	20.6773	20.6838	20.6838	20.6850	20.6813	20.6689	20.5831	20.4427 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9819	0.9622	0.9180	0.7695	0.5782	0.3892	0.2746	0.3027	0.4923	0.7842	0.9454	0.9850 (94)
Useful gains	440.9600	458.3115	443.0848	387.7522	297.9729	198.0264	132.9277	138.9100	215.9437	329.6936	403.2938	430.2748 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	553.4479	533.4022	479.5387	392.3957	298.1579	198.0277	132.9277	138.9101	215.9651	334.4111	451.3765	548.0651 (97)
Space heating kWh	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359 (98a)
Space heating requirement - total per year (kWh/year)												290.5200
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												290.5200
Space heating per m2										(98c) / (4) =		4.6858 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater													(216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	18.3371	14.7107	13.2453	9.7041	7.4957	6.1241	6.8378	8.8881	11.5448	15.1473	17.1089	18.8467	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													290.5200 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													340.0764
Water heating fuel used													726.6710 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	150.5841	(231)
Electricity for lighting (calculated in Appendix L)	147.9906	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1315.7657	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	290.5200	0.1595	46.3508 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			148.9642 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	147.9906	0.1443	21.3596 (268)
Total CO2, kg/year			191.2117 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	290.5200	1.5906	462.0882 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1568.1977 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	147.9906	1.5338	226.9929 (282)
Total Primary energy kWh/year			2022.9942 (286)
Dwelling Primary energy Rate (DPER)			32.6300 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.0000	2.3700	146.9400
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1361 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.3861		(18)
Number of sides sheltered	3		(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2992	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings		NetArea		U-value		A x U		K-value		A x K	
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		kJ/K	
TER Opening Type					7.8700		1.1450		9.0115				(27)	
Heatloss Floor 1					62.0000		0.1300		8.0600				(28a)	
External Wall	22.2100		7.8700		14.3400		0.1800		2.5812				(29a)	
Total net area of external elements Aum(A, m2)					84.2100								(31)	
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =				19.6527				(33)	
Main dwelling														
Corridor					44.1500		0.0000		0.0000				(32)	
Party Wall					11.7100		0.0000		0.0000				(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													325.8061 (35)	
List of Thermal Bridges														
K1 Element							Length		Psi-value		Total			
E2 Other lintels (including other steel lintels)							4.7700		0.0500		0.2385			
E3 Sill							4.7700		0.0500		0.2385			
E4 Jamb							9.9000		0.0500		0.4950			
E5 Ground floor (normal)							9.3700		0.1600		1.4992			
E18 Party wall between dwellings							4.7400		0.0600		0.2844			
E7 Party floor between dwellings (in blocks of flats)							9.3700		0.0700		0.6559			
P1 Party wall - Ground floor							23.5700		0.0800		1.8856			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							23.5700		0.0000		0.0000			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													5.2971 (36)	
Point Thermal bridges											(36a) =		0.0000	
Total fabric heat loss									(33) + (36) + (36a) =				24.9498 (37)	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)	
	27.7742	27.6372	27.5029	26.8719	26.7539	26.2044	26.2044	26.1026	26.4160	26.7539	26.9927	27.2424		
Heat transfer coeff	52.7240	52.5870	52.4526	51.8217	51.7037	51.1541	51.1541	51.0524	51.3658	51.7037	51.9425	52.1921	(39)	
Average = Sum(39)m / 12 =													51.8211	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)	
	0.8504	0.8482	0.8460	0.8358	0.8339	0.8251	0.8251	0.8234	0.8285	0.8339	0.8378	0.8418		
HLP (average)													0.8358	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)														

Assumed occupancy													2.0376	(42)
Hot water usage for mixer showers														
	58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594	(42a)	
Hot water usage for baths														
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)	
Hot water usage for other uses														
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)	
Average daily hot water use (litres/day)													109.4892	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	119.1099	116.5670	113.4700	108.7601	104.9355	100.8238	99.2431	102.3267	105.5789	109.8956	114.6781	118.8009	(44)	
Energy conte	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135	(45)	
Energy content (annual)													Total = Sum(45)m =	1818.5931
Distribution loss (46)m = 0.15 x (45)m														
	28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084	(62)	
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m =	2119.2152 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)
Heat gains from water heating, kWh/month	99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254	(65)	

5. Internal gains (see Table 5 and 5a)														

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.3979	108.9405	98.3979	101.6778	98.3979	101.6778	98.3979	98.3979	101.6778	98.3979	101.6778	98.3979	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)	
Water heating gains (Table 5)	134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331	(72)	
Total internal gains	467.3302	477.5446	458.1585	442.3480	420.9373	403.5839	388.8403	389.9772	401.4087	417.5598	442.1490	458.3038	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Northwest				7.8700	11.2829		0.6300		0.7000	0.7700	27.1374 (81)
Solar gains	27.1374	55.2390	99.5232	163.4457	219.7030	234.2267	219.1143	174.6804	121.2706	67.5065	22.1618 (83)
Total gains	494.4676	532.7837	557.6817	605.7936	640.6403	637.8106	607.9546	564.6576	522.6793	485.0663	480.4656 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	106.4241	106.7015	106.9747	108.2772	108.5244	109.6902	109.6902	109.9088	109.2382	108.5244	108.0254	107.5087
alpha	8.0949	8.1134	8.1316	8.2185	8.2350	8.3127	8.3127	8.3273	8.2825	8.2350	8.2017	8.1672
util living area	0.9959	0.9912	0.9773	0.9062	0.7316	0.5123	0.3702	0.4157	0.6691	0.9317	0.9885	0.9967 (86)
MIT	20.4339	20.5351	20.6853	20.8859	20.9822	20.9991	20.9999	20.9999	20.9931	20.8746	20.6329	20.4186 (87)
Th 2	20.2099	20.2118	20.2136	20.2224	20.2240	20.2317	20.2317	20.2331	20.2287	20.2240	20.2207	20.2172 (88)
util rest of house	0.9943	0.9879	0.9686	0.8767	0.6778	0.4513	0.3056	0.3465	0.5987	0.9027	0.9834	0.9954 (89)
MIT 2	19.5599	19.6895	19.8780	20.1180	20.2118	20.2313	20.2316	20.2330	20.2252	20.1120	19.8210	19.5467 (90)
Living area fraction									fLA = Living area / (4) =			0.3702 (91)
MIT	19.8834	20.0025	20.1768	20.4023	20.4970	20.5155	20.5160	20.5169	20.5094	20.3942	20.1215	19.8694 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8834	20.0025	20.1768	20.4023	20.4970	20.5155	20.5160	20.5169	20.5094	20.3942	20.1215	19.8694 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9934	0.9867	0.9681	0.8842	0.6972	0.4739	0.3295	0.3722	0.6247	0.9099	0.9826	0.9946 (94)
Useful gains	491.2068	525.7230	539.8775	535.6231	446.6313	302.2775	200.3086	210.1418	326.5390	441.3559	468.0291	477.8725 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	821.6196	794.1959	717.3859	596.0666	454.8354	302.6012	200.3218	210.1770	329.2254	506.3981	676.3691	817.8211 (97)
Space heating kWh	245.8271	180.4137	132.0662	43.5194	6.1038	0.0000	0.0000	0.0000	0.0000	48.3915	150.0048	252.9217 (98a)
Space heating requirement - total per year (kWh/year)												1059.2483
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	245.8271	180.4137	132.0662	43.5194	6.1038	0.0000	0.0000	0.0000	0.0000	48.3915	150.0048	252.9217 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1059.2483
Space heating per m2										(98c) / (4) =		17.0846 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	245.8271	180.4137	132.0662	43.5194	6.1038	0.0000	0.0000	0.0000	0.0000	48.3915	150.0048	252.9217	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	266.3349	195.4645	143.0837	47.1499	6.6130	0.0000	0.0000	0.0000	0.0000	52.4285	162.5187	274.0214	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)
Efficiency of water heater (217)m	84.4296	84.0099	83.1913	81.4554	80.0833	79.8000	79.8000	79.8000	79.8000	81.5847	83.5828	79.8000	(216)
Fuel for water heating, kWh/month	247.0052	219.5817	235.9333	213.0141	210.7599	191.4084	189.6254	196.7757	198.4878	215.4979	222.4350	244.2269	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.4451	16.4018	14.7680	10.8197	8.3574	6.8281	7.6239	9.9099	12.8720	16.8887	19.0758	21.0134	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-21.2162	-30.9375	-45.9788	-53.5143	-59.2914	-55.9365	-55.2767	-51.4207	-44.8526	-36.2137	-23.6964	-18.2266	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-9.0439	-19.3041	-38.8866	-59.1609	-78.9550	-79.5817	-78.6203	-66.2094	-48.0768	-27.8257	-12.1470	-7.1290	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	1147.6146 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2584.7513 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	165.0039 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2961.8681 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1147.6146	0.2100	240.9991 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2584.7513	0.2100	542.7978 (264)
Space and water heating			783.7968 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	165.0039	0.1443	23.8152 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.5614	0.1339	-66.4754
PV Unit electricity exported	-524.9404	0.1255	-65.8942
Total			-132.3696 (269)
Total CO2, kg/year			687.1717 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1147.6146	1.1300	1296.8045 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2584.7513	1.1300	2920.7690 (278)
Space and water heating			4217.5735 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	165.0039	1.5338	253.0885 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.5614	1.4947	-742.2231
PV Unit electricity exported	-524.9404	0.4608	-241.8681
Total			-984.0912 (283)
Total Primary energy kWh/year			3616.6716 (286)
Target Primary Energy Rate (TPER)			58.3300 (287)

Full SAP Calculation Printout



Property Reference	Plot 1				Issued on Date	27/08/2025
Assessment Reference	Plot 1		Prop Type Ref			
Property	Flat 1, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	89 B	DER	3.08	TER	11.08	
Environmental	98 A	% DER < TER				72.20
CO ₂ Emissions (t/year)	0.16	DFEE	20.23	TFEE	24.70	
Compliance Check	See BREL	% DFEE < TFEE				18.13
% DPER < TPER	44.06	DPER	32.63	TPER	58.33	
Assessor Details	Daniel Smith				Assessor ID	CJ06-0001
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

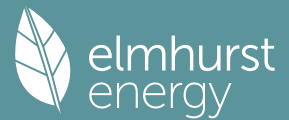
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8200 (17)
Infiltration rate	0.2771 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2148 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.2738	0.2685	0.2631	0.2362	0.2309	0.2040	0.2040	0.1987	0.2148	0.2309	0.2416	0.2523 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5375	0.5360	0.5346	0.5279	0.5266	0.5208	0.5208	0.5197	0.5231	0.5266	0.5292	0.5318 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			62.0000	0.1100	6.8200	75.0000	4650.0000 (28a)
External Wall	22.2100	7.8700	14.3400	0.1900	2.7246	150.0000	2150.9999 (29a)
Total net area of external elements Aum(A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.6454		(33)
Main dwelling							
Corridor			44.1500	0.0000	0.0000	180.0000	7947.0003 (32)
Party Wall			11.7100	0.0000	0.0000	180.0000	2107.8000 (32)
Party Ceiling 1			62.0000			40.0000	2480.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20199.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							325.8061 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				9.9000	0.0300	0.2970	

Full SAP Calculation Printout



E5 Ground floor (normal)	9.3700	0.0810	0.7590
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687
P1 Party wall - Ground floor	23.5700	0.1600	3.7712
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0822 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	20.7275 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	26.0629	25.9923	25.9231	25.5982	25.5374	25.2543	25.2543	25.2019	25.3633	25.5374	25.6604	25.7890 (38)
Average = Sum(39)m / 12 =	46.7905	46.7199	46.6507	46.3257	46.2649	45.9818	45.9818	45.9294	46.0909	46.2649	46.3879	46.5165 (39)
												46.3254
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7547	0.7535	0.7524	0.7472	0.7462	0.7416	0.7416	0.7408	0.7434	0.7462	0.7482	0.7503 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												55.6619 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414 (44)
Energy content (annual)	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499 (45)
Distribution loss (46)m = 0.15 x (45)m												924.4260
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (64)
12Total per year (kWh/year)												785.7621 (64)
Electric shower(s)	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551 (64a)
Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656 (65)
												531.8370 (64a)
												786 (64)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	101.3413	112.1993	101.3413	104.7194	101.3413	104.7194	101.3413	101.3413	104.7194	101.3413	104.7194	101.3413 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
	376.0468	387.6642	370.4739	360.8170	342.8704	332.3774	320.1076	319.5299	328.9885	337.8445	356.7517	367.8444 (73)

6. Solar gains

[Jan]			Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
-----			-----		-----		-----		-----		-----		-----	
Northwest			7.8700		11.2829		0.2400		0.0000		0.7700		16.4096 (81)	
-----			-----		-----		-----		-----		-----		-----	
Solar gains			16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009 (83)
Total gains			392.4565	421.0665	430.6542	459.6504	475.7219	474.0111	452.6030	425.1568	402.3192	378.6647	377.3993	381.2453 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



tau	119.9198	120.1010	120.2792	121.1229	121.2821	122.0287	122.0287	122.1680	121.7401	121.2821	120.9605	120.6261
alpha	8.9947	9.0067	9.0186	9.0749	9.0855	9.1352	9.1352	9.1445	9.1160	9.0855	9.0640	9.0417
util living area	0.9990	0.9976	0.9937	0.9656	0.8500	0.6178	0.4469	0.4965	0.7691	0.9735	0.9968	0.9992 (86)
MIT	20.4235	20.5081	20.6320	20.8270	20.9616	20.9979	20.9999	20.9997	20.9872	20.8331	20.6019	20.4065 (87)
Th 2	20.2928	20.2938	20.2947	20.2993	20.3002	20.3042	20.3042	20.3049	20.3027	20.3002	20.2985	20.2966 (88)
util rest of house	0.9986	0.9966	0.9910	0.9512	0.8041	0.5522	0.3763	0.4218	0.7012	0.9593	0.9952	0.9989 (89)
MIT 2	19.7650	19.8502	19.9737	20.1646	20.2774	20.3034	20.3042	20.3049	20.2970	20.1734	19.9477	19.7515 (90)
Living area fraction									FLA = Living area / (4) =			0.3702 (91)
MIT	20.0088	20.0937	20.2174	20.4098	20.5306	20.5605	20.5617	20.5621	20.5525	20.4176	20.1898	19.9940 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0088	20.0937	20.2174	20.4098	20.5306	20.5605	20.5617	20.5621	20.5525	20.4176	20.1898	19.9940 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9983	0.9963	0.9906	0.9538	0.8200	0.5766	0.4024	0.4495	0.7263	0.9621	0.9949	0.9987 (94)
Useful gains	391.8079	419.5061	426.6196	438.4006	390.1070	273.2950	182.1397	191.0919	292.2225	364.3103	375.4655	380.7577 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	735.0214	709.8493	639.9242	533.1998	408.5491	274.0733	182.1664	191.1623	297.4019	454.2103	607.2099	734.6797 (97)
Space heating kWh	255.3508	195.1106	158.6986	68.2555	13.7209	0.0000	0.0000	0.0000	0.0000	66.8856	166.8560	263.3180 (98a)
Space heating requirement - total per year (kWh/year)												1188.1960
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	255.3508	195.1106	158.6986	68.2555	13.7209	0.0000	0.0000	0.0000	0.0000	66.8856	166.8560	263.3180 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1188.1960
Space heating per m2										(98c) / (4) =		19.1645 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	432.2294	340.2657	349.0637	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9576	0.9880	0.9779	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	413.9206	336.1811	341.3629	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	507.9638	485.2376	455.2183	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	67.7111	110.8980	84.7085	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	16.9278	27.7245	21.1771	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												65.8294 (107)
Energy for space heating												19.1645 (99)
Energy for space cooling												1.0618 (108)
Total												20.2262 (109)
Fabric Energy Efficiency (DFEE)												20.2 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3861 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2992 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			7.8700	1.1450	9.0115			(27)
Heatloss Floor 1			62.0000	0.1300	8.0600			(28a)
External Wall	22.2100	7.8700	14.3400	0.1800	2.5812			(29a)
Total net area of external elements Aum(A, m2)			84.2100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.6527			(33)
Main dwelling								
Corridor			44.1500	0.0000	0.0000			(32)
Party Wall			11.7100	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							325.8061	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0500		0.2385	
E3 Sill				4.7700	0.0500		0.2385	
E4 Jamb				9.9000	0.0500		0.4950	
E5 Ground floor (normal)				9.3700	0.1600		1.4992	
E18 Party wall between dwellings				4.7400	0.0600		0.2844	
E7 Party floor between dwellings (in blocks of flats)				9.3700	0.0700		0.6559	
P1 Party wall - Ground floor				23.5700	0.0800		1.8856	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.5700	0.0000		0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.2971	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	24.9498	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													(42a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													(42b)
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	25.1446	(42b)
Hot water usage for other uses													(42c)
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	35.4969	(42c)
Average daily hot water use (litres/day)												55.6619	(43)
Daily hot water use													
60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414	60.6414	(44)
Energy conte	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499	(45)
Energy content (annual)												924.4260	
Distribution loss (46)m = 0.15 x (45)m													(46)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													(56)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													(57)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074	80.7074	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074	(64)
Total per year (kWh/year)												785.7621	(64)
Electric shower(s)	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												531.8370	(64a)
Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	98.3979	108.9405	98.3979	101.6778	98.3979	101.6778	98.3979	98.3979	101.6778	98.3979	101.6778	98.3979 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
	373.1033	384.4053	367.5304	357.7754	339.9270	329.3358	317.1641	316.5865	325.9469	334.9010	353.7101	364.9009 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W					
-----					Northwest	7.8700	11.2829	0.6300	0.7000		0.7700	27.1374 (81)					
-----					Solar gains	27.1374	55.2390	99.5232	163.4457	219.7030	234.2267	219.1143	174.6804	121.2706	67.5065	34.1459	22.1618 (83)
-----					Total gains	400.2408	439.6444	467.0536	521.2211	559.6300	563.5625	536.2784	491.2669	447.2175	402.4075	387.8560	387.0627 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	106.4241	106.7015	106.9747	108.2772	108.5244	109.6902	109.6902	109.9088	109.2382	108.5244	108.0254	107.5087
alpha	8.0949	8.1134	8.1316	8.2185	8.2350	8.3127	8.3127	8.3273	8.2825	8.2350	8.2017	8.1672
util living area	0.9991	0.9976	0.9926	0.9548	0.8132	0.5782	0.4195	0.4775	0.7654	0.9752	0.9972	0.9993 (86)
MIT	20.2988	20.4045	20.5665	20.8109	20.9623	20.9978	20.9999	20.9996	20.9823	20.7875	20.5100	20.2841 (87)
Th 2	20.2099	20.2118	20.2136	20.2224	20.2240	20.2317	20.2317	20.2331	20.2287	20.2240	20.2207	20.2172 (88)
util rest of house	0.9987	0.9966	0.9893	0.9365	0.7612	0.5102	0.3464	0.3982	0.6921	0.9613	0.9957	0.9990 (89)
MIT 2	19.5693	19.6761	19.8381	20.0782	20.2025	20.2309	20.2316	20.2330	20.2210	20.0620	19.7890	19.5609 (90)
Living area fraction	19.8393	19.9457	20.1077	20.3494	20.4838	20.5148	20.5160	20.5168	FLA = Living area / (4) =	20.5028	20.3305	20.0559 (91)
MIT	19.8393	19.9457	20.1077	20.3494	20.4838	20.5148	20.5160	20.5168	20.5028	20.3305	20.0559	19.8286 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8393	19.9457	20.1077	20.3494	20.4838	20.5148	20.5160	20.5168	20.5028	20.3305	20.0559	19.8286 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9984	0.9962	0.9888	0.9399	0.7795	0.5355	0.3735	0.4276	0.7192	0.9636	0.9954	0.9988 (94)
Ext temp.	399.6195	437.9756	461.8129	489.8943	436.2149	301.7657	200.2847	210.0685	321.6408	387.7401	386.0547	386.6006 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	819.2948	791.2100	713.7598	593.3263	454.1526	302.5644	200.3197	210.1708	328.8836	503.1046	672.9611	815.6908 (97)
Space heating requirement - total per year (kWh/year)	312.2385	237.3736	187.4485	74.4711	13.3456	0.0000	0.0000	0.0000	0.0000	85.8312	206.5726	319.2431 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	312.2385	237.3736	187.4485	74.4711	13.3456	0.0000	0.0000	0.0000	0.0000	85.8312	206.5726	319.2431 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1436.5241
Space heating per m2										(98c) / (4) =		23.1697 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	480.8488	378.5406	387.9980	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9689	0.9905	0.9802	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	465.8909	374.9430	380.3182	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	615.9318	586.2021	535.5686	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	108.0295	157.1768	115.5063	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	27.0074	39.2942	28.8766	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												95.1782 (107)
Energy for space heating												23.1697 (99)
Energy for space cooling												1.5351 (108)
Total												24.7049 (109)
Fabric Energy Efficiency (TFEE)												24.7 (109)

Full SAP Calculation Printout



Property Reference	Plot 1			Issued on Date	27/08/2025
Assessment Reference	Plot 1	Prop Type Ref			
Property	Flat 1, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.08	TER	11.08
Environmental	98 A	% DER < TER			72.20
CO ₂ Emissions (t/year)	0.16	DFEE	20.23	TFEE	24.70
Compliance Check	See BREL	% DFEE < TFEE			18.13
% DPER < TPER	44.06	DPER	32.63	TPER	58.33
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.8200	(17)
Infiltration rate	0.1410	(18)
Number of sides sheltered	3	(19)

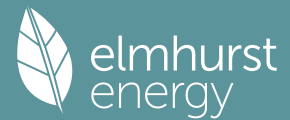
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1093 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1393	0.1366	0.1339	0.1202	0.1175	0.1038	0.1038	0.1011	0.1093	0.1175	0.1229	0.1284 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2793	0.2766	0.2739	0.2602	0.2575	0.2438	0.2438	0.2411	0.2493	0.2575	0.2629	0.2684 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			62.0000	0.1100	6.8200	75.0000	4650.0000 (28a)
External Wall	22.2100	7.8700	14.3400	0.1900	2.7246	150.0000	2150.9999 (29a)
Total net area of external elements Aum(A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.6454		(33)
Main dwelling							
Corridor			44.1500	0.0000	0.0000	180.0000	7947.0003 (32)
Party Wall			11.7100	0.0000	0.0000	180.0000	2107.8000 (32)
Party Ceiling 1			62.0000			30.0000	1860.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 19579.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							315.8061 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622	
E3 Sill	4.7700	0.0260	0.1240	
E4 Jamb	9.9000	0.0300	0.2970	
E5 Ground floor (normal)	9.3700	0.0810	0.7590	
E8 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687	
P1 Party wall - Ground floor	23.5700	0.1600	3.7712	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.0822 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		20.7275 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.5446	13.4121	13.2796	12.6173	12.4848	11.8225	11.8225	11.6900	12.0874	12.4848	12.7497	13.0147 (38)
Average = Sum(39)m / 12 =	34.2721	34.1396	34.0072	33.3448	33.2123	32.5500	32.5500	32.4175	32.8149	33.2123	33.4773	33.7422 (39)
												33.3117
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5528	0.5506	0.5485	0.5378	0.5357	0.5250	0.5250	0.5229	0.5293	0.5357	0.5400	0.5442 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)										Total = Sum(45)m =		2153.9058
Distribution loss (46)m = 0.15 x (45)m												
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	101.3413	112.1993	101.3413	104.7194	101.3413	104.7194	101.3413	101.3413	104.7194	101.3413	104.7194	101.3413 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
	432.6678	442.8954	422.4830	405.0374	382.5049	367.1625	351.5766	353.2123	365.3411	379.5999	405.9391	423.4067 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
Northwest	7.8700											
Solar gains	16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009 (83)
Total gains	449.0774	476.2977	482.6633	503.8708	515.3563	508.7962	484.0720	458.8392	438.6717	420.4201	426.5867	436.8076 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	158.6971	159.3129	159.9335	163.1103	163.7609	167.0932	167.0932	167.7760	165.7441	163.7609	162.4649	161.1892	
alpha	11.5798	11.6209	11.6622	11.8740	11.9174	12.1395	12.1395	12.1851	12.0496	11.9174	11.8310	11.7459	
util living area	0.9864	0.9698	0.9305	0.7887	0.5988	0.4094	0.2959	0.3250	0.5161	0.8063	0.9557	0.9889 (86)	
MIT	20.7965	20.8620	20.9308	20.9904	20.9996	21.0000	21.0000	21.0000	20.9999	20.9899	20.9092	20.7875 (87)	
Th 2	20.4727	20.4746	20.4766	20.4863	20.4882	20.4980	20.4980	20.4999	20.4941	20.4882	20.4843	20.4805 (88)	
util rest of house	0.9821	0.9614	0.9138	0.7589	0.5661	0.3773	0.2621	0.2897	0.4783	0.7718	0.9427	0.9853 (89)	
MIT 2	20.2442	20.3256	20.4074	20.4782	20.4879	20.4980	20.4980	20.4999	20.4940	20.4802	20.3914	20.2401 (90)	
Living area fraction									fLA = Living area / (4) =				0.3702 (91)
MIT	20.4486	20.5241	20.6011	20.6678	20.6773	20.6838	20.6838	20.6850	20.6813	20.6689	20.5831	20.4427 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.4486	20.5241	20.6011	20.6678	20.6773	20.6838	20.6838	20.6850	20.6813	20.6689	20.5831	20.4427 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9819	0.9622	0.9180	0.7695	0.5782	0.3892	0.2746	0.3027	0.4923	0.7842	0.9454	0.9850 (94)
Useful gains	440.9600	458.3115	443.0848	387.7522	297.9729	198.0264	132.9277	138.9100	215.9437	329.6936	403.2938	430.2748 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	553.4479	533.4022	479.5387	392.3957	298.1579	198.0277	132.9277	138.9101	215.9651	334.4111	451.3765	548.0651 (97)
Space heating kWh	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359 (98a)
Space heating requirement - total per year (kWh/year)												290.5200
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												290.5200
Space heating per m2										(98c) / (4) =		4.6858 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	83.6910	50.4609	27.1217	3.3433	0.1377	0.0000	0.0000	0.0000	0.0000	3.5098	34.6196	87.6359	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater													(216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	18.3371	14.7107	13.2453	9.7041	7.4957	6.1241	6.8378	8.8881	11.5448	15.1473	17.1089	18.8467	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													290.5200 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													340.0764
Water heating fuel used													726.6710 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	150.5841 (231)
Electricity for lighting (calculated in Appendix L)	147.9906 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1315.7657 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	290.5200	0.1595	46.3508 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			148.9642 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	147.9906	0.1443	21.3596 (268)
Total CO2, kg/year			191.2117 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	290.5200	1.5906	462.0882 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1568.1977 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	147.9906	1.5338	226.9929 (282)
Total Primary energy kWh/year			2022.9942 (286)
Dwelling Primary energy Rate (DPER)			32.6300 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

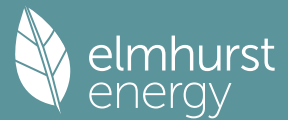
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3861 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2992 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings		NetArea		U-value		A x U		K-value		A x K	
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		kJ/K	
TER Opening Type					7.8700		1.1450		9.0115				(27)	
Heatloss Floor 1					62.0000		0.1300		8.0600				(28a)	
External Wall	22.2100		7.8700		14.3400		0.1800		2.5812				(29a)	
Total net area of external elements Aum(A, m2)					84.2100								(31)	
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =				19.6527				(33)	
Main dwelling														
Corridor					44.1500		0.0000		0.0000				(32)	
Party Wall					11.7100		0.0000		0.0000				(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													325.8061 (35)	
List of Thermal Bridges														
K1 Element							Length		Psi-value		Total			
E2 Other lintels (including other steel lintels)							4.7700		0.0500		0.2385			
E3 Sill							4.7700		0.0500		0.2385			
E4 Jamb							9.9000		0.0500		0.4950			
E5 Ground floor (normal)							9.3700		0.1600		1.4992			
E18 Party wall between dwellings							4.7400		0.0600		0.2844			
E7 Party floor between dwellings (in blocks of flats)							9.3700		0.0700		0.6559			
P1 Party wall - Ground floor							23.5700		0.0800		1.8856			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							23.5700		0.0000		0.0000			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													5.2971 (36)	
Point Thermal bridges											(36a) =		0.0000	
Total fabric heat loss									(33) + (36) + (36a) =				24.9498 (37)	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)	
	27.7742	27.6372	27.5029	26.8719	26.7539	26.2044	26.2044	26.1026	26.4160	26.7539	26.9927	27.2424		
Heat transfer coeff	52.7240	52.5870	52.4526	51.8217	51.7037	51.1541	51.1541	51.0524	51.3658	51.7037	51.9425	52.1921	(39)	
Average = Sum(39)m / 12 =													51.8211	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)	
	0.8504	0.8482	0.8460	0.8358	0.8339	0.8251	0.8251	0.8234	0.8285	0.8339	0.8378	0.8418		
HLP (average)													0.8358	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)														

Assumed occupancy													2.0376 (42)	
Hot water usage for mixer showers														
	58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594	(42a)	
Hot water usage for baths														
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)	
Hot water usage for other uses														
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)	
Average daily hot water use (litres/day)													109.4892 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	119.1099	116.5670	113.4700	108.7601	104.9355	100.8238	99.2431	102.3267	105.5789	109.8956	114.6781	118.8009	(44)	
Energy conte	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135	(45)	
Energy content (annual)														
Distribution loss (46)m = 0.15 x (45)m													1818.5931	
	28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020	(46)	
Water storage loss:														
Store volume													150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)	
Temperature factor from Table 2b													0.5400 (49)	
Enter (49) or (54) in (55)													0.7527 (55)	
Total storage loss														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084	(62)	
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)	
12Total per year (kWh/year)													2119.2152 (64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)	
Heat gains from water heating, kWh/month	99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254	(65)	

5. Internal gains (see Table 5 and 5a)														

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	98.3979	108.9405	98.3979	101.6778	98.3979	101.6778	98.3979	98.3979	101.6778	98.3979	101.6778	98.3979	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)	
Water heating gains (Table 5)														
	134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331	(72)	
Total internal gains	467.3302	477.5446	458.1585	442.3480	420.9373	403.5839	388.8403	389.9772	401.4087	417.5598	442.1490	458.3038	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Northwest	7.8700				11.2829		0.6300		0.7000	0.7700	27.1374 (81)
Solar gains	27.1374	55.2390	99.5232	163.4457	219.7030	234.2267	219.1143	174.6804	121.2706	67.5065	22.1618 (83)
Total gains	494.4676	532.7837	557.6817	605.7936	640.6403	637.8106	607.9546	564.6576	522.6793	485.0663	480.4656 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	106.4241	106.7015	106.9747	108.2772	108.5244	109.6902	109.6902	109.9088	109.2382	108.5244	108.0254	107.5087
alpha	8.0949	8.1134	8.1316	8.2185	8.2350	8.3127	8.3127	8.3273	8.2825	8.2350	8.2017	8.1672
util living area	0.9959	0.9912	0.9773	0.9062	0.7316	0.5123	0.3702	0.4157	0.6691	0.9317	0.9885	0.9967 (86)
MIT	20.4339	20.5351	20.6853	20.8859	20.9822	20.9991	20.9999	20.9999	20.9931	20.8746	20.6329	20.4186 (87)
Th 2	20.2099	20.2118	20.2136	20.2224	20.2240	20.2317	20.2317	20.2331	20.2287	20.2240	20.2207	20.2172 (88)
util rest of house	0.9943	0.9879	0.9686	0.8767	0.6778	0.4513	0.3056	0.3465	0.5987	0.9027	0.9834	0.9954 (89)
MIT 2	19.5599	19.6895	19.8780	20.1180	20.2118	20.2313	20.2316	20.2330	20.2252	20.1120	19.8210	19.5467 (90)
Living area fraction									fLA = Living area / (4) =			0.3702 (91)
MIT	19.8834	20.0025	20.1768	20.4023	20.4970	20.5155	20.5160	20.5169	20.5094	20.3942	20.1215	19.8694 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8834	20.0025	20.1768	20.4023	20.4970	20.5155	20.5160	20.5169	20.5094	20.3942	20.1215	19.8694 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9934	0.9867	0.9681	0.8842	0.6972	0.4739	0.3295	0.3722	0.6247	0.9099	0.9826	0.9946 (94)
Useful gains	491.2068	525.7230	539.8775	535.6231	446.6313	302.2775	200.3086	210.1418	326.5390	441.3559	468.0291	477.8725 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	821.6196	794.1959	717.3859	596.0666	454.8354	302.6012	200.3218	210.1770	329.2254	506.3981	676.3691	817.8211 (97)
Space heating kWh	245.8271	180.4137	132.0662	43.5194	6.1038	0.0000	0.0000	0.0000	0.0000	48.3915	150.0048	252.9217 (98a)
Space heating requirement - total per year (kWh/year)												1059.2483
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	245.8271	180.4137	132.0662	43.5194	6.1038	0.0000	0.0000	0.0000	0.0000	48.3915	150.0048	252.9217 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1059.2483
Space heating per m2										(98c) / (4) =		17.0846 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	245.8271	180.4137	132.0662	43.5194	6.1038	0.0000	0.0000	0.0000	0.0000	48.3915	150.0048	252.9217 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	266.3349	195.4645	143.0837	47.1499	6.6130	0.0000	0.0000	0.0000	0.0000	52.4285	162.5187	274.0214 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Efficiency of water heater (217)m	84.4296	84.0099	83.1913	81.4554	80.0833	79.8000	79.8000	79.8000	79.8000	81.5847	83.5828	79.8000 (216)
Fuel for water heating, kWh/month	247.0052	219.5817	235.9333	213.0141	210.7599	191.4084	189.6254	196.7757	198.4878	215.4979	222.4350	244.2269 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.4451	16.4018	14.7680	10.8197	8.3574	6.8281	7.6239	9.9099	12.8720	16.8887	19.0758	21.0134 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-21.2162	-30.9375	-45.9788	-53.5143	-59.2914	-55.9365	-55.2767	-51.4207	-44.8526	-36.2137	-23.6964	-18.2266 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-9.0439	-19.3041	-38.8866	-59.1609	-78.9550	-79.5817	-78.6203	-66.2094	-48.0768	-27.8257	-12.1470	-7.1290 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	1147.6146 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2584.7513 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	165.0039 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2961.8681 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1147.6146	0.2100	240.9991 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2584.7513	0.2100	542.7978 (264)
Space and water heating			783.7968 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	165.0039	0.1443	23.8152 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.5614	0.1339	-66.4754
PV Unit electricity exported	-524.9404	0.1255	-65.8942
Total			-132.3696 (269)
Total CO2, kg/year			687.1717 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1147.6146	1.1300	1296.8045 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2584.7513	1.1300	2920.7690 (278)
Space and water heating			4217.5735 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	165.0039	1.5338	253.0885 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.5614	1.4947	-742.2231
PV Unit electricity exported	-524.9404	0.4608	-241.8681
Total			-984.0912 (283)
Total Primary energy kWh/year			3616.6716 (286)
Target Primary Energy Rate (TPER)			58.3300 (287)

Full SAP Calculation Printout



Property Reference	Plot 1			Issued on Date	27/08/2025
Assessment Reference	Plot 1	Prop Type Ref			
Property	Flat 1, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.08	TER	11.08
Environmental	98 A	% DER < TER			72.20
CO ₂ Emissions (t/year)	0.16	DFEE	20.23	TFEE	24.70
Compliance Check	See BREL	% DFEE < TFEE			18.13
% DPER < TPER	44.06	DPER	32.63	TPER	58.33
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.8200	(17)
Infiltration rate	0.1410	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1093 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1393	0.1366	0.1339	0.1202	0.1175	0.1038	0.1038	0.1011	0.1093	0.1175	0.1229	0.1284 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2793	0.2766	0.2739	0.2602	0.2575	0.2438	0.2438	0.2411	0.2493	0.2575	0.2629	0.2684 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			62.0000	0.1100	6.8200	75.0000	4650.0000 (28a)
External Wall	22.2100	7.8700	14.3400	0.1900	2.7246	150.0000	2150.9999 (29a)
Total net area of external elements Aum(A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.6454		(33)
Main dwelling							
Corridor			44.1500	0.0000	0.0000	180.0000	7947.0003 (32)
Party Wall			11.7100	0.0000	0.0000	180.0000	2107.8000 (32)
Party Ceiling 1			62.0000			40.0000	2480.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 20199.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							325.8061 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	9.9000	0.0300	0.2970
E5 Ground floor (normal)	9.3700	0.0810	0.7590
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687
P1 Party wall - Ground floor	23.5700	0.1600	3.7712
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0822 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	20.7275 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.5446	13.4121	13.2796	12.6173	12.4848	11.8225	11.8225	11.6900	12.0874	12.4848	12.7497	13.0147 (38)
Average = Sum(39)m / 12 =	34.2721	34.1396	34.0072	33.3448	33.2123	32.5500	32.5500	32.4175	32.8149	33.2123	33.4773	33.7422 (39)
												33.3117
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5528	0.5506	0.5485	0.5378	0.5357	0.5250	0.5250	0.5229	0.5293	0.5357	0.5400	0.5442 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)										Total = Sum(45)m =		2153.9058
Distribution loss (46)m = 0.15 x (45)m												
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
								Total per year (kWh/year) = Sum(64)m =				2471.2368 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
	20.9496	18.6072	15.1324	11.4562	8.5637	7.2298	7.8121	10.1544	13.6292	17.3054	20.1980	21.5319 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)												
	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains												
	476.3796	474.3164	458.9952	429.6158	401.4092	375.5659	360.0727	363.1413	377.6589	403.8515	435.8647	463.8333 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	7.8700							0.0000		0.7700		16.4096 (81)
Solar gains	16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009 (83)
Total gains	492.7893	507.7187	519.1755	528.4491	534.2607	517.1996	492.5682	468.7681	450.9896	444.6717	456.5123	477.2342 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	163.7223	164.3575	164.9978	168.2752	168.9464	172.3842	172.3842	173.0886	170.9924	168.9464	167.6093	166.2933	21.0000 (85)
alpha	11.9148	11.9572	11.9999	12.2183	12.2631	12.4923	12.4923	12.5392	12.3995	12.2631	12.1740	12.0862	
util living area	0.9727	0.9540	0.8971	0.7566	0.5778	0.4028	0.2908	0.3181	0.5020	0.7687	0.9326	0.9779	(86)
MIT	20.8578	20.9002	20.9582	20.9944	20.9998	21.0000	21.0000	21.0000	21.0000	20.9945	20.9394	20.8467	(87)
Th 2	20.4727	20.4746	20.4766	20.4863	20.4882	20.4980	20.4980	20.4999	20.4941	20.4882	20.4843	20.4805	(88)
util rest of house	0.9650	0.9423	0.8762	0.7267	0.5462	0.3712	0.2576	0.2835	0.4652	0.7338	0.9152	0.9715	(89)
MIT 2	20.3182	20.3701	20.4365	20.4818	20.4881	20.4980	20.4980	20.4999	20.4941	20.4840	20.4248	20.3121	(90)
Living area fraction									fLA = Living area / (4) =				0.3702 (91)
MIT	20.5180	20.5663	20.6296	20.6715	20.6775	20.6838	20.6838	20.6850	20.6813	20.6730	20.6153	20.5100	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.5180	20.5663	20.6296	20.6715	20.6775	20.6838	20.6838	20.6850	20.6813	20.6730	20.6153	20.5100	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9657	0.9445	0.8826	0.7376	0.5579	0.3829	0.2699	0.2963	0.4788	0.7465	0.9199	0.9719	(94)
Useful gains	475.9033	479.5453	458.2227	389.7977	298.0599	198.0269	132.9277	138.9101	215.9535	331.9599	419.9453	463.8365	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	555.8236	534.8411	480.5085	392.5196	298.1631	198.0277	132.9277	138.9101	215.9657	334.5475	452.4547	550.3348	(97)
Space heating kWh	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547	(98a)
Space heating requirement - total per year (kWh/year)												204.9233	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												204.9233	
Space heating per m2										(98c) / (4) =		3.3052	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	18.3371	14.7107	13.2453	9.7041	7.4957	6.1241	6.8378	8.8881	11.5448	15.1473	17.1089	18.8467	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													204.9233 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													340.0764
Water heating fuel used													726.6710 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)
Total electricity for the above, kWh/year													150.5841 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	147.9906 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1230.1690 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	204.9233	16.4900	33.7919 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	16.4900	119.8280 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313 (249)
Energy for lighting	147.9906	16.4900	24.4036 (250)
Additional standing charges			0.0000 (251)
Total energy cost			202.8549 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.6825 (257)
SAP value	88.9366
SAP rating (Section 12)	89 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	204.9233	0.1598	32.7508 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			135.3642 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	147.9906	0.1443	21.3596 (268)
Total CO2, kg/year			177.6117 (272)
CO2 emissions per m2			2.8600 (273)
EI value			97.7757
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

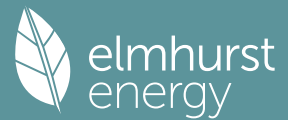
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 146.9400 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8200 (17)
Infiltration rate	0.1410 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1093 (21)

Full SAP Calculation Printout



Wind speed	Jan 4.3000	Feb 4.2000	Mar 4.3000	Apr 3.9000	May 4.0000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.4000	Oct 3.8000	Nov 3.8000	Dec 3.9000 (22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1175	0.1147	0.1175	0.1065	0.1093	0.0929	0.0902	0.0902	0.0929	0.1038	0.1038	0.1065 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2575	0.2547	0.2575	0.2465	0.2493	0.2329	0.2302	0.2302	0.2329	0.2438	0.2438	0.2465 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			62.0000	0.1100	6.8200	75.0000	4650.0000 (28a)
External Wall	22.2100	7.8700	14.3400	0.1900	2.7246	150.0000	2150.9999 (29a)
Total net area of external elements Aum(A, m2)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.6454		(33)
Main dwelling							
Corridor			44.1500	0.0000	0.0000	180.0000	7947.0003 (32)
Party Wall			11.7100	0.0000	0.0000	180.0000	2107.8000 (32)
Party Ceiling 1			62.0000			40.0000	2480.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 20199.9801 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 325.8061 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	9.9000	0.0300	0.2970
E5 Ground floor (normal)	9.3700	0.0810	0.7590
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687
P1 Party wall - Ground floor	23.5700	0.1600	3.7712
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0822 (36)
Point Thermal Bridges			0.0000 (36a) =
Total fabric heat loss			(33) + (36) + (36a) = 20.7275 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 12.4848	Feb 12.3523	Mar 12.4848	Apr 11.9549	May 12.0874	Jun 11.2926	Jul 11.1601	Aug 11.1601	Sep 11.2926	Oct 11.8225	Nov 11.8225	Dec 11.9549 (38)
Heat transfer coeff	33.2123	33.0799	33.2123	32.6825	32.8149	32.0201	31.8877	31.8877	32.0201	32.5500	32.5500	32.6825 (39)
Average = Sum(39)m / 12 =												32.5500

HLP	Jan 0.5357	Feb 0.5335	Mar 0.5357	Apr 0.5271	May 0.5293	Jun 0.5165	Jul 0.5143	Aug 0.5143	Sep 0.5165	Oct 0.5250	Nov 0.5250	Dec 0.5271 (40)
HLP (average)												0.5250
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)

Daily hot water use	Jan 141.0035	Feb 138.1316	Mar 134.5552	Apr 128.9280	May 124.4264	Jun 119.5597	Jul 117.5500	Aug 121.1094	Sep 124.8832	Oct 130.0105	Nov 135.7300	Dec 140.6107 (44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)										Total = Sum(45)m =		2153.9058
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)

Water storage loss:

Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)

If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Total per year (kWh/year) = Sum(64)m =												2471.2368 (64)

Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9496	18.6072	15.1324	11.4562	8.5637	7.2298	7.8121	10.1544	13.6292	17.3054	20.1980	21.5319 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	476.3796	474.3164	458.9952	429.6158	401.4092	375.5659	360.0727	363.1413	377.6589	403.8515	435.8647	463.8333 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	7.8700		9.9768		0.2400		0.0000		0.7700		14.5100 (81)	
Solar gains	14.5100	30.3070	57.0633	95.5887	125.3089	136.7484	124.8513	98.9531	71.4475	39.5864	18.7644	12.7561 (83)
Total gains	490.8897	504.6234	516.0584	525.2044	526.7181	512.3143	484.9240	462.0944	449.1064	443.4379	454.6291	476.5893 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	168.9464	169.6229	168.9464	171.6855	170.9924	175.2368	175.9648	175.9648	175.2368	172.3842	172.3842	171.6855
alpha	12.2631	12.3082	12.2631	12.4457	12.3995	12.6825	12.7310	12.7310	12.6825	12.4923	12.4923	12.4457
util living area	0.9536	0.9262	0.8589	0.6946	0.5108	0.3375	0.2499	0.2760	0.4563	0.7160	0.8970	0.9626 (86)
MIT	20.9081	20.9406	20.9769	20.9981	21.0000	21.0000	21.0000	21.0000	21.0000	20.9977	20.9664	20.8965 (87)
Th 2	20.4882	20.4902	20.4882	20.4960	20.4941	20.5058	20.5077	20.5077	20.5058	20.4980	20.4980	20.4960 (88)
util rest of house	0.9418	0.9097	0.8344	0.6642	0.4793	0.3066	0.2175	0.2421	0.4211	0.6807	0.8744	0.9527 (89)
MIT 2	20.3923	20.4308	20.4671	20.4946	20.4940	20.5058	20.5077	20.5077	20.5058	20.4964	20.4668	20.3863 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.5832	20.6195	20.6558	20.6809	20.6813	20.6887	20.6899	20.6899	20.6887	20.6819	20.6518	20.5752 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.5832	20.6195	20.6558	20.6809	20.6813	20.6887	20.6899	20.6899	20.6887	20.6819	20.6518	20.5752 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9442	0.9142	0.8426	0.6754	0.4910	0.3180	0.2295	0.2546	0.4341	0.6937	0.8816	0.9544 (94)
Useful gains	463.4860	461.3064	434.8548	354.7152	258.6053	162.9413	111.2862	117.6638	194.9585	307.6152	400.8181	454.8417 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	514.2347	493.5353	446.8987	355.6161	258.6247	162.9413	111.2862	117.6638	194.9613	308.6373	418.3255	512.3035 (97)
Space heating kWh	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516 (98a)
Space heating requirement - total per year (kWh/year)												125.1561
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												125.1561
Space heating per m2												(98c) / (4) = 2.0186 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2													0.0000 (213)

Water heating
Water heating requirement

Full SAP Calculation Printout



Efficiency of water heater	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.7893	12.7893 (231)
Pumps and Fa	18.3371	14.7107	13.2453	9.7041	7.4957	6.1241	6.8378	8.8881	11.5448	15.1473	17.1089	18.8467 (232)
Lighting	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Annual totals kWh/year												
Space heating fuel - main system 1												125.1561 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764
Water heating fuel used												726.6710 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												150.5841 (230a)
Total electricity for the above, kWh/year												150.5841 (231)
Electricity for lighting (calculated in Appendix L)												147.9906 (232)

Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1150.4018 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	125.1561	28.4300	35.5819 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	28.4300	206.5926 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111 (249)
Energy for lighting	147.9906	28.4300	42.0737 (250)
Additional standing charges			0.0000 (251)
Total energy cost			327.0592 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	125.1561	0.1603	20.0606 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			122.6741 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	147.9906	0.1443	21.3596 (268)
Total CO2, kg/year			164.9215 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	125.1561	1.5933	199.4085 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1305.5179 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	147.9906	1.5338	226.9929 (282)
Total Primary energy kWh/year			1760.3145 (286)

SAP 10 EPC IMPROVEMENTS

Plot 1

Current energy efficiency rating: B 89
Current environmental impact rating: A 98

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £327	Potential £327	Saving £0
Space heating	£78	£78	£0
Water heating	£207	£207	£0
Lighting	£42	£42	£0
Total cost of fuels	£327	£327	£0
Total cost of uses	£327	£327	£0
Delivered energy	19 kWh/m ²	19 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	28 kWh/m ²	28 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure Test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		2.8200 (17)
Infiltration rate		0.1410 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1093 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1393	0.1366	0.1339	0.1202	0.1175	0.1038	0.1038	0.1011	0.1093	0.1175	0.1229	0.1284 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												72.0000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2793	0.2766	0.2739	0.2602	0.2575	0.2438	0.2438	0.2411	0.2493	0.2575	0.2629	0.2684 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			62.0000	0.1100	6.8200	75.0000	4650.0000 (28a)

Full SAP Calculation Printout



External Wall	22.2100	7.8700	14.3400	0.1900	2.7246	150.0000	2150.9999	(29a)					
Total net area of external elements Aum(A, m2)			84.2100					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.6454			(33)					
Main dwelling													
Corridor			44.1500	0.0000	0.0000	180.0000	7947.0003	(32)					
Party Wall			11.7100	0.0000	0.0000	180.0000	2107.8000	(32)					
Party Ceiling 1			62.0000			40.0000	2480.0000	(32b)					
Internal Wall 1			96.0200			9.0000	864.1800	(32c)					
Heat capacity Cm = Sum(A x k)													
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				(28)...(30) + (32) + (32a)...(32e) =			20199.9801	(34)					
List of Thermal Bridges							325.8061	(35)					
K1 Element					Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)					4.7700	0.0340	0.1622						
E3 Sill					4.7700	0.0260	0.1240						
E4 Jamb					9.9000	0.0300	0.2970						
E5 Ground floor (normal)					9.3700	0.0810	0.7590						
E18 Party wall between dwellings					4.7400	0.0290	0.1375						
E7 Party floor between dwellings (in blocks of flats)					9.3700	-0.0180	-0.1687						
P1 Party wall - Ground floor					23.5700	0.1600	3.7712						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					23.5700	0.0000	0.0000						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.0822	(36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	20.7275	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	13.5446	13.4121	13.2796	12.6173	12.4848	11.8225	11.8225	11.6900	12.0874	12.4848	12.7497	13.0147	(38)
Average = Sum(39)m / 12 =	34.2721	34.1396	34.0072	33.3448	33.2123	32.5500	32.5500	32.4175	32.8149	33.2123	33.4773	33.7422	(39)
												33.3117	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	0.5528	0.5506	0.5485	0.5378	0.5357	0.5250	0.5250	0.5229	0.5293	0.5357	0.5400	0.5442	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	(42a)	
Hot water usage for baths													
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)	
Hot water usage for other uses													
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)	
Average daily hot water use (litres/day)												129.6745 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)	
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Energy content (annual)										Total = Sum(45)m =		2153.9058	
Distribution loss (46)m = 0.15 x (45)m													
33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)	
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)	
Electric shower(s)													
										Total per year (kWh/year) = Sum(64)m =		2471.2368	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9496	18.6072	15.1324	11.4562	8.5637	7.2298	7.8121	10.1544	13.6292	17.3054	20.1980	21.5319 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	476.3796	474.3164	458.9952	429.6158	401.4092	375.5659	360.0727	363.1413	377.6589	403.8515	435.8647	463.8333 (73)

6. Solar gains

Full SAP Calculation Printout



[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northwest				7.8700	11.2829	0.2400		0.0000		0.7700		16.4096 (81)
Solar gains	16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009 (83)
Total gains	492.7893	507.7187	519.1755	528.4491	534.2607	517.1996	492.5682	468.7681	450.9896	444.6717	456.5123	477.2342 (84)

7. Mean internal temperature (heating season)												

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	163.7223	164.3575	164.9978	168.2752	168.9464	172.3842	172.3842	173.0886	170.9924	168.9464	167.6093	166.2933
alpha	11.9148	11.9572	11.9999	12.2183	12.2631	12.4923	12.4923	12.5392	12.3995	12.2631	12.1740	12.0862
util living area	0.9727	0.9540	0.8971	0.7566	0.5778	0.4028	0.2908	0.3181	0.5020	0.7687	0.9326	0.9779 (86)
MIT	20.8578	20.9002	20.9582	20.9944	20.9998	21.0000	21.0000	21.0000	21.0000	20.9945	20.9394	20.8467 (87)
Th 2	20.4727	20.4746	20.4766	20.4863	20.4882	20.4980	20.4980	20.4999	20.4941	20.4882	20.4843	20.4805 (88)
util rest of house	0.9650	0.9423	0.8762	0.7267	0.5462	0.3712	0.2576	0.2835	0.4652	0.7338	0.9152	0.9715 (89)
MIT 2	20.3182	20.3701	20.4365	20.4818	20.4881	20.4980	20.4980	20.4999	20.4941	20.4840	20.4248	20.3121 (90)
Living area fraction	fLA = Living area / (4) = 0.3702 (91)											
MIT	20.5180	20.5663	20.6296	20.6715	20.6775	20.6838	20.6838	20.6850	20.6813	20.6730	20.6153	20.5100 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.5180	20.5663	20.6296	20.6715	20.6775	20.6838	20.6838	20.6850	20.6813	20.6730	20.6153	20.5100 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9657	0.9445	0.8826	0.7376	0.5579	0.3829	0.2699	0.2963	0.4788	0.7465	0.9199	0.9719 (94)
Useful gains	475.9033	479.5453	458.2227	389.7977	298.0599	198.0269	132.9277	138.9101	215.9535	331.9599	419.9453	463.8365 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	555.8236	534.8411	480.5085	392.5196	298.1631	198.0277	132.9277	138.9101	215.9657	334.5475	452.4547	550.3348 (97)
Space heating kWh	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547 (98a)
Space heating requirement - total per year (kWh/year)	204.9233											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	204.9233											
Space heating per m2	(98c) / (4) = 3.3052 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP												

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	59.4607	37.1587	16.5806	1.9598	0.0768	0.0000	0.0000	0.0000	0.0000	1.9252	23.4068	64.3547 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)
Lighting	18.3371	14.7107	13.2453	9.7041	7.4957	6.1241	6.8378	8.8881	11.5448	15.1473	17.1089	18.8467 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												

Full SAP Calculation Printout



(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												204.9233	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												150.5841	(230a)
Total electricity for the above, kWh/year												150.5841	(231)
Electricity for lighting (calculated in Appendix L)												147.9906	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1230.1690	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	204.9233	16.4900	33.7919	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	16.4900	119.8280	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313	(249)
Energy for lighting	147.9906	16.4900	24.4036	(250)
Additional standing charges			0.0000	(251)
Total energy cost			202.8549	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.6825	(257)
SAP value		88.9366	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	204.9233	0.1598	32.7508	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			135.3642	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	147.9906	0.1443	21.3596	(268)
Total CO2, kg/year			177.6117	(272)
CO2 emissions per m2			2.8600	(273)
EI value			97.7757	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.0000	2.3700	146.9400	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000			
Dwelling volume			146.9400	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)

Full SAP Calculation Printout



Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.8200 (17)
Infiltration rate 0.1410 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1093 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1175	0.1147	0.1175	0.1065	0.1093	0.0929	0.0902	0.0902	0.0929	0.1038	0.1038	0.1065	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.2575	0.2547	0.2575	0.2465	0.2493	0.2329	0.2302	0.2302	0.2329	0.2438	0.2438	0.2465	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			7.8700	0.7752	6.1008			(27)
Heatloss Floor 1			62.0000	0.1100	6.8200	75.0000	4650.0000	(28a)
External Wall	22.2100	7.8700	14.3400	0.1900	2.7246	150.0000	2150.9999	(29a)
Total net area of external elements Aum(A, m2)			84.2100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	15.6454		(33)
Main dwelling								
Corridor			44.1500	0.0000	0.0000	180.0000	7947.0003	(32)
Party Wall			11.7100	0.0000	0.0000	180.0000	2107.8000	(32)
Party Ceiling 1			62.0000			40.0000	2480.0000	(32b)
Internal Wall 1			96.0200			9.0000	864.1800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 20199.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 325.8061 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	4.7700	0.0340	0.1622
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240
E3 Sill	9.9000	0.0300	0.2970
E4 Jamb	9.3700	0.0810	0.7590
E5 Ground floor (normal)	4.7400	0.0290	0.1375
E18 Party wall between dwellings	9.3700	-0.0180	-0.1687
E7 Party floor between dwellings (in blocks of flats)	23.5700	0.1600	3.7712
P1 Party wall - Ground floor	23.5700	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.0822 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 20.7275 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.4848	12.3523	12.4848	11.9549	12.0874	11.2926	11.1601	11.1601	11.2926	11.8225	11.8225	11.9549	(38)
Heat transfer coeff	33.2123	33.0799	33.2123	32.6825	32.8149	32.0201	31.8877	31.8877	32.0201	32.5500	32.5500	32.6825	(39)
Average = Sum(39)m / 12 =												32.5500	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.5357	0.5335	0.5357	0.5271	0.5293	0.5165	0.5143	0.5143	0.5165	0.5250	0.5250	0.5271	(40)
HLP (average)												0.5250	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0376 (42)

Hot water usage for mixer showers 80.2768 79.0704 77.3124 73.9489 71.4666 68.6985 67.1251 68.8697 70.7822 73.7544 77.1902 79.9692 (42a)

Hot water usage for baths 25.2299 24.8552 24.3275 23.3546 22.6261 21.8183 21.3820 21.9060 22.4765 23.3408 24.3338 25.1446 (42b)

Hot water usage for other uses 35.4969 34.2061 32.9153 31.6245 30.3337 29.0429 29.0429 30.3337 31.6245 32.9153 34.2061 35.4969 (42c)

Average daily hot water use (litres/day) 129.6745 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Energy content (annual)										Total = Sum(45)m =		2153.9058	
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)

Full SAP Calculation Printout



FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
	Total per year (kWh/year) = Sum(64)m =											2471.2368 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9496	18.6072	15.1324	11.4562	8.5637	7.2298	7.8121	10.1544	13.6292	17.3054	20.1980	21.5319	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924	(72)
Total internal gains	476.3796	474.3164	458.9952	429.6158	401.4092	375.5659	360.0727	363.1413	377.6589	403.8515	435.8647	463.8333	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

Northwest					7.8700	9.9768	0.2400	0.0000			0.7700	14.5100 (81)	

Solar gains	14.5100	30.3070	57.0633	95.5887	125.3089	136.7484	124.8513	98.9531	71.4475	39.5864	18.7644	12.7561	(83)
Total gains	490.8897	504.6234	516.0584	525.2044	526.7181	512.3143	484.9240	462.0944	449.1064	443.4379	454.6291	476.5893	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	168.9464	169.6229	168.9464	171.6855	170.9924	175.2368	175.9648	175.9648	175.2368	172.3842	172.3842	171.6855
alpha	12.2631	12.3082	12.2631	12.4457	12.3995	12.6825	12.7310	12.7310	12.6825	12.4923	12.4923	12.4457
util living area	0.9536	0.9262	0.8589	0.6946	0.5108	0.3375	0.2499	0.2760	0.4563	0.7160	0.8970	0.9626 (86)
MIT	20.9081	20.9406	20.9769	20.9981	21.0000	21.0000	21.0000	21.0000	21.0000	20.9977	20.9664	20.8965 (87)
Th 2	20.4882	20.4902	20.4882	20.4960	20.4941	20.5058	20.5077	20.5077	20.5058	20.4980	20.4980	20.4960 (88)
util rest of house	0.9418	0.9097	0.8344	0.6642	0.4793	0.3066	0.2175	0.2421	0.4211	0.6807	0.8744	0.9527 (89)
MIT 2	20.3923	20.4308	20.4671	20.4946	20.4940	20.5058	20.5077	20.5077	20.5058	20.4964	20.4668	20.3863 (90)
Living area fraction	20.5832	20.6195	20.6558	20.6809	20.6813	20.6887	20.6899	20.6899	20.6887	20.6819	20.6518	20.5752 (91)
MIT	20.5832	20.6195	20.6558	20.6809	20.6813	20.6887	20.6899	20.6899	20.6887	20.6819	20.6518	20.5752 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5832	20.6195	20.6558	20.6809	20.6813	20.6887	20.6899	20.6899	20.6887	20.6819	20.6518	20.5752 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	463.4860	461.3064	434.8548	354.7152	258.6053	162.9413	111.2862	117.6638	194.9585	307.6152	400.8181	454.8417	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	514.2347	493.5353	446.8987	355.6161	258.6247	162.9413	111.2862	117.6638	194.9613	308.6373	418.3255	512.3035	(97)
Space heating kWh	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516	(98a)
Space heating requirement - total per year (kWh/year)												125.1561	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												125.1561	
Space heating per m2												(98c) / (4) =	2.0186 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)	
Fraction of space heat from main system(s)												1.0000 (202)	
Fraction of main heating from main system 2												0.0000 (203)	
Fraction of total heating from main system 1												1.0000 (204)	
Fraction of total heating from main system 2												0.0000 (205)	
Efficiency of main space heating system 1 (in %)												100.0000 (206)	
Efficiency of main space heating system 2 (in %)												0.0000 (207)	
Efficiency of secondary/supplementary heating system, %												0.0000 (208)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516	(98)
Space heating efficiency (main heating system 1)													

Full SAP Calculation Printout



100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	37.7571	21.6578	8.9607	0.6487	0.0145	0.0000	0.0000	0.0000	0.0000	0.7605	12.6053	42.7516 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2											0.0000	(213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater												340.0764 (216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)
Lighting	18.3371	14.7107	13.2453	9.7041	7.4957	6.1241	6.8378	8.8881	11.5448	15.1473	17.1089	18.8467 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												125.1561 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764
Water heating fuel used												726.6710 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												150.5841 (230a)
Total electricity for the above, kWh/year												150.5841 (231)
Electricity for lighting (calculated in Appendix L)												147.9906 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1150.4018 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	125.1561	28.4300	35.5819	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	28.4300	206.5926	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111	(249)
Energy for lighting	147.9906	28.4300	42.0737	(250)
Additional standing charges			0.0000	(251)
Total energy cost			327.0592	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	125.1561	0.1603	20.0606	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			122.6741	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	147.9906	0.1443	21.3596	(268)
Total CO2, kg/year			164.9215	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	125.1561	1.5933	199.4085	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	1.5222	1106.1095	(278)
Space and water heating			1305.5179	(279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036	(281)
Energy for lighting	147.9906	1.5338	226.9929	(282)
Total Primary energy kWh/year			1760.3145	(286)

Full SAP Calculation Printout



Property Reference	Plot 2			Issued on Date	27/08/2025
Assessment Reference	Plot 2	Prop Type Ref			
Property	Flat 2, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.26	TER	11.79
Environmental	98 A	% DER < TER			72.35
CO ₂ Emissions (t/year)	0.14	DFEE	19.17	TFEE	22.29
Compliance Check	See BREL	% DFEE < TFEE			13.99
% DPER < TPER	44.55	DPER	34.59	TPER	62.37
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling				
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(4)
Dwelling volume			118.5000 (5)	(3a)+(3b)+(3c)+(3d)+(3e)...(3n)

2. Ventilation rate

	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7900	(17)
Infiltration rate	0.1895	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1469 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1872	0.1836	0.1799	0.1615	0.1579	0.1395	0.1395	0.1358	0.1469	0.1579	0.1652	0.1726	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.3272	0.3236	0.3199	0.3015	0.2979	0.2795	0.2795	0.2758	0.2869	0.2979	0.3052	0.3126	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
Window			5.2500	0.7752	4.0698			(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000	(28a)
External Wall	14.1500	5.2500	8.9000	0.1900	1.6910	150.0000	1334.9999	(29a)
Total net area of external elements Aum(A, m ²)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	11.2608			(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999	(32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001	(32)
Party Ceiling 1			50.0000			30.0000	1500.0000	(32b)
Internal Wall			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16867.6799	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							337.3536	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	6.6000	0.0300	0.1980	
E5 Ground floor (normal)	5.9700	0.0810	0.4836	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
P1 Party wall - Ground floor	22.6000	0.1600	3.6160	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.5184 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		15.7791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7971	12.6535	12.5099	11.7921	11.6485	10.9306	10.9306	10.7870	11.2178	11.6485	11.9356	12.2228 (38)
Average = Sum(39)m / 12 =	28.5762	28.4327	28.2891	27.5712	27.4276	26.7097	26.7097	26.5662	26.9969	27.4276	27.7148	28.0019 (39)
												27.5353
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5715	0.5687	0.5658	0.5514	0.5486	0.5342	0.5342	0.5313	0.5399	0.5486	0.5543	0.5600 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	87.2647	96.6145	87.2647	90.1735	87.2647	90.1735	87.2647	87.2647	90.1735	87.2647	90.1735	87.2647 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	372.6894	381.3374	363.7261	348.6115	329.3712	316.2845	302.9582	304.5650	315.0120	327.2578	349.9249	364.9247 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
Northwest	5.2500											
Solar gains	10.9467	22.2823	40.1457	65.9308	88.6239	94.4824	88.3864	70.4627	48.9182	27.2308	13.7738	8.9396 (83)
Total gains	383.6361	403.6198	403.8718	414.5423	417.9951	410.7669	391.3445	375.0277	363.9301	354.4886	363.6987	373.8643 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	163.9637	164.7917	165.6281	169.9406	170.8302	175.4216	175.4216	176.3697	173.5558	170.8302	169.0602	167.3266	
alpha	11.9309	11.9861	12.0419	12.3294	12.3887	12.6948	12.6948	12.7580	12.5704	12.3887	12.2707	12.1551	
util living area	0.9846	0.9675	0.9303	0.7933	0.6097	0.4162	0.3003	0.3259	0.5118	0.7934	0.9483	0.9868 (86)	
MIT	20.8178	20.8768	20.9368	20.9913	20.9996	21.0000	21.0000	21.0000	21.0000	20.9927	20.9259	20.8138 (87)	
Th 2	20.4557	20.4583	20.4609	20.4739	20.4765	20.4896	20.4896	20.4922	20.4844	20.4765	20.4713	20.4661 (88)	
util rest of house	0.9796	0.9580	0.9126	0.7625	0.5756	0.3830	0.2655	0.2899	0.4736	0.7576	0.9330	0.9824 (89)	
MIT 2	20.2539	20.3274	20.3989	20.4668	20.4763	20.4896	20.4896	20.4922	20.4843	20.4710	20.3977	20.2585 (90)	
Living area fraction									fLA = Living area / (4) =				0.4460 (91)
MIT	20.5054	20.5724	20.6388	20.7007	20.7097	20.7172	20.7172	20.7187	20.7143	20.7037	20.6333	20.5062 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.5054	20.5724	20.6388	20.7007	20.7097	20.7172	20.7172	20.7187	20.7143	20.7037	20.6333	20.5062 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9801	0.9602	0.9188	0.7760	0.5908	0.3978	0.2810	0.3059	0.4906	0.7734	0.9380	0.9828 (94)	
Useful gains	375.9991	387.5655	371.0639	321.6833	246.9636	163.3888	109.9702	114.7307	178.5540	274.1462	341.1667	367.4375 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	463.0900	445.6090	399.9735	325.3605	247.1139	163.3896	109.9702	114.7308	178.5658	277.1194	375.0721	456.6045 (97)	
Space heating kWh	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (98a)	
Space heating requirement - total per year (kWh/year)												221.0331	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												221.0331	
Space heating per m2										(98c) / (4) =		4.4207 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)	
Lighting	15.8509	12.7162	11.4495	8.3884	6.4794	5.2938	5.9108	7.6830	9.9795	13.0937	14.7893	16.2915 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												221.0331 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490 (219)	
Space cooling fuel												0.0000 (221)	
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)	

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	127.9259	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1125.9468	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	221.0331	0.1596	35.2872 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			127.8345 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	127.9259	0.1443	18.4637 (268)
Total CO2, kg/year			163.1432 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.2600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	221.0331	1.5909	351.6510 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1349.4152 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	127.9259	1.5338	196.2171 (282)
Total Primary energy kWh/year			1729.3449 (286)
Dwelling Primary energy Rate (DPER)			34.5900 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume			118.5000 (4)
		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings		NetArea		U-value		A x U		K-value		A x K	
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		kJ/K	
TER Opening Type					5.2500		1.1450		6.0115				(27)	
Heatloss Floor 1					50.0000		0.1300		6.5000				(28a)	
External Wall	14.1500		5.2500		8.9000		0.1800		1.6020				(29a)	
Total net area of external elements Aum(A, m2)					64.1500								(31)	
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =		14.1135						(33)	
Main dwelling														
Corridor					22.1400		0.0000		0.0000				(32)	
Party Wall					31.4300		0.0000		0.0000				(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K														347.3536 (35)
List of Thermal Bridges														
K1 Element									Length	Psi-value	Total			
E2 Other lintels (including other steel lintels)									3.1800	0.0500	0.1590			
E3 Sill									3.1800	0.0500	0.1590			
E4 Jamb									6.6000	0.0500	0.3300			
E5 Ground floor (normal)									5.9700	0.1600	0.9552			
E18 Party wall between dwellings									4.7400	0.0600	0.2844			
E7 Party floor between dwellings (in blocks of flats)									5.9700	0.0700	0.4179			
P1 Party wall - Ground floor									22.6000	0.0800	1.8080			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)									22.6000	0.0000	0.0000			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														4.1135 (36)
Point Thermal bridges														(36a) = 0.0000
Total fabric heat loss														(33) + (36) + (36a) = 18.2270 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)	
	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960		
Heat transfer coeff	41.1275	40.9975	40.8700	40.2715	40.1595	39.6382	39.6382	39.5416	39.8390	40.1595	40.3861	40.6229	(39)	
Average = Sum(39)m / 12 =													40.2710	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)	
	0.8225	0.8199	0.8174	0.8054	0.8032	0.7928	0.7928	0.7908	0.7968	0.8032	0.8077	0.8125		
HLP (average)													0.8054	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)														

Assumed occupancy													1.6901 (42)	
Hot water usage for mixer showers														
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)		
Hot water usage for baths														
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)		
Hot water usage for other uses														
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)		
Average daily hot water use (litres/day)													98.5597 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Energy content (annual)														
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 1637.0557	
	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)	
Temperature factor from Table 2b													0.5400 (49)	
Enter (49) or (54) in (55)													0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 1962.4258 (64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)	
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)														

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.8689	93.9620	84.8689	87.6978	84.8689	87.6978	84.8689	84.8689	87.6978	84.8689	87.6978	84.8689	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)	
Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)	
Total internal gains	409.4458	418.1092	401.3945	387.7603	369.5214	354.3334	341.7570	342.9147	352.7425	366.9827	388.0828	401.8924	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Northwest	5.2500				11.2829		0.6300		0.7000	0.7700	18.1031 (81)
Solar gains	18.1031	36.8494	66.3909	109.0330	146.5618	156.2503	146.1690	116.5276	80.8984	45.0329	14.7839 (83)
Total gains	427.5489	454.9586	467.7855	496.7933	516.0831	510.5838	487.9260	459.4423	433.6409	412.0156	416.6763 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	117.3025	117.6744	118.0414	119.7958	120.1299	121.7098	121.7098	122.0070	121.0963	120.1299	119.4560	118.7595
alpha	8.8202	8.8450	8.8694	8.9864	9.0087	9.1140	9.1140	9.1338	9.0731	9.0087	8.9637	8.9173
util living area	0.9942	0.9881	0.9714	0.8909	0.7124	0.4964	0.3574	0.3958	0.6302	0.9061	0.9829	0.9952 (86)
MIT	20.5504	20.6383	20.7624	20.9231	20.9900	20.9996	21.0000	21.0000	20.9972	20.9236	20.7288	20.5393 (87)
Th 2	20.2338	20.2361	20.2383	20.2486	20.2506	20.2596	20.2596	20.2613	20.2561	20.2506	20.2466	20.2425 (88)
util rest of house	0.9918	0.9835	0.9604	0.8584	0.6596	0.4392	0.2973	0.3323	0.5642	0.8704	0.9754	0.9932 (89)
MIT 2	19.7241	19.8364	19.9908	20.1811	20.2440	20.2595	20.2596	20.2613	20.2548	20.1866	19.9591	19.7176 (90)
Living area fraction	20.0926	20.1940	20.3349	20.5120	20.5767	20.5896	20.5898	20.5907	20.5859	20.5153	20.3024	20.0841 (92)
MIT	20.0926	20.1940	20.3349	20.5120	20.5767	20.5896	20.5898	20.5907	20.5859	20.5153	20.3024	20.0841 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0926	20.1940	20.3349	20.5120	20.5767	20.5896	20.5898	20.5907	20.5859	20.5153	20.3024	20.0841 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9913	0.9832	0.9620	0.8705	0.6829	0.4648	0.3241	0.3607	0.5937	0.8840	0.9760	0.9927 (94)
Useful gains	423.8324	447.3191	450.0161	432.4817	352.4500	237.2973	158.1453	165.6988	257.4343	364.2408	401.0124	413.6486 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	649.5115	627.0169	565.4341	467.6330	356.4834	237.4157	158.1490	165.7083	258.3917	398.1941	533.1920	645.2578 (97)
Space heating kWh	167.9053	120.7569	85.8709	25.3089	3.0009	0.0000	0.0000	0.0000	0.0000	25.2613	95.1694	172.3172 (98a)
Space heating requirement - total per year (kWh/year)												695.5908
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	167.9053	120.7569	85.8709	25.3089	3.0009	0.0000	0.0000	0.0000	0.0000	25.2613	95.1694	172.3172 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												695.5908
Space heating per m2										(98c) / (4) =		13.9118 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	167.9053	120.7569	85.8709	25.3089	3.0009	0.0000	0.0000	0.0000	0.0000	25.2613	95.1694	172.3172 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	181.9125	130.8309	93.0346	27.4203	3.2512	0.0000	0.0000	0.0000	0.0000	27.3687	103.1087	186.6926 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater (217)m	83.7561	83.3034	82.4867	80.9159	79.9524	79.8000	79.8000	79.8000	79.8000	80.9007	82.7905	79.8000 (216)
Fuel for water heating, kWh/month	229.6882	204.3812	219.8345	198.5914	195.8492	177.9421	176.5248	182.9609	184.3137	201.3743	207.5825	227.1787 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.6341	14.1467	12.7375	9.3321	7.2084	5.8893	6.5757	8.5474	11.1022	14.5666	16.4530	18.1242 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2498	-25.2264	-37.6017	-43.9058	-48.7826	-46.0908	-45.5700	-42.3396	-36.8350	-29.6149	-19.2998	-14.8125 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.1535	-15.2910	-30.8382	-46.9613	-62.7065	-63.1981	-62.4115	-52.5234	-38.1080	-22.0297	-9.6062	-5.6355 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	753.6195 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2406.2215 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	142.3171 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2564.3663 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	753.6195	0.2100	158.2601 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2406.2215	0.2100	505.3065 (264)
Space and water heating			663.5666 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	142.3171	0.1443	20.5408 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.3289	0.1338	-54.5002
PV Unit electricity exported	-416.4629	0.1255	-52.2694
Total			-106.7697 (269)
Total CO2, kg/year			589.2670 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	753.6195	1.1300	851.5901 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2406.2215	1.1300	2719.0303 (278)
Space and water heating			3570.6203 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	142.3171	1.5338	218.2907 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.3289	1.4945	-608.7343
PV Unit electricity exported	-416.4629	0.4607	-191.8576
Total			-800.5919 (283)
Total Primary energy kWh/year			3118.4199 (286)
Target Primary Energy Rate (TPER)			62.3700 (287)

Full SAP Calculation Printout



Property Reference	Plot 2			Issued on Date	27/08/2025
Assessment Reference	Plot 2	Prop Type Ref			
Property	Flat 2, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.26	TER	11.79
Environmental	98 A	% DER < TER			72.35
CO ₂ Emissions (t/year)	0.14	DFEE	19.17	TFEE	22.29
Compliance Check	See BREL	% DFEE < TFEE			13.99
% DPER < TPER	44.55	DPER	34.59	TPER	62.37
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7900 (17)
Infiltration rate	0.3583 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3540	0.3471	0.3401	0.3054	0.2985	0.2638	0.2638	0.2568	0.2777	0.2985	0.3124	0.3263 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5627	0.5602	0.5578	0.5466	0.5445	0.5348	0.5348	0.5330	0.5385	0.5445	0.5488	0.5532 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.2500	0.7752	4.0698		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	14.1500	5.2500	8.9000	0.1900	1.6910	150.0000	1334.9999 (29a)
Total net area of external elements Aum(A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	11.2608		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17367.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							347.3536 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				6.6000	0.0300	0.1980	

Full SAP Calculation Printout



E5 Ground floor (normal)	5.9700	0.0810	0.4836
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075
P1 Party wall - Ground floor	22.6000	0.1600	3.6160
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.5184 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	15.7791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.0030	21.9079	21.8146	21.3765	21.2945	20.9130	20.9130	20.8423	21.0599	21.2945	21.4604	21.6337 (38)
Average = Sum(39)m / 12 =	37.7822	37.6870	37.5937	37.1556	37.0737	36.6921	36.6921	36.6214	36.8391	37.0737	37.2395	37.4129 (39)
												37.1553
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7556	0.7537	0.7519	0.7431	0.7415	0.7338	0.7338	0.7324	0.7368	0.7415	0.7448	0.7483 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.7244 (42b)
Hot water usage for other uses												31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss (46)m = 0.15 x (45)m												832.1197
Water storage loss:												
Total storage loss												0.0000 (46)
If cylinder contains dedicated solar storage												0.0000 (56)
Primary loss												0.0000 (57)
Combi loss												0.0000 (59)
Total heat required for water heating calculated for each month												0.0000 (61)
WWHRS	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (64)
12Total per year (kWh/year)												707.3017 (64)
Electric shower(s)												707 (64)
Heat gains from water heating, kWh/month	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)
												478.7637 (64a)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	87.2647	96.6145	87.2647	90.1735	87.2647	90.1735	87.2647	87.2647	90.1735	87.2647	90.1735	87.2647 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
	321.7198	331.6188	316.9079	308.8047	293.6926	284.9712	274.6301	274.2445	282.2879	289.6701	305.6469	314.9081 (73)

6. Solar gains

[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northwest	5.2500	11.2829	0.2400	0.0000	0.7700	10.9467 (81)						
Solar gains	10.9467	22.2823	40.1457	65.9308	88.6239	94.4824	88.3864	70.4627	48.9182	27.2308	13.7738	8.9396 (83)
Total gains	332.6665	353.9011	357.0536	374.7354	382.3165	379.4536	363.0165	344.7072	331.2060	316.9009	319.4207	323.8477 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



tau	127.6886	128.0111	128.3287	129.8418	130.1289	131.4821	131.4821	131.7358	130.9575	130.1289	129.5494	128.9491
alpha	9.5126	9.5341	9.5552	9.6561	9.6753	9.7655	9.7655	9.7824	9.7305	9.6753	9.6366	9.5966
util living area	0.9989	0.9976	0.9939	0.9665	0.8531	0.6167	0.4446	0.4885	0.7530	0.9695	0.9963	0.9992 (86)
MIT	20.4820	20.5598	20.6698	20.8481	20.9676	20.9986	20.9999	20.9999	20.9917	20.8639	20.6536	20.4705 (87)
Th 2	20.2919	20.2936	20.2952	20.3029	20.3043	20.3110	20.3110	20.3123	20.3085	20.3043	20.3014	20.2984 (88)
util rest of house	0.9985	0.9965	0.9910	0.9516	0.8063	0.5515	0.3751	0.4156	0.6846	0.9529	0.9945	0.9988 (89)
MIT 2	19.8200	19.8989	20.0093	20.1863	20.2857	20.3105	20.3110	20.3122	20.3050	20.2039	19.9992	19.8142 (90)
Living area fraction									FLA = Living area / (4) =			0.4460 (91)
MIT	20.1153	20.1937	20.3039	20.4815	20.5898	20.6174	20.6183	20.6189	20.6113	20.4982	20.2911	20.1069 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1153	20.1937	20.3039	20.4815	20.5898	20.6174	20.6183	20.6189	20.6113	20.4982	20.2911	20.1069 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9983	0.9963	0.9911	0.9559	0.8265	0.5806	0.4061	0.4481	0.7153	0.9583	0.9944	0.9987 (94)
Useful gains	332.1041	352.5874	353.8644	358.2211	315.9768	220.3232	147.4260	154.4699	236.9124	303.6793	317.6370	323.4174 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	597.5351	576.3723	518.9398	430.3178	329.5790	220.7909	147.4392	154.5031	239.8697	366.9644	491.2286	595.1228 (97)
Space heating kWh	197.4807	150.3834	122.8161	51.9096	10.1200	0.0000	0.0000	0.0000	0.0000	47.0841	124.9860	202.1488 (98a)
Space heating requirement - total per year (kWh/year)												906.9287
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	197.4807	150.3834	122.8161	51.9096	10.1200	0.0000	0.0000	0.0000	0.0000	47.0841	124.9860	202.1488 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												906.9287
Space heating per m2										(98c) / (4) =		18.1386 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	344.9058	271.5216	278.3230	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9610	0.9901	0.9826	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	331.4457	268.8390	273.4798	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	402.6001	385.4578	365.8436	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	51.2312	86.7644	68.7187	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	12.8078	21.6911	17.1797	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												51.6786 (107)
Energy for space heating												18.1386 (99)
Energy for space cooling												1.0336 (108)
Total												19.1721 (109)
Fabric Energy Efficiency (DFEE)												19.2 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.2500	1.1450	6.0115			(27)
Heatloss Floor 1			50.0000	0.1300	6.5000			(28a)
External Wall	14.1500	5.2500	8.9000	0.1800	1.6020			(29a)
Total net area of external elements Aum(A, m2)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 14.1135			(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000			(32)
Party Wall			31.4300	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							347.3536	(35)

List of Thermal Bridges													
K1 Element							Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)							3.1800	0.0500	0.1590				
E3 Sill							3.1800	0.0500	0.1590				
E4 Jamb							6.6000	0.0500	0.3300				
E5 Ground floor (normal)							5.9700	0.1600	0.9552				
E18 Party wall between dwellings							4.7400	0.0600	0.2844				
E7 Party floor between dwellings (in blocks of flats)							5.9700	0.0700	0.4179				
P1 Party wall - Ground floor							22.6000	0.0800	1.8080				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							22.6000	0.0000	0.0000				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												4.1135	(36)
Point Thermal bridges												0.0000	(36a) =
Total fabric heat loss												18.2270	(33) + (36) + (36a) = (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Heat transfer coeff	41.1275	40.9975	40.8700	40.2715	40.1595	39.6382	39.6382	39.5416	39.8390	40.1595	40.3861	40.6229	(39)
Average = Sum(39)m / 12 =												40.2710	
HLP	0.8225	0.8199	0.8174	0.8054	0.8032	0.7928	0.7928	0.7908	0.7968	0.8032	0.8077	0.8125	(40)
HLP (average)												0.8054	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													0.0000 (42a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Hot water usage for baths													22.7244 (42b)
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476		
Hot water usage for other uses													31.9383 (42c)
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383		(43)
Average daily hot water use (litres/day)													50.1040
Daily hot water use													
54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859		(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)													832.1197
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481		(64)
12Total per year (kWh/year)													707.3017 (64)
Electric shower(s)													707 (64)
42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893		(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												478.7637	(64a)
Heat gains from water heating, kWh/month													
28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844		(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.8689	93.9620	84.8689	87.6978	84.8689	87.6978	84.8689	84.8689	87.6978	84.8689	87.6978	84.8689 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
	319.3239	328.9662	314.5120	306.3290	291.2967	282.4955	272.2342	271.8487	279.8121	287.2742	303.1712	312.5122 (73)

6. Solar gains

[Jan]													
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	

Northwest				5.2500	11.2829	0.6300		0.7000		0.7700		18.1031 (81)	

Solar gains	18.1031	36.8494	66.3909	109.0330	146.5618	156.2503	146.1690	116.5276	80.8984	45.0329	22.7784	14.7839 (83)	
Total gains	337.4270	365.8156	380.9030	415.3620	437.8585	438.7458	418.4032	388.3763	360.7105	332.3071	325.9496	327.2961 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	117.3025	117.6744	118.0414	119.7958	120.1299	121.7098	121.7098	122.0070	121.0963	120.1299	119.4560	118.7595
util living area	8.8202	8.8450	8.8694	8.9864	9.0087	9.1140	9.1140	9.1338	9.0731	9.0087	8.9637	8.9173
	0.9990	0.9976	0.9928	0.9559	0.8154	0.5765	0.4168	0.4681	0.7456	0.9710	0.9968	0.9993 (86)
MIT	20.3993	20.4929	20.6314	20.8446	20.9717	20.9987	20.9999	20.9998	20.9898	20.8364	20.5930	20.3886 (87)
Th 2	20.2338	20.2361	20.2383	20.2486	20.2506	20.2596	20.2596	20.2613	20.2561	20.2506	20.2466	20.2425 (88)
util rest of house	0.9986	0.9965	0.9895	0.9372	0.7635	0.5108	0.3467	0.3931	0.6732	0.9546	0.9951	0.9989 (89)
MIT 2	19.6870	19.7821	19.9210	20.1320	20.2349	20.2592	20.2596	20.2613	20.2520	20.1294	19.8910	19.6839 (90)
Living area fraction	20.0047	20.0991	20.2378	20.4498	20.5635	20.5890	20.5898	20.5907	20.5810	20.4447	20.2041	19.9982 (92)
MIT	20.0047	20.0991	20.2378	20.4498	20.5635	20.5890	20.5898	20.5907	20.5810	20.4447	20.2041	19.9982 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0047	20.0991	20.2378	20.4498	20.5635	20.5890	20.5898	20.5907	20.5810	20.4447	20.2041	19.9982 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9984	0.9963	0.9895	0.9428	0.7860	0.5402	0.3779	0.4266	0.7057	0.9596	0.9950	0.9988 (94)
Ext temp.	336.9012	364.4495	376.8936	391.6177	344.1629	236.9897	158.1342	165.6659	254.5383	318.8655	324.3116	326.8999 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	645.8945	623.1254	561.4655	465.1284	355.9535	237.3943	158.1481	165.7056	258.1970	395.3589	529.2226	641.7699 (97)
Space heating requirement - total per year (kWh/year)	229.8910	173.8302	137.3215	52.9277	8.7722	0.0000	0.0000	0.0000	0.0000	56.9111	147.5359	234.2633 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	229.8910	173.8302	137.3215	52.9277	8.7722	0.0000	0.0000	0.0000	0.0000	56.9111	147.5359	234.2633 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1041.4529
Space heating per m2										(98c) / (4) =		20.8291 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9741	0.9932	0.9860	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	362.9351	291.3217	296.3161	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	474.5867	452.7694	419.3913	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	80.3891	120.1171	91.5680	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction												
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (104)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	20.0973	30.0293	22.8920	0.0000	0.0000	0.0000	0.0000 (105)
Space cooling requirement												73.0186 (107)
Energy for space heating												20.8291 (99)
Energy for space cooling												1.4604 (108)
Total												22.2894 (109)
Fabric Energy Efficiency (TFEE)												22.3 (109)

Full SAP Calculation Printout



Property Reference	Plot 2			Issued on Date	27/08/2025
Assessment Reference	Plot 2	Prop Type Ref			
Property	Flat 2, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.26	TER	11.79
Environmental	98 A	% DER < TER			72.35
CO ₂ Emissions (t/year)	0.14	DFEE	19.17	TFEE	22.29
Compliance Check	See BREL	% DFEE < TFEE			13.99
% DPER < TPER	44.55	DPER	34.59	TPER	62.37
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7900	(17)
Infiltration rate	0.1895	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1469 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1872	0.1836	0.1799	0.1615	0.1579	0.1395	0.1395	0.1358	0.1469	0.1579	0.1652	0.1726 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3272	0.3236	0.3199	0.3015	0.2979	0.2795	0.2795	0.2758	0.2869	0.2979	0.3052	0.3126 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.2500	0.7752	4.0698		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	14.1500	5.2500	8.9000	0.1900	1.6910	150.0000	1334.9999 (29a)
Total net area of external elements Aum(A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.2608		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16867.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							337.3536 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	6.6000	0.0300	0.1980	
E5 Ground floor (normal)	5.9700	0.0810	0.4836	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
P1 Party wall - Ground floor	22.6000	0.1600	3.6160	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.5184 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		15.7791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7971	12.6535	12.5099	11.7921	11.6485	10.9306	10.9306	10.7870	11.2178	11.6485	11.9356	12.2228 (38)
Average = Sum(39)m / 12 =	28.5762	28.4327	28.2891	27.5712	27.4276	26.7097	26.7097	26.5662	26.9969	27.4276	27.7148	28.0019 (39)
												27.5353
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5715	0.5687	0.5658	0.5514	0.5486	0.5342	0.5342	0.5313	0.5399	0.5486	0.5543	0.5600 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	71.9889	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	126.5748	(44)
Energy content	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1938.9067	
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	29.7278	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377	(64)
Electric shower(s)												2256	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month													
66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	87.2647	96.6145	87.2647	90.1735	87.2647	90.1735	87.2647	87.2647	90.1735	87.2647	90.1735	87.2647	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains													
	372.6894	381.3374	363.7261	348.6115	329.3712	316.2845	302.9582	304.5650	315.0120	327.2578	349.9249	364.9247	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northwest				5.2500	11.2829	0.2400	0.0000	0.7700	10.9467 (81)			
Solar gains	10.9467	22.2823	40.1457	65.9308	88.6239	94.4824	88.3864	70.4627	48.9182	27.2308	13.7738	8.9396 (83)
Total gains	383.6361	403.6198	403.8718	414.5423	417.9951	410.7669	391.3445	375.0277	363.9301	354.4886	363.6987	373.8643 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	163.9637	164.7917	165.6281	169.9406	170.8302	175.4216	175.4216	176.3697	173.5558	170.8302	169.0602	167.3266	
alpha	11.9309	11.9861	12.0419	12.3294	12.3887	12.6948	12.6948	12.7580	12.5704	12.3887	12.2707	12.1551	
util living area	0.9846	0.9675	0.9303	0.7933	0.6097	0.4162	0.3003	0.3259	0.5118	0.7934	0.9483	0.9868 (86)	
MIT	20.8178	20.8768	20.9368	20.9913	20.9996	21.0000	21.0000	21.0000	21.0000	20.9927	20.9259	20.8138 (87)	
Th 2	20.4557	20.4583	20.4609	20.4739	20.4765	20.4896	20.4896	20.4922	20.4844	20.4765	20.4713	20.4661 (88)	
util rest of house	0.9796	0.9580	0.9126	0.7625	0.5756	0.3830	0.2655	0.2899	0.4736	0.7576	0.9330	0.9824 (89)	
MIT 2	20.2539	20.3274	20.3989	20.4668	20.4763	20.4896	20.4896	20.4922	20.4843	20.4710	20.3977	20.2585 (90)	
Living area fraction									fLA = Living area / (4) =				0.4460 (91)
MIT	20.5054	20.5724	20.6388	20.7007	20.7097	20.7172	20.7172	20.7187	20.7143	20.7037	20.6333	20.5062 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.5054	20.5724	20.6388	20.7007	20.7097	20.7172	20.7172	20.7187	20.7143	20.7037	20.6333	20.5062 (93)	

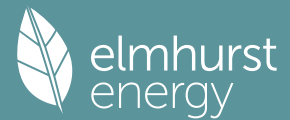
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9801	0.9602	0.9188	0.7760	0.5908	0.3978	0.2810	0.3059	0.4906	0.7734	0.9380	0.9828 (94)	
Useful gains	375.9991	387.5655	371.0639	321.6833	246.9636	163.3888	109.9702	114.7307	178.5540	274.1462	341.1667	367.4375 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	463.0900	445.6090	399.9735	325.3605	247.1139	163.3896	109.9702	114.7308	178.5658	277.1194	375.0721	456.6045 (97)	
Space heating kWh	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (98a)	
Space heating requirement - total per year (kWh/year)												221.0331	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												221.0331	
Space heating per m2										(98c) / (4) =		4.4207 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	64.7956	39.0052	21.5087	2.6476	0.1118	0.0000	0.0000	0.0000	0.0000	2.2120	24.4119	66.3403 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)	
Lighting	15.8509	12.7162	11.4495	8.3884	6.4794	5.2938	5.9108	7.6830	9.9795	13.0937	14.7893	16.2915 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												221.0331 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490 (219)	
Space cooling fuel												0.0000 (221)	
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)	

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	127.9259	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1125.9468	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	221.0331	0.1596	35.2872 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			127.8345 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	127.9259	0.1443	18.4637 (268)
Total CO2, kg/year			163.1432 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.2600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	221.0331	1.5909	351.6510 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1349.4152 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	127.9259	1.5338	196.2171 (282)
Total Primary energy kWh/year			1729.3449 (286)
Dwelling Primary energy Rate (DPER)			34.5900 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings		NetArea		U-value		A x U		K-value		A x K	
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		kJ/K	
TER Opening Type					5.2500		1.1450		6.0115				(27)	
Heatloss Floor 1					50.0000		0.1300		6.5000				(28a)	
External Wall	14.1500		5.2500		8.9000		0.1800		1.6020				(29a)	
Total net area of external elements Aum(A, m2)					64.1500								(31)	
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =		14.1135						(33)	
Main dwelling														
Corridor					22.1400		0.0000		0.0000				(32)	
Party Wall					31.4300		0.0000		0.0000				(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													347.3536 (35)	
List of Thermal Bridges														
K1 Element									Length	Psi-value	Total			
E2 Other lintels (including other steel lintels)									3.1800	0.0500	0.1590			
E3 Sill									3.1800	0.0500	0.1590			
E4 Jamb									6.6000	0.0500	0.3300			
E5 Ground floor (normal)									5.9700	0.1600	0.9552			
E18 Party wall between dwellings									4.7400	0.0600	0.2844			
E7 Party floor between dwellings (in blocks of flats)									5.9700	0.0700	0.4179			
P1 Party wall - Ground floor									22.6000	0.0800	1.8080			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)									22.6000	0.0000	0.0000			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													4.1135 (36)	
Point Thermal bridges													(36a) = 0.0000	
Total fabric heat loss													(33) + (36) + (36a) = 18.2270 (37)	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)	
	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960		
Heat transfer coeff	41.1275	40.9975	40.8700	40.2715	40.1595	39.6382	39.6382	39.5416	39.8390	40.1595	40.3861	40.6229	(39)	
Average = Sum(39)m / 12 =													40.2710	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)	
	0.8225	0.8199	0.8174	0.8054	0.8032	0.7928	0.7928	0.7908	0.7968	0.8032	0.8077	0.8125		
HLP (average)													0.8054	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)														

Assumed occupancy													1.6901 (42)	
Hot water usage for mixer showers														
	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)	
Hot water usage for baths														
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses														
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)													98.5597 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Energy content (annual)											Total = Sum(45)m =	1637.0557		
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)	
Temperature factor from Table 2b													0.5400 (49)	
Enter (49) or (54) in (55)													0.7527 (55)	
Total storage loss														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
										Total per year (kWh/year) = Sum(64)m =		1962.4258 (64)		
12Total per year (kWh/year)														
Electric shower(s)													1962 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)	
Heat gains from water heating, kWh/month														
	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)														

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)	
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	84.8689	93.9620	84.8689	87.6978	84.8689	87.6978	84.8689	84.8689	87.6978	84.8689	87.6978	84.8689	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)	
Water heating gains (Table 5)														
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)	
Total internal gains	409.4458	418.1092	401.3945	387.7603	369.5214	354.3334	341.7570	342.9147	352.7425	366.9827	388.0828	401.8924	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Northwest	5.2500				11.2829		0.6300		0.7000	0.7700	18.1031 (81)
Solar gains	18.1031	36.8494	66.3909	109.0330	146.5618	156.2503	146.1690	116.5276	80.8984	45.0329	14.7839 (83)
Total gains	427.5489	454.9586	467.7855	496.7933	516.0831	510.5838	487.9260	459.4423	433.6409	412.0156	416.6763 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	117.3025	117.6744	118.0414	119.7958	120.1299	121.7098	121.7098	122.0070	121.0963	120.1299	119.4560	118.7595
alpha	8.8202	8.8450	8.8694	8.9864	9.0087	9.1140	9.1140	9.1338	9.0731	9.0087	8.9637	8.9173
util living area	0.9942	0.9881	0.9714	0.8909	0.7124	0.4964	0.3574	0.3958	0.6302	0.9061	0.9829	0.9952 (86)
MIT	20.5504	20.6383	20.7624	20.9231	20.9900	20.9996	21.0000	21.0000	20.9972	20.9236	20.7288	20.5393 (87)
Th 2	20.2338	20.2361	20.2383	20.2486	20.2506	20.2596	20.2596	20.2613	20.2561	20.2506	20.2466	20.2425 (88)
util rest of house	0.9918	0.9835	0.9604	0.8584	0.6596	0.4392	0.2973	0.3323	0.5642	0.8704	0.9754	0.9932 (89)
MIT 2	19.7241	19.8364	19.9908	20.1811	20.2440	20.2595	20.2596	20.2613	20.2548	20.1866	19.9591	19.7176 (90)
Living area fraction	20.0926	20.1940	20.3349	20.5120	20.5767	20.5896	20.5898	20.5907	20.5859	20.5153	20.3024	20.0841 (92)
MIT	20.0926	20.1940	20.3349	20.5120	20.5767	20.5896	20.5898	20.5907	20.5859	20.5153	20.3024	20.0841 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0926	20.1940	20.3349	20.5120	20.5767	20.5896	20.5898	20.5907	20.5859	20.5153	20.3024	20.0841 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9913	0.9832	0.9620	0.8705	0.6829	0.4648	0.3241	0.3607	0.5937	0.8840	0.9760	0.9927 (94)
Useful gains	423.8324	447.3191	450.0161	432.4817	352.4500	237.2973	158.1453	165.6988	257.4343	364.2408	401.0124	413.6486 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	649.5115	627.0169	565.4341	467.6330	356.4834	237.4157	158.1490	165.7083	258.3917	398.1941	533.1920	645.2578 (97)
Space heating kWh	167.9053	120.7569	85.8709	25.3089	3.0009	0.0000	0.0000	0.0000	0.0000	25.2613	95.1694	172.3172 (98a)
Space heating requirement - total per year (kWh/year)												695.5908
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	167.9053	120.7569	85.8709	25.3089	3.0009	0.0000	0.0000	0.0000	0.0000	25.2613	95.1694	172.3172 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												695.5908
Space heating per m2										(98c) / (4) =		13.9118 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	167.9053	120.7569	85.8709	25.3089	3.0009	0.0000	0.0000	0.0000	0.0000	25.2613	95.1694	172.3172 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	181.9125	130.8309	93.0346	27.4203	3.2512	0.0000	0.0000	0.0000	0.0000	27.3687	103.1087	186.6926 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater (217)m	83.7561	83.3034	82.4867	80.9159	79.9524	79.8000	79.8000	79.8000	79.8000	80.9007	82.7905	79.8000 (216)
Fuel for water heating, kWh/month	229.6882	204.3812	219.8345	198.5914	195.8492	177.9421	176.5248	182.9609	184.3137	201.3743	207.5825	227.1787 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.6341	14.1467	12.7375	9.3321	7.2084	5.8893	6.5757	8.5474	11.1022	14.5666	16.4530	18.1242 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2498	-25.2264	-37.6017	-43.9058	-48.7826	-46.0908	-45.5700	-42.3396	-36.8350	-29.6149	-19.2998	-14.8125 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.1535	-15.2910	-30.8382	-46.9613	-62.7065	-63.1981	-62.4115	-52.5234	-38.1080	-22.0297	-9.6062	-5.6355 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	753.6195 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2406.2215 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	142.3171 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2564.3663 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	753.6195	0.2100	158.2601 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2406.2215	0.2100	505.3065 (264)
Space and water heating			663.5666 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	142.3171	0.1443	20.5408 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.3289	0.1338	-54.5002
PV Unit electricity exported	-416.4629	0.1255	-52.2694
Total			-106.7697 (269)
Total CO2, kg/year			589.2670 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	753.6195	1.1300	851.5901 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2406.2215	1.1300	2719.0303 (278)
Space and water heating			3570.6203 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	142.3171	1.5338	218.2907 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.3289	1.4945	-608.7343
PV Unit electricity exported	-416.4629	0.4607	-191.8576
Total			-800.5919 (283)
Total Primary energy kWh/year			3118.4199 (286)
Target Primary Energy Rate (TPER)			62.3700 (287)

Full SAP Calculation Printout



Property Reference	Plot 2			Issued on Date	27/08/2025
Assessment Reference	Plot 2	Prop Type Ref			
Property	Flat 2, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.26	TER	11.79
Environmental	98 A	% DER < TER			72.35
CO ₂ Emissions (t/year)	0.14	DFEE	19.17	TFEE	22.29
Compliance Check	See BREL	% DFEE < TFEE			13.99
% DPER < TPER	44.55	DPER	34.59	TPER	62.37
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7900 (17)
Infiltration rate	0.1895 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1469 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1872	0.1836	0.1799	0.1615	0.1579	0.1395	0.1395	0.1358	0.1469	0.1579	0.1652	0.1726 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3272	0.3236	0.3199	0.3015	0.2979	0.2795	0.2795	0.2758	0.2869	0.2979	0.3052	0.3126 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.2500	0.7752	4.0698		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	14.1500	5.2500	8.9000	0.1900	1.6910	150.0000	1334.9999 (29a)
Total net area of external elements Aum(A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.2608		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17367.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							347.3536 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	6.6000	0.0300	0.1980	
E5 Ground floor (normal)	5.9700	0.0810	0.4836	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
P1 Party wall - Ground floor	22.6000	0.1600	3.6160	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.5184 (36)
Point Thermal bridges				0.0000
Total fabric heat loss			(33) + (36) + (36a) =	15.7791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7971	12.6535	12.5099	11.7921	11.6485	10.9306	10.9306	10.7870	11.2178	11.6485	11.9356	12.2228 (38)
Average = Sum(39)m / 12 =	28.5762	28.4327	28.2891	27.5712	27.4276	26.7097	26.7097	26.5662	26.9969	27.4276	27.7148	28.0019 (39)
												27.5353
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5715	0.5687	0.5658	0.5514	0.5486	0.5342	0.5342	0.5313	0.5399	0.5486	0.5543	0.5600 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
								Total per year (kWh/year) = Sum(64)m =				2256.2377 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
	18.1092	16.0845	13.0808	9.9030	7.4026	6.2496	6.7529	8.7777	11.7814	14.9592	17.4595	18.6126 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	408.3334	406.3593	393.1978	367.9596	344.0317	322.0936	308.9797	311.8588	324.2970	346.6664	374.0211	397.8722 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.2500											10.9467 (81)
Solar gains	10.9467	22.2823	40.1457	65.9308	88.6239	94.4824	88.3864	70.4627	48.9182	27.2308	13.7738	8.9396 (83)
Total gains	419.2801	428.6417	433.3435	433.8903	432.6556	416.5761	397.3661	382.3215	373.2151	373.8972	387.7949	406.8119 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	168.8240	169.6765	170.5377	174.9781	175.8940	180.6216	180.6216	181.5977	178.7004	175.8940	174.0716	172.2865	21.0000 (85)
alpha	12.2549	12.3118	12.3692	12.6652	12.7263	13.0414	13.0414	13.1065	12.9134	12.7263	12.6048	12.4858	
util living area	0.9697	0.9514	0.8973	0.7623	0.5893	0.4103	0.2958	0.3196	0.4991	0.7570	0.9234	0.9743	(86)
MIT	20.8740	20.9109	20.9619	20.9949	20.9998	21.0000	21.0000	21.0000	21.0000	20.9960	20.9515	20.8677	(87)
Th 2	20.4557	20.4583	20.4609	20.4739	20.4765	20.4896	20.4896	20.4922	20.4844	20.4765	20.4713	20.4661	(88)
util rest of house	0.9609	0.9386	0.8753	0.7314	0.5562	0.3776	0.2614	0.2844	0.4618	0.7212	0.9037	0.9667	(89)
MIT 2	20.3212	20.3666	20.4251	20.4699	20.4764	20.4896	20.4896	20.4922	20.4843	20.4737	20.4251	20.3235	(90)
Living area fraction									fLA = Living area / (4) =			0.4460	(91)
MIT	20.5678	20.6094	20.6645	20.7041	20.7098	20.7172	20.7172	20.7187	20.7143	20.7066	20.6599	20.5662	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.5678	20.6094	20.6645	20.7041	20.7098	20.7172	20.7172	20.7187	20.7143	20.7066	20.6599	20.5662	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9629	0.9424	0.8839	0.7451	0.5710	0.3922	0.2767	0.3001	0.4784	0.7371	0.9111	0.9683	(94)
Useful gains	403.7107	403.9593	383.0479	323.2788	247.0327	163.3891	109.9702	114.7308	178.5592	275.5838	353.3149	393.8996	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	464.8714	446.6594	400.7009	325.4521	247.1178	163.3896	109.9702	114.7308	178.5661	277.2011	375.8086	458.2858	(97)
Space heating kWh	45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033	(98a)
Space heating requirement - total per year (kWh/year)												154.2620	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												154.2620	
Space heating per m2										(98c) / (4) =		3.0852	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater													344.1753 (216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.8509	12.7162	11.4495	8.3884	6.4794	5.2938	5.9108	7.6830	9.9795	13.0937	14.7893	16.2915	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													154.2620 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													121.4388 (230a)
Total electricity for the above, kWh/year													121.4388 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	127.9259	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1059.1756	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price £/year p/kWh	Fuel cost £/year	
Space heating - main system 1	154.2620	16.4900	25.4378	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	127.9259	16.4900	21.0950	(250)
Additional standing charges			0.0000	(251)
Total energy cost			174.6581	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.6619	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	89.2712	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	154.2620	0.1599	24.6672	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			117.2144	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	127.9259	0.1443	18.4637	(268)
Total CO2, kg/year			152.5232	(272)
CO2 emissions per m2			3.0500	(273)
EI value			97.8486	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	(1b) x 2.3700 (2b)	= 118.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000	

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.7900	(17)
Infiltration rate		0.1895	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1469	(21)

Full SAP Calculation Printout



Wind speed	Jan 4.3000	Feb 4.2000	Mar 4.3000	Apr 3.9000	May 4.0000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.4000	Oct 3.8000	Nov 3.8000	Dec 3.9000 (22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1579	0.1542	0.1579	0.1432	0.1469	0.1248	0.1212	0.1212	0.1248	0.1395	0.1395	0.1432 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2979	0.2942	0.2979	0.2832	0.2869	0.2648	0.2612	0.2612	0.2648	0.2795	0.2795	0.2832 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.2500	0.7752	4.0698			(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000	(28a)
External Wall	14.1500	5.2500	8.9000	0.1900	1.6910	150.0000	1334.9999	(29a)
Total net area of external elements Aum(A, m2)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.2608			(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999	(32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001	(32)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 17367.6799 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 347.3536 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	6.6000	0.0300	0.1980	
E5 Ground floor (normal)	5.9700	0.0810	0.4836	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
P1 Party wall - Ground floor	22.6000	0.1600	3.6160	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.5184 (36)
Point Thermal Bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	15.7791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 11.6485	Feb 11.5049	Mar 11.6485	Apr 11.0742	May 11.2178	Jun 10.3563	Jul 10.2127	Aug 10.2127	Sep 10.3563	Oct 10.9306	Nov 10.9306	Dec 11.0742 (38)
Heat transfer coeff	27.4276	27.2840	27.4276	26.8533	26.9969	26.1354	25.9919	25.9919	26.1354	26.7097	26.7097	26.8533 (39)
Average = Sum(39)m / 12 =												26.7097

HLP	Jan 0.5486	Feb 0.5457	Mar 0.5486	Apr 0.5371	May 0.5399	Jun 0.5227	Jul 0.5198	Aug 0.5198	Sep 0.5227	Oct 0.5342	Nov 0.5342	Dec 0.5371 (40)
HLP (average)												0.5342
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths												
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses												
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)												116.7306 (43)

Daily hot water use	Jan 126.9285	Feb 124.3436	Mar 121.1244	Apr 116.0589	May 112.0068	Jun 107.6259	Jul 105.8165	Aug 109.0204	Sep 112.4173	Oct 117.0328	Nov 122.1814	Dec 126.5748 (44)
Energy conte (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)												Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m												
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)

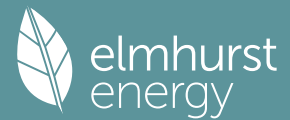
Water storage loss:

Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)

If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month												
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Total per year (kWh/year) = Sum(64)m =												2256.2377 (64)

Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1092	16.0845	13.0808	9.9030	7.4026	6.2496	6.7529	8.7777	11.7814	14.9592	17.4595	18.6126 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	408.3334	406.3593	393.1978	367.9596	344.0317	322.0936	308.9797	311.8588	324.2970	346.6664	374.0211	397.8722 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.2500		9.9768		0.2400		0.0000		0.7700		9.6795 (81)	
Solar gains	9.6795	20.2175	38.0664	63.7663	83.5923	91.2235	83.2870	66.0107	47.6619	26.4077	12.5176	8.5094 (83)
Total gains	418.0129	426.5768	431.2641	431.7258	427.6240	413.3172	392.2668	377.8695	371.9589	373.0741	386.5386	406.3817 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	175.8940	176.8196	175.8940	179.6558	178.7004	184.5906	185.6102	185.6102	184.5906	180.6216	180.6216	179.6558
alpha	12.7263	12.7880	12.7263	12.9771	12.9134	13.3060	13.3740	13.3740	13.3060	13.0414	13.0414	12.9771
util living area	0.9451	0.9170	0.8532	0.6947	0.5176	0.3415	0.2518	0.2751	0.4497	0.6995	0.8788	0.9536 (86)
MIT	20.9266	20.9530	20.9811	20.9985	21.0000	21.0000	21.0000	21.0000	21.0000	20.9986	20.9769	20.9197 (87)
Th 2	20.4765	20.4791	20.4765	20.4870	20.4844	20.5001	20.5027	20.5027	20.5001	20.4896	20.4896	20.4870 (88)
util rest of house	0.9312	0.8986	0.8274	0.6636	0.4851	0.3098	0.2188	0.2409	0.4146	0.6640	0.8537	0.9413 (89)
MIT 2	20.4019	20.4334	20.4598	20.4859	20.4843	20.5001	20.5027	20.5027	20.5001	20.4886	20.4690	20.4041 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.6359	20.6651	20.6923	20.7145	20.7143	20.7230	20.7245	20.7245	20.7230	20.7161	20.6956	20.6341 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.6359	20.6651	20.6923	20.7145	20.7143	20.7230	20.7245	20.7245	20.7230	20.7161	20.6956	20.6341 (93)

8. Space heating requirement

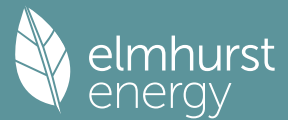
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9357	0.9055	0.8383	0.6774	0.4996	0.3239	0.2335	0.2562	0.4302	0.6798	0.8642	0.9451 (94)
Useful gains	391.1380	386.2590	361.5289	292.4698	213.6479	133.8927	91.6079	96.8063	160.0269	253.6267	334.0399	384.0708 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	426.1138	408.3096	370.0614	293.0904	213.6616	133.8927	91.6079	96.8063	160.0281	254.1723	344.4369	422.5118 (97)
Space heating kWh	26.0220	14.8180	6.3481	0.4468	0.0102	0.0000	0.0000	0.0000	0.0000	0.4060	7.4858	28.6001 (98a)
Space heating requirement - total per year (kWh/year)												84.1370
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	26.0220	14.8180	6.3481	0.4468	0.0102	0.0000	0.0000	0.0000	0.0000	0.4060	7.4858	28.6001 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												84.1370
Space heating per m2												(98c) / (4) = 1.6827 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	26.0220	14.8180	6.3481	0.4468	0.0102	0.0000	0.0000	0.0000	0.0000	0.4060	7.4858	28.6001 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	26.0220	14.8180	6.3481	0.4468	0.0102	0.0000	0.0000	0.0000	0.0000	0.4060	7.4858	28.6001 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2													0.0000 (213)

Water heating
Water heating requirement

Full SAP Calculation Printout



Efficiency of water heater	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.8509	12.7162	11.4495	8.3884	6.4794	5.2938	5.9108	7.6830	9.9795	13.0937	14.7893	16.2915	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												84.1370	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												127.9259	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												989.0507	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	84.1370	28.4300	23.9201 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	127.9259	28.4300	36.3693 (250)
Additional standing charges			0.0000 (251)
Total energy cost			281.1871 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	84.1370	0.1604	13.4964 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			106.0436 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	127.9259	0.1443	18.4637 (268)
Total CO2, kg/year			141.3523 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	84.1370	1.5937	134.0930 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1131.8571 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	127.9259	1.5338	196.2171 (282)
Total Primary energy kWh/year			1511.7868 (286)

SAP 10 EPC IMPROVEMENTS

Plot 2

Current energy efficiency rating: B 89
Current environmental impact rating: A 98

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £281	Potential £281	Saving £0
Space heating	£58	£58	£0
Water heating	£186	£186	£0
Lighting	£36	£36	£0
Total cost of fuels	£281	£281	£0
Total cost of uses	£280	£280	£0
Delivered energy	20 kWh/m ²	20 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	30 kWh/m ²	30 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure Test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7900	(17)
Infiltration rate	0.1895	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1469 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1872	0.1836	0.1799	0.1615	0.1579	0.1395	0.1395	0.1358	0.1469	0.1579	0.1652	0.1726 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												72.0000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3272	0.3236	0.3199	0.3015	0.2979	0.2795	0.2795	0.2758	0.2869	0.2979	0.3052	0.3126 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.2500	0.7752	4.0698		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)

Full SAP Calculation Printout



External Wall	14.1500	5.2500	8.9000	0.1900	1.6910	150.0000	1334.9999 (29a)
Total net area of external elements Aum(A, m2)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.2608		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
(28)...(30) + (32) + (32a)...(32e) = 17367.6799 (34)
347.3536 (35)

List of Thermal Bridges							
K1 Element			Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)			3.1800	0.0340	0.1081		
E3 Sill			3.1800	0.0260	0.0827		
E4 Jamb			6.6000	0.0300	0.1980		
E5 Ground floor (normal)			5.9700	0.0810	0.4836		
E18 Party wall between dwellings			4.7400	0.0290	0.1375		
E7 Party floor between dwellings (in blocks of flats)			5.9700	-0.0180	-0.1075		
P1 Party wall - Ground floor			22.6000	0.1600	3.6160		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			22.6000	0.0000	0.0000		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						4.5184 (36)	
Point Thermal bridges						0.0000	
Total fabric heat loss					(33) + (36) + (36a) =	15.7791 (37)	

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7971	12.6535	12.5099	11.7921	11.6485	10.9306	10.9306	10.7870	11.2178	11.6485	11.9356	12.2228 (38)
Average = Sum(39)m / 12 =	28.5762	28.4327	28.2891	27.5712	27.4276	26.7097	26.7097	26.5662	26.9969	27.4276	27.7148	28.0019 (39)
												27.5353
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5715	0.5687	0.5658	0.5514	0.5486	0.5342	0.5342	0.5313	0.5399	0.5486	0.5543	0.5600 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)	
Hot water usage for baths												
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)	
Hot water usage for other uses												
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)	
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)												Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m												
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)	
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)	
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h												
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)	
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
18.1092	16.0845	13.0808	9.9030	7.4026	6.2496	6.7529	8.7777	11.7814	14.9592	17.4595	18.6126 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)	
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)	
Losses e.g. evaporation (negative values) (Table 5)												
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)	
Water heating gains (Table 5)												
89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)	
Total internal gains												
408.3334	406.3593	393.1978	367.9596	344.0317	322.0936	308.9797	311.8588	324.2970	346.6664	374.0211	397.8722 (73)	

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W		
Northwest		5.2500				11.2829		0.2400		0.0000		0.7700		10.9467 (81)	
Solar gains		10.9467	22.2823	40.1457	65.9308	88.6239	94.4824	88.3864	70.4627	48.9182	27.2308	13.7738	8.9396 (83)		
Total gains		419.2801	428.6417	433.3435	433.8903	432.6556	416.5761	397.3661	382.3215	373.2151	373.8972	387.7949	406.8119 (84)		
7. Mean internal temperature (heating season)															
Temperature during heating periods in the living area from Table 9, Th1 (C)															
Utilisation factor for gains for living area, nil,m (see Table 9a)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
tau	168.8240	169.6765	170.5377	174.9781	175.8940	180.6216	180.6216	181.5977	178.7004	175.8940	174.0716	172.2865			
alpha	12.2549	12.3118	12.3692	12.6652	12.7263	13.0414	13.0414	13.1065	12.9134	12.7263	12.6048	12.4858			
util living area		0.9697	0.9514	0.8973	0.7623	0.5893	0.4103	0.2958	0.3196	0.4991	0.7570	0.9234	0.9743 (86)		
MIT		20.8740	20.9109	20.9619	20.9949	20.9998	21.0000	21.0000	21.0000	21.0000	20.9960	20.9515	20.8677 (87)		
Th 2		20.4557	20.4583	20.4609	20.4739	20.4765	20.4896	20.4896	20.4922	20.4844	20.4765	20.4713	20.4661 (88)		
util rest of house		0.9609	0.9386	0.8753	0.7314	0.5562	0.3776	0.2614	0.2844	0.4618	0.7212	0.9037	0.9667 (89)		
MIT 2		20.3212	20.3666	20.4251	20.4699	20.4764	20.4896	20.4896	20.4922	20.4843	20.4737	20.4251	20.3235 (90)		
Living area fraction		fLA = Living area / (4) =													
MIT		20.5678	20.6094	20.6645	20.7041	20.7098	20.7172	20.7172	20.7187	20.7143	20.7066	20.6599	20.5662 (92)		
Temperature adjustment		0.0000													
adjusted MIT		20.5678	20.6094	20.6645	20.7041	20.7098	20.7172	20.7172	20.7187	20.7143	20.7066	20.6599	20.5662 (93)		
8. Space heating requirement															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Utilisation	0.9629	0.9424	0.8839	0.7451	0.5710	0.3922	0.2767	0.3001	0.4784	0.7371	0.9111	0.9683	(94)		
Useful gains	403.7107	403.9593	383.0479	323.2788	247.0327	163.3891	109.9702	114.7308	178.5592	275.5838	353.3149	393.8996	(95)		
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)		
Heat loss rate W		464.8714	446.6594	400.7009	325.4521	247.1178	163.3896	109.9702	114.7308	178.5661	277.2011	375.8086	458.2858 (97)		
Space heating kWh		45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033 (98a)		
Space heating requirement - total per year (kWh/year)		154.2620													
Solar heating kWh		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)		
Solar heating contribution - total per year (kWh/year)		0.0000													
Space heating kWh		45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033 (98c)		
Space heating requirement after solar contribution - total per year (kWh/year)		154.2620													
Space heating per m2		(98c) / (4) =											3.0852 (99)		
9a. Energy requirements - Individual heating systems, including micro-CHP															
Fraction of space heat from secondary/supplementary system (Table 11)															
Fraction of space heat from main system(s)															
Fraction of main heating from main system 2															
Fraction of total heating from main system 1															
Fraction of total heating from main system 2															
Efficiency of main space heating system 1 (in %)															
Efficiency of main space heating system 2 (in %)															
Efficiency of secondary/supplementary heating system, %															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement		45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033 (98)		
Space heating efficiency (main heating system 1)		100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)		
Space heating fuel (main heating system)		45.5036	28.6945	13.1338	1.5648	0.0633	0.0000	0.0000	0.0000	0.0000	1.2032	16.1955	47.9033 (211)		
Space heating efficiency (main heating system 2)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)		
Space heating fuel (main heating system 2)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)		
Space heating fuel (secondary)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)		
Space heating fuel used, main system 2		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)		
Water heating															
Water heating requirement		227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)		
Efficiency of water heater (217)m		344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)		
Fuel for water heating, kWh/month		66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)		
Space cooling fuel requirement (221)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)		
Pumps and Fa		10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)		
Lighting		15.8509	12.7162	11.4495	8.3884	6.4794	5.2938	5.9108	7.6830	9.9795	13.0937	14.7893	16.2915 (232)		
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)		
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)		
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)		
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)		
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)		
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)		
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)		
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)															

Full SAP Calculation Printout



(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												154.2620	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												127.9259	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1059.1756	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	154.2620	16.4900	25.4378	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	127.9259	16.4900	21.0950	(250)
Additional standing charges			0.0000	(251)
Total energy cost			174.6581	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.6619	(257)
SAP value		89.2712	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	154.2620	0.1599	24.6672	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			117.2144	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	127.9259	0.1443	18.4637	(268)
Total CO2, kg/year			152.5232	(272)
CO2 emissions per m2			3.0500	(273)
EI value			97.8486	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

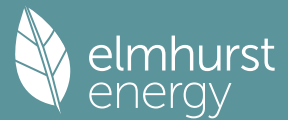
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	2.3700	118.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			
Dwelling volume			118.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)

Full SAP Calculation Printout



Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.7900 (17)
Infiltration rate 0.1895 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1469 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1579	0.1542	0.1579	0.1432	0.1469	0.1248	0.1212	0.1212	0.1248	0.1395	0.1395	0.1432 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2979	0.2942	0.2979	0.2832	0.2869	0.2648	0.2612	0.2612	0.2648	0.2795	0.2795	0.2832 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.2500	0.7752	4.0698		
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (27a)
External Wall	14.1500	5.2500	8.9000	0.1900	1.6910	150.0000	1334.9999 (28a)
Total net area of external elements Aum(A, m2)			64.1500				
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 11.2608		
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 17367.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 347.3536 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	3.1800	0.0340	0.1081
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827
E3 Sill	6.6000	0.0300	0.1980
E4 Jamb	5.9700	0.0810	0.4836
E5 Ground floor (normal)	4.7400	0.0290	0.1375
E18 Party wall between dwellings	5.9700	-0.0180	-0.1075
E7 Party floor between dwellings (in blocks of flats)	22.6000	0.1600	3.6160
P1 Party wall - Ground floor	22.6000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.5184 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 15.7791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	11.6485	11.5049	11.6485	11.0742	11.2178	10.3563	10.2127	10.2127	10.3563	10.9306	10.9306	11.0742 (38)
Heat transfer coeff	27.4276	27.2840	27.4276	26.8533	26.9969	26.1354	25.9919	25.9919	26.1354	26.7097	26.7097	26.8533 (39)
Average = Sum(39)m / 12 =												26.7097

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.5486	0.5457	0.5486	0.5371	0.5399	0.5227	0.5198	0.5198	0.5227	0.5342	0.5342	0.5371 (40)
HLP (average)												0.5342
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6901 (42)

Hot water usage for mixer showers 72.2658 71.1798 69.5972 66.5693 64.3348 61.8429 60.4265 61.9971 63.7187 66.3942 69.4872 71.9889 (42a)

Hot water usage for baths 22.7244 22.3869 21.9117 21.0354 20.3792 19.6517 19.2587 19.7306 20.2445 21.0230 21.9173 22.6476 (42b)

Hot water usage for other uses 31.9383 30.7769 29.6155 28.4541 27.2927 26.1314 26.1314 27.2927 28.4541 29.6155 30.7769 31.9383 (42c)

Average daily hot water use (litres/day) 116.7306 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)

Full SAP Calculation Printout



FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
	Total per year (kWh/year) = Sum(64)m =											2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1092	16.0845	13.0808	9.9030	7.4026	6.2496	6.7529	8.7777	11.7814	14.9592	17.4595	18.6126	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	408.3334	406.3593	393.1978	367.9596	344.0317	322.0936	308.9797	311.8588	324.2970	346.6664	374.0211	397.8722	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W

Northwest					5.2500	9.9768	0.2400	0.0000			0.7700	9.6795 (81)

Solar gains	9.6795	20.2175	38.0664	63.7663	83.5923	91.2235	83.2870	66.0107	47.6619	26.4077	12.5176	8.5094 (83)
Total gains	418.0129	426.5768	431.2641	431.7258	427.6240	413.3172	392.2668	377.8695	371.9589	373.0741	386.5386	406.3817 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	175.8940	176.8196	175.8940	179.6558	178.7004	184.5906	185.6102	185.6102	184.5906	180.6216	180.6216	179.6558
alpha	12.7263	12.7880	12.7263	12.9771	12.9134	13.3060	13.3740	13.3740	13.3060	13.0414	13.0414	12.9771
util living area	0.9451	0.9170	0.8532	0.6947	0.5176	0.3415	0.2518	0.2751	0.4497	0.6995	0.8788	0.9536 (86)
MIT	20.9266	20.9530	20.9811	20.9985	21.0000	21.0000	21.0000	21.0000	21.0000	20.9986	20.9769	20.9197 (87)
Th 2	20.4765	20.4791	20.4765	20.4870	20.4844	20.5001	20.5027	20.5027	20.5001	20.4896	20.4896	20.4870 (88)
util rest of house	0.9312	0.8986	0.8274	0.6636	0.4851	0.3098	0.2188	0.2409	0.4146	0.6640	0.8537	0.9413 (89)
MIT 2	20.4019	20.4334	20.4598	20.4859	20.4843	20.5001	20.5027	20.5027	20.5001	20.4886	20.4690	20.4041 (90)
Living area fraction	20.6359	20.6651	20.6923	20.7145	20.7143	20.7230	20.7245	20.7245	20.7230	20.7161	20.6956	20.6341 (91)
MIT	20.6359	20.6651	20.6923	20.7145	20.7143	20.7230	20.7245	20.7245	20.7230	20.7161	20.6956	20.6341 (92)
Temperature adjustment												0.0000
adjusted MIT	20.6359	20.6651	20.6923	20.7145	20.7143	20.7230	20.7245	20.7245	20.7230	20.7161	20.6956	20.6341 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	391.1380	386.2590	361.5289	292.4698	213.6479	133.8927	91.6079	96.8063	160.0269	253.6267	334.0399	384.0708 (95)	
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)	
Heat loss rate W	426.1138	408.3096	370.0614	293.0904	213.6616	133.8927	91.6079	96.8063	160.0281	254.1723	344.4369	422.5118 (97)	
Space heating kWh	26.0220	14.8180	6.3481	0.4468	0.0102	0.0000	0.0000	0.0000	0.0000	0.4060	7.4858	28.6001 (98a)	
Space heating requirement - total per year (kWh/year)												84.1370	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	26.0220	14.8180	6.3481	0.4468	0.0102	0.0000	0.0000	0.0000	0.0000	0.4060	7.4858	28.6001 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												84.1370	
Space heating per m2												1.6827 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	26.0220	14.8180	6.3481	0.4468	0.0102	0.0000	0.0000	0.0000	0.0000	0.4060	7.4858	28.6001 (98)
Space heating efficiency (main heating system 1)												

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	84.1370	1.5937	134.0930 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1131.8571 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	127.9259	1.5338	196.2171 (282)
Total Primary energy kWh/year			1511.7868 (286)

Full SAP Calculation Printout



Property Reference	Plot 3			Issued on Date	27/08/2025
Assessment Reference	Plot 3	Prop Type Ref			
Property	Flat 3, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	3.67	TER	11.77
Environmental	97 A	% DER < TER			68.82
CO ₂ Emissions (t/year)	0.2	DFEE	23.65	TFEE	29.47
Compliance Check	See BREL	% DFEE < TFEE			19.74
% DPER < TPER	38.00	DPER	38.46	TPER	62.03
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	67.0000 (1b)	2.3700 (2b)	158.7900 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		158.7900 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	158.7900 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7200 (17)
Infiltration rate	0.1860 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1442 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1838	0.1802	0.1766	0.1586	0.1550	0.1369	0.1369	0.1333	0.1442	0.1550	0.1622	0.1694 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3238	0.3202	0.3166	0.2986	0.2950	0.2769	0.2769	0.2733	0.2842	0.2950	0.3022	0.3094 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			67.0000	0.1100	7.3700	75.0000	5025.0000 (28a)
External Wall	46.3300	7.8700	38.4600	0.1900	7.3074	150.0000	5769.0003 (29a)
Total net area of external elements A _{um} (A, m ²)			113.3300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.7782		(33)
Main dwelling							
Corridor			14.2900	0.0000	0.0000	180.0000	2572.2000 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Ceiling 1			67.0000			30.0000	2010.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 19789.9801 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							295.3728 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

SAP 10 Online 2.22.2 Page 2 of 7

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.8551	131.4459	132.0422	135.1063	135.7363	138.9763	138.9763	139.6430	137.6619	135.7363	134.4821	133.2510
alpha	9.7237	9.7631	9.8028	10.0071	10.0491	10.2651	10.2651	10.3095	10.1775	10.0491	9.9655	9.8834
util living area	0.9925	0.9844	0.9650	0.8727	0.6923	0.4756	0.3436	0.3763	0.5954	0.8834	0.9772	0.9938 (86)
MIT	20.6502	20.7296	20.8282	20.9536	20.9952	20.9999	21.0000	21.0000	20.9991	20.9560	20.8064	20.6438 (87)
Th 2	20.4057	20.4083	20.4108	20.4234	20.4260	20.4387	20.4387	20.4412	20.4336	20.4260	20.4209	20.4159 (88)
util rest of house	0.9901	0.9796	0.9545	0.8449	0.6518	0.4339	0.2998	0.3306	0.5471	0.8518	0.9695	0.9917 (89)
MIT 2	20.0035	20.1051	20.2280	20.3811	20.4225	20.4386	20.4387	20.4412	20.4331	20.3876	20.2121	20.0043 (90)
Living area fraction									fLA = Living area / (4) =			0.4375 (91)
MIT	20.2864	20.3783	20.4906	20.6315	20.6731	20.6842	20.6842	20.6857	20.6807	20.6363	20.4720	20.2841 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2864	20.3783	20.4906	20.6315	20.6731	20.6842	20.6842	20.6857	20.6807	20.6363	20.4720	20.2841 (93)
8. Space heating requirement												
Utilisation	0.9895	0.9793	0.9561	0.8553	0.6694	0.4521	0.3190	0.3506	0.5682	0.8640	0.9703	0.9912 (94)
Useful gains	470.9422	493.7144	486.7070	452.8499	361.1371	240.6211	161.5510	168.7079	262.4204	383.8453	438.5473	458.9956 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	671.5871	647.3201	582.4596	477.3340	363.4021	240.6593	161.5519	168.7101	262.7856	406.4610	546.6081	663.5412 (97)
Space heating kWh	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (98a)
Space heating requirement - total per year (kWh/year)												589.8683
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												589.8683
Space heating per m2										(98c) / (4) =		8.8040 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (64)
Efficiency of water heater (217)m	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009 (216)
Fuel for water heating, kWh/month	76.4651	67.5295	71.4009	61.8462	59.3440	52.8020	51.5723	53.9626	54.9435	62.0807	67.0232	75.4980 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.8207	12.4832	13.8207	13.3749	13.8207	13.3749	13.8207	13.8207	13.3749	13.8207	13.3749	13.8207 (231)
Lighting	19.9282	15.9871	14.3946	10.5461	8.1461	6.6555	7.4312	9.6593	12.5465	16.4617	18.5935	20.4821 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												589.8683 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												338.5009
Water heating fuel used												754.4679 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)			
mechanical ventilation fans (SFP = 0.8400)			162.7280 (230a)
Total electricity for the above, kWh/year			162.7280 (231)
Electricity for lighting (calculated in Appendix L)			160.8319 (232)
Energy saving/generation technologies (Appendices M ,N and Q)			
PV generation			0.0000 (233)
Wind generation			0.0000 (234)
Hydro-electric generation (Appendix N)			0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)			0.0000 (235)
Appendix Q - special features			
Energy saved or generated			-0.0000 (236)
Energy used			0.0000 (237)
Total delivered energy for all uses			1667.8960 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	589.8683	0.1582	93.3337 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	754.4679	0.1412	106.5476 (264)
Space and water heating			199.8813 (265)
Pumps, fans and electric keep-hot	162.7280	0.1387	22.5724 (267)
Energy for lighting	160.8319	0.1443	23.2130 (268)
Total CO2, kg/year			245.6667 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.6700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	589.8683	1.5858	935.3868 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	754.4679	1.5222	1148.4544 (278)
Space and water heating			2083.8412 (279)
Pumps, fans and electric keep-hot	162.7280	1.5128	246.1749 (281)
Energy for lighting	160.8319	1.5338	246.6894 (282)
Total Primary energy kWh/year			2576.7055 (286)
Dwelling Primary energy Rate (DPER)			38.4600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

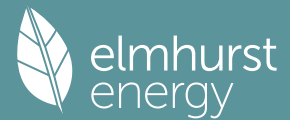
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	67.0000 (1b)	x 2.3700 (2b)	= 158.7900 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	158.7900 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1260 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3760 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2914 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3715	0.3642	0.3569	0.3205	0.3132	0.2768	0.2768	0.2695	0.2914	0.3132	0.3278	0.3424 (22b)
Effective ac	0.5690	0.5663	0.5637	0.5514	0.5491	0.5383	0.5383	0.5363	0.5424	0.5491	0.5537	0.5586 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			7.8700	1.1450	9.0115			(27)
Heatloss Floor 1			67.0000	0.1300	8.7100			(28a)
External Wall	46.3300	7.8700	38.4600	0.1800	6.9228			(29a)
Total net area of external elements Aum(A, m2)			113.3300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.6443			(33)
Main dwelling								
Corridor			14.2900	0.0000	0.0000			(32)
Party Wall			19.7200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

305.3728 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	4.7700	0.0500	0.2385	
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385	
E3 Sill	9.9000	0.0500	0.4950	
E4 Jamb	19.5500	0.1600	3.1280	
E5 Ground floor (normal)	4.7400	0.0600	0.2844	
E7 Party wall between dwellings	19.5500	0.0700	1.3685	
P1 Party wall - Ground floor	14.3500	0.0800	1.1480	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3500	0.0000	0.0000	
E16 Corner (normal)	4.7400	0.0900	0.4266	
E17 Corner (inverted - internal area greater than external area)	2.3700	-0.0900	-0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

7.1142 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 31.7585 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	29.8161	29.6757	29.5381	28.8916	28.7707	28.2077	28.2077	28.1034	28.4246	28.7707	29.0154	29.2712	(38)
Average = Sum(39)m / 12 =	61.5745	61.4341	61.2965	60.6501	60.5292	59.9662	59.9662	59.8619	60.1830	60.5292	60.7738	61.0296	(39)
												60.6495	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9190	0.9169	0.9149	0.9052	0.9034	0.8950	0.8950	0.8935	0.8983	0.9034	0.9071	0.9109	(40)
HLP (average)												0.9052	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1711 (42)
Hot water usage for mixer showers													
60.6226	59.7116	58.3840	55.8440	53.9695	51.8791	50.6909	52.0084	53.4526	55.6971	58.2917	60.3904	60.3904	(42a)
Hot water usage for baths													
26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044	26.1044	(42b)
Hot water usage for other uses													
36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647	36.8647	(42c)
Average daily hot water use (litres/day)												113.6904	(43)
Daily hot water use													
123.6803	121.0397	117.8238	112.9332	108.9619	104.6923	103.0511	106.2531	109.6302	114.1126	119.0786	123.3595	123.3595	(44)
Energy conte	195.8794	172.3590	181.0909	154.5999	146.6836	128.7314	124.6314	131.5636	135.1850	154.8497	169.6492	193.1512	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
29.3819	25.8538	27.1636	23.1900	22.0025	19.3097	18.6947	19.7345	20.2777	23.2275	25.4474	28.9727	28.9727	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(58)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
242.4743	214.4447	227.6858	199.6918	193.2785	173.8232	171.2263	178.1585	180.2768	201.4446	214.7411	239.7461	239.7461	(62)
WWHRS	-27.7141	-24.5106	-25.6661	-21.2525	-19.8066	-16.9487	-15.8867	-16.8939	-17.5357	-20.6727	-23.4197	-27.2009	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	214.7602	189.9341	202.0197	178.4392	173.4719	156.8746	155.3396	161.2646	162.7411	180.7719	191.3214	212.5451	(64)
12Total per year (kWh/year)												2179.4834	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
102.4058	90.9779	97.4886	87.4779	86.0482	78.8767	78.7159	81.0208	81.0225	88.7634	92.4818	101.4987	101.4987	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
106.9857	118.4485	106.9857	110.5519	106.9857	110.5519	106.9857	106.9857	110.5519	106.9857	110.5519	106.9857	106.9857	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
190.1965	192.1702	187.1966	176.6086	163.2431	150.6814	142.2895	140.3158	145.2893	155.8774	169.2429	181.8045	181.8045	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	(71)
Water heating gains (Table 5)													
137.6422	135.3838	131.0331	121.4972	115.6562	109.5509	105.8009	108.8989	112.5312	119.3057	128.4470	136.4230	136.4230	(72)
Total internal gains													

Full SAP Calculation Printout



493.3917 504.5697 483.7827 467.2249 444.4523 426.3515 410.6433 411.7677 423.9397 440.7360 466.8090 483.7805 (73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	

Northwest														
7.8700				11.2829		0.6300		0.7000		0.7700		27.1374 (81)		

Solar gains	27.1374	55.2390	99.5232	163.4457	219.7030	234.2267	219.1143	174.6804	121.2706	67.5065	34.1459	22.1618	(83)	
Total gains	520.5291	559.8087	583.3059	630.6706	664.1553	660.5782	629.7576	586.4481	545.2103	508.2425	500.9549	505.9423	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	92.3000	92.5109	92.7186	93.7068	93.8941	94.7756	94.7756	94.9407	94.4341	93.8941	93.5161	93.1241
alpha	7.1533	7.1674	7.1812	7.2471	7.2596	7.3184	7.3184	7.3294	7.2956	7.2596	7.2344	7.2083
util living area	0.9962	0.9926	0.9828	0.9343	0.7954	0.5764	0.4186	0.4686	0.7338	0.9509	0.9906	0.9969 (86)
MIT	20.2802	20.3877	20.5541	20.7953	20.9509	20.9957	20.9996	20.9992	20.9785	20.7930	20.5069	20.2634 (87)
Th 2	20.1514	20.1531	20.1549	20.1631	20.1646	20.1717	20.1717	20.1731	20.1690	20.1646	20.1615	20.1583 (88)
util rest of house	0.9948	0.9898	0.9761	0.9108	0.7411	0.5041	0.3400	0.3849	0.6576	0.9280	0.9865	0.9957 (89)
MIT 2	19.3210	19.4590	19.6696	19.9657	20.1280	20.1697	20.1716	20.1728	20.1568	19.9697	19.6176	19.3052 (90)
Living area fraction	19.7406	19.8653	20.0565	20.3286	20.4880	20.5310	20.5339	20.5343	20.5162	20.3299	20.0066	0.4375 (91)
MIT	19.7406	19.8653	20.0565	20.3286	20.4880	20.5310	20.5339	20.5343	20.5162	20.3299	20.0066	19.7244 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7406	19.8653	20.0565	20.3286	20.4880	20.5310	20.5339	20.5343	20.5162	20.3299	20.0066	19.7244 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9939	0.9886	0.9752	0.9160	0.7630	0.5357	0.3744	0.4216	0.6906	0.9332	0.9855	0.9949 (94)
Useful gains	517.3390	553.4452	568.8114	577.6934	506.7757	353.8822	235.7864	247.2320	376.5022	474.3025	493.7120	503.3654 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	950.7497	919.3793	830.9682	693.1462	531.9285	355.6605	235.8981	247.4888	386.1488	588.9400	784.3843	947.4475 (97)
Space heating kWh	322.4576	245.9077	195.0447	83.1260	18.7137	0.0000	0.0000	0.0000	0.0000	85.2903	209.2841	330.3970 (98a)
Space heating requirement - total per year (kWh/year)												1490.2212
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	322.4576	245.9077	195.0447	83.1260	18.7137	0.0000	0.0000	0.0000	0.0000	85.2903	209.2841	330.3970 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1490.2212
Space heating per m2										(98c) / (4) =		22.2421 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	322.4576	245.9077	195.0447	83.1260	18.7137	0.0000	0.0000	0.0000	0.0000	85.2903	209.2841	330.3970 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	349.3582	266.4222	211.3160	90.0607	20.2749	0.0000	0.0000	0.0000	0.0000	92.4055	226.7433	357.9600 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	214.7602	189.9341	202.0197	178.4392	173.4719	156.8746	155.3396	161.2646	162.7411	180.7719	191.3214	212.5451 (64)
Efficiency of water heater	84.9691	84.6400	83.9810	82.4559	80.5954	79.8000	79.8000	79.8000	79.8000	82.4797	84.2615	79.8000 (216)
Fuel for water heating, kWh/month	252.7510	224.4022	240.5539	216.4057	215.2380	196.5847	194.6612	202.0860	203.9362	219.1712	227.0568	249.9202 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.2295	17.8333	16.0570	11.7640	9.0869	7.4240	8.2893	10.7748	13.9954	18.3627	20.7406	22.8473 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-22.8658	-33.3089	-49.4485	-57.4807	-63.6154	-59.9816	-59.2683	-55.1673	-48.1728	-38.9543	-25.5251	-19.6471 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.8346	-20.9845	-42.2609	-64.2813	-85.7800	-86.4655	-85.4269	-71.9492	-52.2509	-30.2494	-13.2089	-7.7532 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)										
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)										
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year										
Space heating fuel - main system 1									1614.5408	(211)
Space heating fuel - main system 2									0.0000	(213)
Space heating fuel - secondary									0.0000	(215)
Efficiency of water heater									79.8000	
Water heating fuel used									2642.7671	(219)
Space cooling fuel									0.0000	(221)
Electricity for pumps and fans:										
Total electricity for the above, kWh/year									86.0000	(231)
Electricity for lighting (calculated in Appendix L)									179.4050	(232)
Energy saving/generation technologies (Appendices M ,N and Q)										
PV generation									-1103.8810	(233)
Wind generation									0.0000	(234)
Hydro-electric generation (Appendix N)									0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)									0.0000	(235)
Appendix Q - special features										
Energy saved or generated									-0.0000	(236)
Energy used									0.0000	(237)
Total delivered energy for all uses									3418.8319	(238)

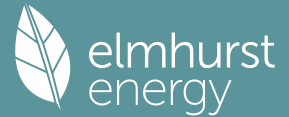
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1614.5408	0.2100	339.0536 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2642.7671	0.2100	554.9811 (264)
Space and water heating			894.0347 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.4050	0.1443	25.8937 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-533.4357	0.1339	-71.4261
PV Unit electricity exported	-570.4452	0.1255	-71.6085
Total			-143.0346 (269)
Total CO2, kg/year			788.8230 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1614.5408	1.1300	1824.4311 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2642.7671	1.1300	2986.3269 (278)
Space and water heating			4810.7580 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.4050	1.5338	275.1773 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-533.4357	1.4948	-797.3937
PV Unit electricity exported	-570.4452	0.4608	-262.8429
Total			-1060.2366 (283)
Total Primary energy kWh/year			4155.7995 (286)
Target Primary Energy Rate (TPER)			62.0300 (287)

Full SAP Calculation Printout



Property Reference	Plot 3			Issued on Date	27/08/2025
Assessment Reference	Plot 3	Prop Type Ref			
Property	Flat 3, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	3.67	TER	11.77
Environmental	97 A	% DER < TER			68.82
CO ₂ Emissions (t/year)	0.2	DFEE	23.65	TFEE	29.47
Compliance Check	See BREL	% DFEE < TFEE			19.74
% DPER < TPER	38.00	DPER	38.46	TPER	62.03
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	67.0000 (1b)	2.3700 (2b)	158.7900 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		158.7900 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 158.7900 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1260 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7200	(17)
Infiltration rate	0.3120	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2418 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infiltr rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3082	0.3022	0.2962	0.2659	0.2599	0.2297	0.2297	0.2236	0.2418	0.2599	0.2720	0.2841 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5475	0.5457	0.5439	0.5354	0.5338	0.5264	0.5264	0.5250	0.5292	0.5338	0.5370	0.5403 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			67.0000	0.1100	7.3700	75.0000	5025.0000 (28a)
External Wall	46.3300	7.8700	38.4600	0.1900	7.3074	150.0000	5769.0003 (29a)
Total net area of external elements Aum(A, m ²)			113.3300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 20.7782		(33)
Main dwelling							
Corridor			14.2900	0.0000	0.0000	180.0000	2572.2000 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Ceiling 1			67.0000			40.0000	2680.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20459.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							305.3728 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				9.9000	0.0300	0.2970	

Full SAP Calculation Printout



E5 Ground floor (normal)	19.5500	0.0810	1.5836	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	19.5500	-0.0180	-0.3519	
P1 Party wall - Ground floor	14.3500	0.1600	2.2960	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3500	0.0000	0.0000	
E16 Corner (normal)	4.7400	0.0490	0.2323	
E17 Corner (inverted - internal area greater than external area)	2.3700	-0.0910	-0.2157	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.2649	(36)
Point Thermal bridges			0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	25.0431	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	28.6898	28.5932	28.4984	28.0533	27.9701	27.5824	27.5824	27.5106	27.7317	27.9701	28.1385	28.3146
Average = Sum(39)m / 12 =	53.7329	53.6362	53.5415	53.0964	53.0131	52.6255	52.6255	52.5537	52.7748	53.0131	53.1816	53.3577
												53.0960
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8020	0.8005	0.7991	0.7925	0.7912	0.7855	0.7855	0.7844	0.7877	0.7912	0.7938	0.7964
Days in month	31	28	31	30	31	30	31	31	30	31	30	31
												0.7925
												0.7925

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.1711
Hot water usage for mixer showers												(42)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for other uses	26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044
Average daily hot water use (litres/day)	36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647
												57.7984
												(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	63.0577	61.3281	59.4398	57.0892	54.9924	52.8132	52.3603	54.2448	56.1776	58.4155	60.7868	62.9691
Energy content (annual)	99.8679	87.3305	91.3568	78.1523	74.0303	64.9400	63.3252	67.1663	69.2726	79.2692	86.6020	98.5944
Distribution loss (46)m = 0.15 x (45)m												959.9076
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	84.8878	74.2309	77.6533	66.4295	62.9258	55.1990	53.8264	57.0914	58.8817	67.3788	73.6117	83.8053
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	84.8878	74.2309	77.6533	66.4295	62.9258	55.1990	53.8264	57.0914	58.8817	67.3788	73.6117	83.8053
12Total per year (kWh/year)												815.9214
Electric shower(s)	48.5486	43.2572	47.2352	45.0760	45.9218	43.8050	45.2652	45.9218	45.0760	47.2352	46.3470	48.5486
Heat gains from water heating, kWh/month	33.3591	29.3720	31.2221	27.8764	27.2119	24.7510	24.7729	25.7533	25.9894	28.6535	29.9897	33.0885
												552.2379
												816
												(64a)
												(64a)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	110.1349	121.9350	110.1349	113.8060	110.1349	113.8060	110.1349	110.1349	113.8060	110.1349	113.8060	110.1349
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	190.1965	192.1702	187.1966	176.6086	163.2431	150.6814	142.2895	140.3158	145.2893	155.8774	169.2429	181.8045
Pumps, fans	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water heating gains (Table 5)	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459
Total internal gains	44.8375	43.7084	41.9652	38.7172	36.5751	34.3764	33.2969	34.6147	36.0964	38.5128	41.6523	44.4738
	400.7361	413.3808	394.8639	384.6990	365.5203	354.4311	341.2884	340.6325	350.7590	360.0922	380.2684	391.9804
												(73)

6. Solar gains												
[Jan]			Area		Solar flux		g		FF		Access	Gains
			m2		Table 6a		Specific data		Specific data		factor	W
					W/m2		or Table 6b		or Table 6c		Table 6d	
Northwest			7.8700		11.2829		0.2400		0.0000		0.7700	16.4096
												(81)
Solar gains	16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009
Total gains	417.1457	446.7831	455.0442	483.5324	498.3718	496.0647	473.7838	446.2594	424.0896	400.9125	400.9160	405.3813
												(84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000
												(85)

Full SAP Calculation Printout



Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	105.7700	105.9606	106.1481	107.0379	107.2060	107.9957	107.9957	108.1432	107.6901	107.2060	106.8664	106.5137
alpha	8.0513	8.0640	8.0765	8.1359	8.1471	8.1997	8.1997	8.2095	8.1793	8.1471	8.1244	8.1009
util living area	0.9989	0.9976	0.9944	0.9735	0.8858	0.6696	0.4880	0.5401	0.8123	0.9785	0.9968	0.9991 (86)
MIT	20.3082	20.3985	20.5337	20.7525	20.9257	20.9933	20.9995	20.9990	20.9717	20.7707	20.5106	20.2922 (87)
Th 2	20.2516	20.2529	20.2541	20.2599	20.2609	20.2660	20.2660	20.2669	20.2640	20.2609	20.2587	20.2565 (88)
util rest of house	0.9984	0.9967	0.9921	0.9621	0.8447	0.5974	0.4070	0.4550	0.7447	0.9669	0.9953	0.9988 (89)
MIT 2	19.6175	19.7085	19.8438	20.0610	20.2135	20.2633	20.2659	20.2666	20.2503	20.0814	19.8253	19.6056 (90)
Living area fraction									FLA = Living area / (4) =			0.4375 (91)
MIT	19.9197	20.0104	20.1456	20.3635	20.5251	20.5826	20.5868	20.5870	20.5659	20.3830	20.1251	19.9059 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9197	20.0104	20.1456	20.3635	20.5251	20.5826	20.5868	20.5870	20.5659	20.3830	20.1251	19.9059 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9982	0.9963	0.9916	0.9640	0.8605	0.6290	0.4425	0.4923	0.7739	0.9692	0.9950	0.9986 (94)
Useful gains	416.3906	445.1296	451.2444	466.1237	428.8470	312.0312	209.6605	219.7058	328.1972	388.5686	398.9158	404.7974 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	839.2892	810.4624	730.6049	608.6707	467.8439	314.8393	209.8075	220.0423	341.2356	518.6256	692.6963	838.0322 (97)
Space heating kWh	314.6366	245.5036	207.8442	102.6339	29.0137	0.0000	0.0000	0.0000	0.0000	96.7624	211.5220	322.3266 (98a)
Space heating requirement - total per year (kWh/year)												1530.2430
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	314.6366	245.5036	207.8442	102.6339	29.0137	0.0000	0.0000	0.0000	0.0000	96.7624	211.5220	322.3266 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1530.2430
Space heating per m2										(98c) / (4) =		22.8394 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	494.6798	389.4288	399.4083	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9181	0.9699	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	454.1492	377.7234	380.1236	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	528.0773	504.5674	474.6567	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	53.2282	94.3719	70.3326	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	13.3071	23.5930	17.5832	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												54.4832 (107)
Energy for space heating												22.8394 (99)
Energy for space cooling												0.8132 (108)
Total												23.6526 (109)
Fabric Energy Efficiency (DFEE)												23.7 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	67.0000		
Ground floor		2.3700	158.7900
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		158.7900 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	158.7900 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1260 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)

Full SAP Calculation Printout



Infiltration rate												0.3760 (18)
Number of sides sheltered												3 (19)
Shelter factor												(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.2914 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infiltr rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3715	0.3642	0.3569	0.3205	0.3132	0.2768	0.2768	0.2695	0.2914	0.3132	0.3278	0.3424 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.5690	0.5663	0.5637	0.5514	0.5491	0.5383	0.5383	0.5363	0.5424	0.5491	0.5537	0.0000 (23c)
												0.5586 (25)

3. Heat losses and heat loss parameter

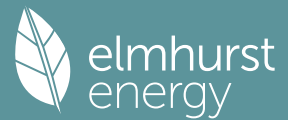
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			7.8700	1.1450	9.0115		(27)
Heatloss Floor 1			67.0000	0.1300	8.7100		(28a)
External Wall	46.3300	7.8700	38.4600	0.1800	6.9228		(29a)
Total net area of external elements Aum(A, m2)			113.3300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	24.6443		(33)
Main dwelling							
Corridor			14.2900	0.0000	0.0000		(32)
Party Wall			19.7200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							305.3728 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0500	0.2385	
E3 Sill				4.7700	0.0500	0.2385	
E4 Jamb				9.9000	0.0500	0.4950	
E5 Ground floor (normal)				19.5500	0.1600	3.1280	
E18 Party wall between dwellings				4.7400	0.0600	0.2844	
E7 Party floor between dwellings (in blocks of flats)				19.5500	0.0700	1.3685	
P1 Party wall - Ground floor				14.3500	0.0800	1.1480	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.3500	0.0000	0.0000	
E16 Corner (normal)				4.7400	0.0900	0.4266	
E17 Corner (inverted - internal area greater than external area)				2.3700	-0.0900	-0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.1142 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	31.7585 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1711 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044 (42b)
Hot water usage for other uses												
	36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647 (42c)
Average daily hot water use (litres/day)												57.9884 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	63.0577	61.3281	59.4398	57.0892	54.9924	52.8132	52.3603	54.2448	56.1776	58.4155	60.7868	62.9691 (44)
Energy content (annual)	99.8679	87.3305	91.3568	78.1523	74.0303	64.9400	63.3252	67.1663	69.2726	79.2692	86.6020	98.5944 (45)
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	84.8878	74.2309	77.6533	66.4295	62.9258	55.1990	53.8264	57.0914	58.8817	67.3788	73.6117	83.8053 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	84.8878	74.2309	77.6533	66.4295	62.9258	55.1990	53.8264	57.0914	58.8817	67.3788	73.6117	83.8053 (64)
12Total per year (kWh/year)												
Electric shower(s)	48.5486	43.2572	47.2352	45.0760	45.9218	43.8050	45.2652	45.9218	45.0760	47.2352	46.3470	48.5486 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												552.2379 (64a)
Heat gains from water heating, kWh/month												
	33.3591	29.3720	31.2221	27.8764	27.2119	24.7510	24.7729	25.7533	25.9894	28.6535	29.9897	33.0885 (65)

5. Internal gains (see Table 5 and 5a)

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.9857	118.4485	106.9857	110.5519	106.9857	110.5519	106.9857	106.9857	110.5519	106.9857	110.5519	106.9857	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	190.1965	192.1702	187.1966	176.6086	163.2431	150.6814	142.2895	140.3158	145.2893	155.8774	169.2429	181.8045	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	(71)
Water heating gains (Table 5)	44.8375	43.7084	41.9652	38.7172	36.5751	34.3764	33.2969	34.6147	36.0964	38.5128	41.6523	44.4738	(72)
Total internal gains	397.5870	409.8942	391.7148	381.4449	362.3712	351.1770	338.1393	337.4834	347.5049	356.9431	377.0143	388.8312	(73)

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	

Northwest						7.8700	11.2829		0.6300	0.7000	0.7700		27.1374 (81)	

Solar gains		27.1374	55.2390	99.5232	163.4457	219.7030	234.2267	219.1143	174.6804	121.2706	67.5065	34.1459	22.1618	(83)
Total gains		424.7244	465.1333	491.2380	544.8906	582.0742	585.4037	557.2536	512.1639	468.7755	424.4496	411.1603	410.9930	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	92.3000	92.5109	92.7186	93.7068	93.8941	94.7756	94.7756	94.9407	94.4341	93.8941	93.5161	93.1241	
alpha	7.1533	7.1674	7.1812	7.2471	7.2596	7.3184	7.3184	7.3294	7.2956	7.2596	7.2344	7.2083	
util living area	0.9989	0.9976	0.9936	0.9674	0.8637	0.6450	0.4724	0.5350	0.8200	0.9806	0.9972	0.9992	(86)
MIT	20.1471	20.2583	20.4338	20.7074	20.9148	20.9912	20.9992	20.9981	20.9563	20.6981	20.3849	20.1309	(87)
Th 2	20.1514	20.1531	20.1549	20.1631	20.1646	20.1717	20.1717	20.1731	20.1690	20.1646	20.1615	20.1583	(88)
util rest of house	0.9985	0.9967	0.9909	0.9535	0.8161	0.5667	0.3841	0.4404	0.7473	0.9696	0.9958	0.9988	(89)
MIT 2	19.3720	19.4843	19.6600	19.9316	20.1118	20.1684	20.1716	20.1726	20.1478	19.9276	19.6177	19.3616	(90)
Living area fraction	19.7110	19.8229	19.9985	20.2710	20.4631	20.5283	20.5336	20.5337	20.5015	20.2647	19.9533	19.6982	(91)
MIT	19.7110	19.8229	19.9985	20.2710	20.4631	20.5283	20.5336	20.5337	20.5015	20.2647	19.9533	19.6982	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7110	19.8229	19.9985	20.2710	20.4631	20.5283	20.5336	20.5337	20.5015	20.2647	19.9533	19.6982	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9982	0.9962	0.9903	0.9556	0.8344	0.6010	0.4228	0.4819	0.7783	0.9712	0.9954	0.9986	(94)
Useful gains	423.9770	463.3563	486.4491	520.6826	485.6789	351.8127	235.6315	246.8326	364.8498	412.2414	409.2754	410.4210	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	948.9276	916.7754	827.4106	689.6516	530.4215	355.4986	235.8836	247.4526	385.2600	584.9948	781.1460	945.8467	(97)
Space heating kWh	390.5633	304.6977	253.6753	121.6576	33.2885	0.0000	0.0000	0.0000	0.0000	128.5285	267.7468	398.3567	(98a)
Space heating requirement - total per year (kWh/year)												1898.5144	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	390.5633	304.6977	253.6753	121.6576	33.2885	0.0000	0.0000	0.0000	0.0000	128.5285	267.7468	398.3567	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1898.5144	
Space heating per m2										(98c) / (4) =		28.3360	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b													
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	563.6818	443.7495	454.9504	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9258	0.9703	0.9481	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	521.8739	430.5655	431.3323	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	636.0273	605.5125	554.9817	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	82.1905	130.1606	91.9951	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	20.5476	32.5402	22.9988	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												76.0866	(107)
Energy for space heating												28.3360	(99)
Energy for space cooling												1.1356	(108)
Total												29.4717	(109)
Fabric Energy Efficiency (TFEE)												29.5	(109)

Full SAP Calculation Printout



Property Reference	Plot 3			Issued on Date	27/08/2025
Assessment Reference	Plot 3	Prop Type Ref			
Property	Flat 3, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	3.67	TER	11.77
Environmental	97 A	% DER < TER			68.82
CO ₂ Emissions (t/year)	0.2	DFEE	23.65	TFEE	29.47
Compliance Check	See BREL	% DFEE < TFEE			19.74
% DPER < TPER	38.00	DPER	38.46	TPER	62.03
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	67.0000 (1b)	2.3700 (2b)	158.7900 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		158.7900 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	158.7900 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7200 (17)
Infiltration rate	0.1860 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1442 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1838	0.1802	0.1766	0.1586	0.1550	0.1369	0.1369	0.1333	0.1442	0.1550	0.1622	0.1694 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3238	0.3202	0.3166	0.2986	0.2950	0.2769	0.2769	0.2733	0.2842	0.2950	0.3022	0.3094 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			67.0000	0.1100	7.3700	75.0000	5025.0000 (28a)
External Wall	46.3300	7.8700	38.4600	0.1900	7.3074	150.0000	5769.0003 (29a)
Total net area of external elements Aum(A, m ²)			113.3300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.7782		(33)
Main dwelling							
Corridor			14.2900	0.0000	0.0000	180.0000	2572.2000 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.9999 (32)
Party Ceiling 1			67.0000			30.0000	2010.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 19789.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							295.3728 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

elmhurst
energy

SAP 10 Online 2.22.2 Page 2 of 7

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.8551	131.4459	132.0422	135.1063	135.7363	138.9763	138.9763	139.6430	137.6619	135.7363	134.4821	133.2510
alpha	9.7237	9.7631	9.8028	10.0071	10.0491	10.2651	10.2651	10.3095	10.1775	10.0491	9.9655	9.8834
util living area	0.9925	0.9844	0.9650	0.8727	0.6923	0.4756	0.3436	0.3763	0.5954	0.8834	0.9772	0.9938 (86)
MIT	20.6502	20.7296	20.8282	20.9536	20.9952	20.9999	21.0000	21.0000	20.9991	20.9560	20.8064	20.6438 (87)
Th 2	20.4057	20.4083	20.4108	20.4234	20.4260	20.4387	20.4387	20.4412	20.4336	20.4260	20.4209	20.4159 (88)
util rest of house	0.9901	0.9796	0.9545	0.8449	0.6518	0.4339	0.2998	0.3306	0.5471	0.8518	0.9695	0.9917 (89)
MIT 2	20.0035	20.1051	20.2280	20.3811	20.4225	20.4386	20.4387	20.4412	20.4331	20.3876	20.2121	20.0043 (90)
Living area fraction									fLA = Living area / (4) =			0.4375 (91)
MIT	20.2864	20.3783	20.4906	20.6315	20.6731	20.6842	20.6842	20.6857	20.6807	20.6363	20.4720	20.2841 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2864	20.3783	20.4906	20.6315	20.6731	20.6842	20.6842	20.6857	20.6807	20.6363	20.4720	20.2841 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9895	0.9793	0.9561	0.8553	0.6694	0.4521	0.3190	0.3506	0.5682	0.8640	0.9703	0.9912 (94)
Useful gains	470.9422	493.7144	486.7070	452.8499	361.1371	240.6211	161.5510	168.7079	262.4204	383.8453	438.5473	458.9956 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	671.5871	647.3201	582.4596	477.3340	363.4021	240.6593	161.5519	168.7101	262.7856	406.4610	546.6081	663.5412 (97)
Space heating kWh	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (98a)
Space heating requirement - total per year (kWh/year)												589.8683
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												589.8683
Space heating per m2										(98c) / (4) =		8.8040 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	149.2798	103.2231	71.2400	17.6286	1.6851	0.0000	0.0000	0.0000	0.0000	16.8261	77.8038	152.1819 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (64)
Efficiency of water heater (217)m	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009 (216)
Fuel for water heating, kWh/month	76.4651	67.5295	71.4009	61.8462	59.3440	52.8020	51.5723	53.9626	54.9435	62.0807	67.0232	75.4980 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.8207	12.4832	13.8207	13.3749	13.8207	13.3749	13.8207	13.8207	13.3749	13.8207	13.3749	13.8207 (231)
Lighting	19.9282	15.9871	14.3946	10.5461	8.1461	6.6555	7.4312	9.6593	12.5465	16.4617	18.5935	20.4821 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												589.8683 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												338.5009
Water heating fuel used												754.4679 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)			
mechanical ventilation fans (SFP = 0.8400)			162.7280 (230a)
Total electricity for the above, kWh/year			162.7280 (231)
Electricity for lighting (calculated in Appendix L)			160.8319 (232)
Energy saving/generation technologies (Appendices M ,N and Q)			
PV generation			0.0000 (233)
Wind generation			0.0000 (234)
Hydro-electric generation (Appendix N)			0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)			0.0000 (235)
Appendix Q - special features			
Energy saved or generated			-0.0000 (236)
Energy used			0.0000 (237)
Total delivered energy for all uses			1667.8960 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	589.8683	0.1582	93.3337 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	754.4679	0.1412	106.5476 (264)
Space and water heating			199.8813 (265)
Pumps, fans and electric keep-hot	162.7280	0.1387	22.5724 (267)
Energy for lighting	160.8319	0.1443	23.2130 (268)
Total CO2, kg/year			245.6667 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.6700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	589.8683	1.5858	935.3868 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	754.4679	1.5222	1148.4544 (278)
Space and water heating			2083.8412 (279)
Pumps, fans and electric keep-hot	162.7280	1.5128	246.1749 (281)
Energy for lighting	160.8319	1.5338	246.6894 (282)
Total Primary energy kWh/year			2576.7055 (286)
Dwelling Primary energy Rate (DPER)			38.4600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

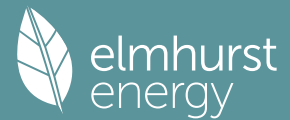
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	67.0000 (1b)	x 2.3700 (2b)	= 158.7900 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 158.7900 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1260 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3760 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2914 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3715	0.3642	0.3569	0.3205	0.3132	0.2768	0.2768	0.2695	0.2914	0.3132	0.3278	0.3424 (22b)
Effective ac	0.5690	0.5663	0.5637	0.5514	0.5491	0.5383	0.5383	0.5363	0.5424	0.5491	0.5537	0.5586 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			7.8700	1.1450	9.0115			(27)
Heatloss Floor 1			67.0000	0.1300	8.7100			(28a)
External Wall	46.3300	7.8700	38.4600	0.1800	6.9228			(29a)
Total net area of external elements Aum(A, m2)			113.3300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.6443			(33)
Main dwelling								
Corridor			14.2900	0.0000	0.0000			(32)
Party Wall			19.7200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

305.3728 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	4.7700	0.0500	0.2385	
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385	
E3 Sill	9.9000	0.0500	0.4950	
E4 Jamb	19.5500	0.1600	3.1280	
E5 Ground floor (normal)	4.7400	0.0600	0.2844	
E7 Party wall between dwellings	19.5500	0.0700	1.3685	
P1 Party wall - Ground floor	14.3500	0.0800	1.1480	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3500	0.0000	0.0000	
E16 Corner (normal)	4.7400	0.0900	0.4266	
E17 Corner (inverted - internal area greater than external area)	2.3700	-0.0900	-0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

7.1142 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 31.7585 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	29.8161	29.6757	29.5381	28.8916	28.7707	28.2077	28.2077	28.1034	28.4246	28.7707	29.0154	29.2712	(38)
Average = Sum(39)m / 12 =	61.5745	61.4341	61.2965	60.6501	60.5292	59.9662	59.9662	59.8619	60.1830	60.5292	60.7738	61.0296	(39)
												60.6495	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9190	0.9169	0.9149	0.9052	0.9034	0.8950	0.8950	0.8935	0.8983	0.9034	0.9071	0.9109	(40)
HLP (average)												0.9052	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1711 (42)
Hot water usage for mixer showers													
60.6226	59.7116	58.3840	55.8440	53.9695	51.8791	50.6909	52.0084	53.4526	55.6971	58.2917	60.3904	60.3904	(42a)
Hot water usage for baths													
26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044	26.1044	(42b)
Hot water usage for other uses													
36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647	36.8647	(42c)
Average daily hot water use (litres/day)												113.6904	(43)
Daily hot water use													
123.6803	121.0397	117.8238	112.9332	108.9619	104.6923	103.0511	106.2531	109.6302	114.1126	119.0786	123.3595	123.3595	(44)
Energy conte	195.8794	172.3590	181.0909	154.5999	146.6836	128.7314	124.6314	131.5636	135.1850	154.8497	169.6492	193.1512	(45)
Energy content (annual)												1888.3742	
Distribution loss (46)m = 0.15 x (45)m													
29.3819	25.8538	27.1636	23.1900	22.0025	19.3097	18.6947	19.7345	20.2777	23.2275	25.4474	28.9727	28.9727	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(58)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
242.4743	214.4447	227.6858	199.6918	193.2785	173.8232	171.2263	178.1585	180.2768	201.4446	214.7411	239.7461	239.7461	(62)
WWHRS	-27.7141	-24.5106	-25.6661	-21.2525	-19.8066	-16.9487	-15.8867	-16.8939	-17.5357	-20.6727	-23.4197	-27.2009	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	214.7602	189.9341	202.0197	178.4392	173.4719	156.8746	155.3396	161.2646	162.7411	180.7719	191.3214	212.5451	(64)
12Total per year (kWh/year)												2179.4834	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
102.4058	90.9779	97.4886	87.4779	86.0482	78.8767	78.7159	81.0208	81.0225	88.7634	92.4818	101.4987	101.4987	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	108.5574	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
106.9857	118.4485	106.9857	110.5519	106.9857	110.5519	106.9857	106.9857	110.5519	106.9857	110.5519	106.9857	106.9857	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
190.1965	192.1702	187.1966	176.6086	163.2431	150.6814	142.2895	140.3158	145.2893	155.8774	169.2429	181.8045	181.8045	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	33.8557	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	(71)
Water heating gains (Table 5)													
137.6422	135.3838	131.0331	121.4972	115.6562	109.5509	105.8009	108.8989	112.5312	119.3057	128.4470	136.4230	136.4230	(72)
Total internal gains													

Full SAP Calculation Printout



493.3917 504.5697 483.7827 467.2249 444.4523 426.3515 410.6433 411.7677 423.9397 440.7360 466.8090 483.7805 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
-----				7.8700	11.2829	0.6300	0.7000	-----		0.7700	27.1374 (81)	
Solar gains	27.1374	55.2390	99.5232	163.4457	219.7030	234.2267	219.1143	174.6804	121.2706	67.5065	34.1459	22.1618 (83)
Total gains	520.5291	559.8087	583.3059	630.6706	664.1553	660.5782	629.7576	586.4481	545.2103	508.2425	500.9549	505.9423 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	92.3000	92.5109	92.7186	93.7068	93.8941	94.7756	94.7756	94.9407	94.4341	93.8941	93.5161	93.1241
alpha	7.1533	7.1674	7.1812	7.2471	7.2596	7.3184	7.3184	7.3294	7.2956	7.2596	7.2344	7.2083
util living area	0.9962	0.9926	0.9828	0.9343	0.7954	0.5764	0.4186	0.4686	0.7338	0.9509	0.9906	0.9969 (86)
MIT	20.2802	20.3877	20.5541	20.7953	20.9509	20.9957	20.9996	20.9992	20.9785	20.7930	20.5069	20.2634 (87)
Th 2	20.1514	20.1531	20.1549	20.1631	20.1646	20.1717	20.1717	20.1731	20.1690	20.1646	20.1615	20.1583 (88)
util rest of house	0.9948	0.9898	0.9761	0.9108	0.7411	0.5041	0.3400	0.3849	0.6576	0.9280	0.9865	0.9957 (89)
MIT 2	19.3210	19.4590	19.6696	19.9657	20.1280	20.1697	20.1716	20.1728	20.1568	19.9697	19.6176	19.3052 (90)
Living area fraction	19.7406	19.8653	20.0565	20.3286	20.4880	20.5310	20.5339	20.5343	20.5162	20.3299	20.0066	0.4375 (91)
MIT	19.7406	19.8653	20.0565	20.3286	20.4880	20.5310	20.5339	20.5343	20.5162	20.3299	20.0066	19.7244 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7406	19.8653	20.0565	20.3286	20.4880	20.5310	20.5339	20.5343	20.5162	20.3299	20.0066	19.7244 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9939	0.9886	0.9752	0.9160	0.7630	0.5357	0.3744	0.4216	0.6906	0.9332	0.9855	0.9949 (94)
Useful gains	517.3390	553.4452	568.8114	577.6934	506.7757	353.8822	235.7864	247.2320	376.5022	474.3025	493.7120	503.3654 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	950.7497	919.3793	830.9682	693.1462	531.9285	355.6605	235.8981	247.4888	386.1488	588.9400	784.3843	947.4475 (97)
Space heating kWh	322.4576	245.9077	195.0447	83.1260	18.7137	0.0000	0.0000	0.0000	0.0000	85.2903	209.2841	330.3970 (98a)
Space heating requirement - total per year (kWh/year)												1490.2212
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	322.4576	245.9077	195.0447	83.1260	18.7137	0.0000	0.0000	0.0000	0.0000	85.2903	209.2841	330.3970 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1490.2212
Space heating per m2										(98c) / (4) =		22.2421 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	322.4576	245.9077	195.0447	83.1260	18.7137	0.0000	0.0000	0.0000	0.0000	85.2903	209.2841	330.3970 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	349.3582	266.4222	211.3160	90.0607	20.2749	0.0000	0.0000	0.0000	0.0000	92.4055	226.7433	357.9600 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	214.7602	189.9341	202.0197	178.4392	173.4719	156.8746	155.3396	161.2646	162.7411	180.7719	191.3214	212.5451 (64)
Efficiency of water heater	84.9691	84.6400	83.9810	82.4559	80.5954	79.8000	79.8000	79.8000	79.8000	82.4797	84.2615	79.8000 (216)
Fuel for water heating, kWh/month	252.7510	224.4022	240.5539	216.4057	215.2380	196.5847	194.6612	202.0860	203.9362	219.1712	227.0568	249.9202 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.2295	17.8333	16.0570	11.7640	9.0869	7.4240	8.2893	10.7748	13.9954	18.3627	20.7406	22.8473 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-22.8658	-33.3089	-49.4485	-57.4807	-63.6154	-59.9816	-59.2683	-55.1673	-48.1728	-38.9543	-25.5251	-19.6471 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.8346	-20.9845	-42.2609	-64.2813	-85.7800	-86.4655	-85.4269	-71.9492	-52.2509	-30.2494	-13.2089	-7.7532 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)										
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)										
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year										
Space heating fuel - main system 1									1614.5408	(211)
Space heating fuel - main system 2									0.0000	(213)
Space heating fuel - secondary									0.0000	(215)
Efficiency of water heater									79.8000	
Water heating fuel used									2642.7671	(219)
Space cooling fuel									0.0000	(221)
Electricity for pumps and fans:										
Total electricity for the above, kWh/year									86.0000	(231)
Electricity for lighting (calculated in Appendix L)									179.4050	(232)
Energy saving/generation technologies (Appendices M ,N and Q)										
PV generation									-1103.8810	(233)
Wind generation									0.0000	(234)
Hydro-electric generation (Appendix N)									0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)									0.0000	(235)
Appendix Q - special features										
Energy saved or generated									-0.0000	(236)
Energy used									0.0000	(237)
Total delivered energy for all uses									3418.8319	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1614.5408	0.2100	339.0536 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2642.7671	0.2100	554.9811 (264)
Space and water heating			894.0347 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.4050	0.1443	25.8937 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-533.4357	0.1339	-71.4261
PV Unit electricity exported	-570.4452	0.1255	-71.6085
Total			-143.0346 (269)
Total CO2, kg/year			788.8230 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1614.5408	1.1300	1824.4311 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2642.7671	1.1300	2986.3269 (278)
Space and water heating			4810.7580 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.4050	1.5338	275.1773 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-533.4357	1.4948	-797.3937
PV Unit electricity exported	-570.4452	0.4608	-262.8429
Total			-1060.2366 (283)
Total Primary energy kWh/year			4155.7995 (286)
Target Primary Energy Rate (TPER)			62.0300 (287)

Full SAP Calculation Printout



Property Reference	Plot 3			Issued on Date	27/08/2025
Assessment Reference	Plot 3	Prop Type Ref			
Property	Flat 3, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	3.67	TER	11.77
Environmental	97 A	% DER < TER			68.82
CO ₂ Emissions (t/year)	0.2	DFEE	23.65	TFEE	29.47
Compliance Check	See BREL	% DFEE < TFEE			19.74
% DPER < TPER	38.00	DPER	38.46	TPER	62.03
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	67.0000 (1b)	2.3700 (2b)	158.7900 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	158.7900 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

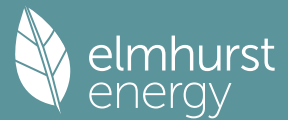
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7200	(17)
Infiltration rate	0.1860	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1442 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1838	0.1802	0.1766	0.1586	0.1550	0.1369	0.1369	0.1333	0.1442	0.1550	0.1622	0.1694 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3238	0.3202	0.3166	0.2986	0.2950	0.2769	0.2769	0.2733	0.2842	0.2950	0.3022	0.3094 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			67.0000	0.1100	7.3700	75.0000	5025.0000 (28a)
External Wall	46.3300	7.8700	38.4600	0.1900	7.3074	150.0000	5769.0003 (29a)
Total net area of external elements Aum(A, m ²)			113.3300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.7782		(33)
Main dwelling							
Corridor			14.2900	0.0000	0.0000	180.0000	2572.2000 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Ceiling 1			67.0000			40.0000	2680.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 20459.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							305.3728 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						4.7700	0.0340	0.1622				
E3 Sill						4.7700	0.0260	0.1240				
E4 Jamb						9.9000	0.0300	0.2970				
E5 Ground floor (normal)						19.5500	0.0810	1.5836				
E8 Party wall between dwellings						4.7400	0.0290	0.1375				
E7 Party floor between dwellings (in blocks of flats)						19.5500	-0.0180	-0.3519				
P1 Party wall - Ground floor						14.3500	0.1600	2.2960				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						14.3500	0.0000	0.0000				
E16 Corner (normal)						4.7400	0.0490	0.2323				
E17 Corner (inverted - internal area greater than external area)						2.3700	-0.0910	-0.2157				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												4.2649 (36)
Point Thermal bridges												0.0000
Total fabric heat loss									(33) + (36) + (36a) =			25.0431 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.9669	16.7780	16.5892	15.6450	15.4562	14.5120	14.5120	14.3231	14.8897	15.4562	15.8339	16.2115 (38)
Average = Sum(39)m / 12 =	42.0100	41.8211	41.6323	40.6881	40.4993	39.5551	39.5551	39.3662	39.9327	40.4993	40.8769	41.2546 (39)
												40.6409
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6270	0.6242	0.6214	0.6073	0.6045	0.5904	0.5904	0.5876	0.5960	0.6045	0.6101	0.6157 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.6066

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.1711 (42)
Hot water usage for mixer showers												
	83.3561	82.1035	80.2780	76.7855	74.2080	71.3337	69.6999	71.5115	73.4974	76.5835	80.1511	83.0368 (42a)
Hot water usage for baths												
	26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044 (42b)
Hot water usage for other uses												
	36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647 (42c)
Average daily hot water use (litres/day)												134.6499 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	146.4138	143.4316	139.7179	133.8747	129.2004	124.1469	122.0602	125.7563	129.6749	134.9990	140.9379	146.0059 (44)
Energy content (annual)	231.8837	204.2447	214.7411	183.2678	173.9286	152.6532	147.6212	155.7125	159.9022	183.1923	200.7919	228.6099 (45)
Distribution loss (46)m = 0.15 x (45)m												2236.5492
	34.7826	30.6367	32.2112	27.4902	26.0893	22.8980	22.1432	23.3569	23.9853	27.4789	30.1188	34.2915 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (64)
Total per year (kWh/year) = Sum(64)m =												2553.8802 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	77.1013	67.9114	71.4014	60.9365	57.8313	50.7572	49.0841	51.7744	53.1675	60.9115	66.7633	76.0128 (65)

5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689 (66)
	22.7674	20.2218	16.4455	12.4503	9.3067	7.8571	8.4899	11.0355	14.8119	18.8070	21.9506	23.4002 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	283.8754	286.8211	279.3980	263.5949	243.6464	224.8976	212.3723	209.4266	216.8497	232.6528	252.6013	271.3501 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459 (71)
Water heating gains (Table 5)												
	103.6308	101.0586	95.9697	84.6341	77.7302	70.4961	65.9732	69.5893	73.8437	81.8702	92.7268	102.1677 (72)
Total internal gains	503.8946	501.7225	485.4341	454.3003	424.3044	396.8719	380.4564	383.6724	399.1263	426.9511	460.8997	490.5390 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	7.8700											16.4096 (81)

Solar gains	16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009 (83)
Total gains	520.3043	535.1248	545.6144	553.1337	557.1558	538.5056	512.9518	489.2993	472.4570	467.7713	481.5473	503.9399 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	135.2852	135.8961	136.5125	139.6804	140.3317	143.6815	143.6815	144.3707	142.3225	140.3317	139.0351	137.7623	21.0000 (85)
alpha	10.0190	10.0597	10.1008	10.3120	10.3554	10.5788	10.5788	10.6247	10.4882	10.3554	10.2690	10.1842	
util living area	0.9866	0.9779	0.9487	0.8499	0.6722	0.4700	0.3393	0.3701	0.5823	0.8570	0.9670	0.9891	(86)
MIT	20.7211	20.7776	20.8724	20.9669	20.9968	20.9999	21.0000	21.0000	20.9994	20.9698	20.8476	20.7110	(87)
Th 2	20.4057	20.4083	20.4108	20.4234	20.4260	20.4387	20.4387	20.4412	20.4336	20.4260	20.4209	20.4159	(88)
util rest of house	0.9824	0.9713	0.9345	0.8199	0.6322	0.4288	0.2960	0.3251	0.5350	0.8224	0.9563	0.9856	(89)
MIT 2	20.0912	20.1633	20.2790	20.3941	20.4238	20.4386	20.4387	20.4412	20.4333	20.4007	20.2608	20.0877	(90)
Living area fraction													
MIT	20.3667	20.4320	20.5386	20.6447	20.6744	20.6842	20.6842	20.6857	20.6809	20.6496	20.5175	20.3604	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.3667	20.4320	20.5386	20.6447	20.6744	20.6842	20.6842	20.6857	20.6809	20.6496	20.5175	20.3604	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9821	0.9716	0.9379	0.8318	0.6496	0.4469	0.3149	0.3448	0.5557	0.8364	0.9583	0.9852	(94)
Useful gains	510.9849	519.9240	511.7085	460.0794	361.9314	240.6337	161.5514	168.7088	262.5460	391.2434	461.4716	496.5003	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	674.9631	649.5664	584.4584	477.8702	363.4585	240.6602	161.5520	168.7102	262.7946	407.0028	548.4661	666.6899	(97)
Space heating kWh	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211	(98a)
Space heating requirement - total per year (kWh/year)												478.1729	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												478.1729	
Space heating per m2										(98c) / (4) =		7.1369	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613	(64)
Efficiency of water heater (217)m	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	(216)
Fuel for water heating, kWh/month	76.4651	67.5295	71.4009	61.8462	59.3440	52.8020	51.5723	53.9626	54.9435	62.0807	67.0232	75.4980	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.8207	12.4832	13.8207	13.3749	13.8207	13.3749	13.8207	13.8207	13.3749	13.8207	13.3749	13.8207	(231)
Lighting	19.9282	15.9871	14.3946	10.5461	8.1461	6.6555	7.4312	9.6593	12.5465	16.4617	18.5935	20.4821	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												478.1729	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												338.5009	
Water heating fuel used												754.4679	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 162.7280 (230a)
 Total electricity for the above, kWh/year 162.7280 (231)
 Electricity for lighting (calculated in Appendix L) 160.8319 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1556.2007 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	478.1729	16.4900	78.8507 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	754.4679	16.4900	124.4118 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	162.7280	16.4900	26.8338 (249)
Energy for lighting	160.8319	16.4900	26.5212 (250)
Additional standing charges			0.0000 (251)
Total energy cost			256.6175 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.3600 (256)
 Energy cost factor (ECF) [(255) x (256)] / [(4) + 45.0] = 0.8248 (257)
 SAP value 86.6293
 SAP rating (Section 12) 87 (258)
 SAP band B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	478.1729	0.1585	75.7800 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	754.4679	0.1412	106.5476 (264)
Space and water heating			182.3276 (265)
Pumps, fans and electric keep-hot	162.7280	0.1387	22.5724 (267)
Energy for lighting	160.8319	0.1443	23.2130 (268)
Total CO2, kg/year			228.1129 (272)
CO2 emissions per m2			3.4000 (273)
EI value			97.2708
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	67.0000 (1b)	2.3700 (2b)	158.7900 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 158.7900 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7200 (17)
Infiltration rate	0.1860 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor											(20) =	1 -	[0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor											(21) =	(18) x (20) =	0.1442 (21)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)		
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)		
Adj infilt rate														
	0.1550	0.1514	0.1550	0.1405	0.1442	0.1225	0.1189	0.1189	0.1225	0.1369	0.1369	0.1405 (22b)		
Balanced mechanical ventilation with heat recovery														
If mechanical ventilation												0.5000 (23a)		
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)		
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)		
Effective ac	0.2950	0.2914	0.2950	0.2805	0.2842	0.2625	0.2589	0.2589	0.2625	0.2769	0.2769	0.2805 (25)		

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
Window			7.8700	0.7752	6.1008			(27)					
Heatloss Floor 1			67.0000	0.1100	7.3700	75.0000	5025.0000	(28a)					
External Wall	46.3300	7.8700	38.4600	0.1900	7.3074	150.0000	5769.0003	(29a)					
Total net area of external elements Aum(A, m2)			113.3300					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.7782			(33)					
Main dwelling													
Corridor			14.2900	0.0000	0.0000	180.0000	2572.2000	(32)					
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999	(32)					
Party Ceiling 1			67.0000			40.0000	2680.0000	(32b)					
Internal Wall			96.0200			9.0000	864.1800	(32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		20459.9801	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							305.3728	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622							
E3 Sill				4.7700	0.0260	0.1240							
E4 Jamb				9.9000	0.0300	0.2970							
E5 Ground floor (normal)				19.5500	0.0810	1.5836							
E18 Party wall between dwellings				4.7400	0.0290	0.1375							
E7 Party floor between dwellings (in blocks of flats)				19.5500	-0.0180	-0.3519							
P1 Party wall - Ground floor				14.3500	0.1600	2.2960							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.3500	0.0000	0.0000							
E16 Corner (normal)				4.7400	0.0490	0.2323							
E17 Corner (inverted - internal area greater than external area)				2.3700	-0.0910	-0.2157							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.2649	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	25.0431	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	15.4562	15.2673	15.4562	14.7008	14.8897	13.7566	13.5678	13.5678	13.7566	14.5120	14.5120	14.7008	(38)
Average = Sum(39)m / 12 =	40.4993	40.3104	40.4993	39.7439	39.9327	38.7997	38.6109	38.6109	38.7997	39.5551	39.5551	39.7439	(39)
												39.5551	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6045	0.6016	0.6045	0.5932	0.5960	0.5791	0.5763	0.5763	0.5791	0.5904	0.5904	0.5932	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1711 (42)
Hot water usage for mixer showers	83.3561	82.1035	80.2780	76.7855	74.2080	71.3337	69.6999	71.5115	73.4974	76.5835	80.1511	83.0368 (42a)
Hot water usage for baths	26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044 (42b)
Hot water usage for other uses	36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647 (42c)
Average daily hot water use (litres/day)												134.6499 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	146.4138	143.4316	139.7179	133.8747	129.2004	124.1469	122.0602	125.7563	129.6749	134.9990	140.9379	146.0059 (44)
Distribution loss (46)m = 0.15 x (45)m	231.8837	204.2447	214.7411	183.2678	173.9286	152.6532	147.6212	155.7125	159.9022	183.1923	200.7919	228.6099 (45)
Water storage loss:												Total = Sum(45)m = 2236.5492
Store volume	34.7826	30.6367	32.2112	27.4902	26.0893	22.8980	22.1432	23.3569	23.9853	27.4789	30.1188	34.2915 (46)
a) If manufacturer declared loss factor is known (kWh/day):												201.0000 (47)
Temperature factor from Table 2b												1.6100 (48)
Enter (49) or (54) in (55)												0.5400 (49)
Total storage loss												0.8694 (55)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
Primary loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Electric shower(s)	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (64)
Heat gains from water heating, kWh/month	Total per year (kWh/year) = Sum(64)m = 2553.8802 (64)											
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)											
	77.1013	67.9114	71.4014	60.9365	57.8313	50.7572	49.0841	51.7744	53.1675	60.9115	66.7633	76.0128 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.7674	20.2218	16.4455	12.4503	9.3067	7.8571	8.4899	11.0355	14.8119	18.8070	21.9506	23.4002	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	283.8754	286.8211	279.3980	263.5949	243.6464	224.8976	212.3723	209.4266	216.8497	232.6528	252.6013	271.3501	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	(71)
Water heating gains (Table 5)	103.6308	101.0586	95.9697	84.6341	77.7302	70.4961	65.9732	69.5893	73.8437	81.8702	92.7268	102.1677	(72)
Total internal gains	503.8946	501.7225	485.4341	454.3003	424.3044	396.8719	380.4564	383.6724	399.1263	426.9511	460.8997	490.5390	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

Northwest					7.8700	9.9768	0.2400	0.0000			0.7700	14.5100 (81)	

Solar gains	14.5100	30.3070	57.0633	95.5887	125.3089	136.7484	124.8513	98.9531	71.4475	39.5864	18.7644	12.7561	(83)
Total gains	518.4047	532.0295	542.4974	549.8890	549.6132	533.6203	505.3077	482.6255	470.5738	466.5374	479.6642	503.2951	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	140.3317	140.9891	140.3317	142.9988	142.3225	146.4787	147.1951	147.1951	146.4787	143.6815	143.6815	142.9988	
alpha	10.3554	10.3993	10.3554	10.5333	10.4882	10.7652	10.8130	10.8130	10.7652	10.5788	10.5788	10.5333	
util living area	0.9774	0.9637	0.9249	0.7913	0.5947	0.3926	0.2904	0.3200	0.5274	0.8085	0.9470	0.9818	(86)
MIT	20.7959	20.8452	20.9150	20.9851	20.9991	21.0000	21.0000	21.0000	20.9998	20.9844	20.8988	20.7829	(87)
Th 2	20.4260	20.4285	20.4260	20.4361	20.4336	20.4488	20.4514	20.4514	20.4488	20.4387	20.4387	20.4361	(88)
util rest of house	0.9707	0.9535	0.9060	0.7570	0.5541	0.3526	0.2484	0.2761	0.4822	0.7697	0.9313	0.9763	(89)
MIT 2	20.2018	20.2635	20.3418	20.4238	20.4331	20.4488	20.4514	20.4514	20.4488	20.4265	20.3368	20.1950	(90)
Living area fraction	20.4617	20.5180	20.5925	20.6693	20.6807	20.6900	20.6914	20.6914	20.6898	20.6706	20.5827	20.4522	(91)
MIT	20.4617	20.5180	20.5925	20.6693	20.6807	20.6900	20.6914	20.6914	20.6898	20.6706	20.5827	20.4522	(92)
Temperature adjustment	20.4617	20.5180	20.5925	20.6693	20.6807	20.6900	20.6914	20.6914	20.6898	20.6706	20.5827	20.4522	(93)
adjusted MIT	20.4617	20.5180	20.5925	20.6693	20.6807	20.6900	20.6914	20.6914	20.6898	20.6706	20.5827	20.4522	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9711	0.9552	0.9118	0.7715	0.5719	0.3701	0.2668	0.2953	0.5020	0.7861	0.9356	0.9765	(94)
Useful gains	503.4467	508.2142	494.6731	424.2180	314.3090	197.4857	134.8054	142.5275	236.2127	366.7469	448.7929	491.4539	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	622.1361	597.3182	542.3876	431.9900	314.6976	197.4885	134.8055	142.5277	236.2835	374.6090	505.6193	618.1036	(97)
Space heating kWh	88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(98a)
Space heating requirement - total per year (kWh/year)												330.5592	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												330.5592	
Space heating per m2										(98c) / (4) =		4.9337	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

0.0000 (213)

10a. Fuel costs - using BEDF prices (577)			
	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	330.5592	28.4300	93.9780 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	754.4679	28.4300	214.4952 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	162.7280	28.4300	46.2636 (249)
Energy for lighting	160.8319	28.4300	45.7245 (250)
Additional standing charges			0.0000 (251)
Total energy cost			400.4613 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	330.5592	0.1591	52.5767 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	754.4679	0.1412	106.5476 (264)
Space and water heating			159.1243 (265)
Pumps, fans and electric keep-hot	162.7280	0.1387	22.5724 (267)
Energy for lighting	160.8319	0.1443	23.2130 (268)
Total CO2, kg/year			204.9097 (272)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	330.5592	1.5888	525.1887 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	754.4679	1.5222	1148.4544 (278)
Space and water heating			1673.6432 (279)
Pumps, fans and electric keep-hot	162.7280	1.5128	246.1749 (281)
Energy for lighting	160.8319	1.5338	246.6894 (282)
Total Primary energy kWh/year			2166.5074 (286)

Plot 3

Full SAP Calculation Printout



Current energy efficiency rating:
Current environmental impact rating:

B 87
A 97

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 87
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current £400	Potential £400	Saving £0
Electricity			
Space heating	£140	£140	£0
Water heating	£214	£214	£0
Lighting	£46	£46	£0
Total cost of fuels	£400	£400	£0
Total cost of uses	£400	£400	£0
Delivered energy	21 kWh/m ²	21 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	32 kWh/m ²	32 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	67.0000 (1b)	2.3700 (2b)	158.7900 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	158.7900 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.7200 (17)
Infiltration rate		0.1860 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1442 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1838	0.1802	0.1766	0.1586	0.1550	0.1369	0.1369	0.1333	0.1442	0.1550	0.1622	0.1694 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3238	0.3202	0.3166	0.2986	0.2950	0.2769	0.2769	0.2733	0.2842	0.2950	0.3022	0.3094 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K						
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
Window			7.8700	0.7752	6.1008			(27)					
Heatloss Floor 1			67.0000	0.1100	7.3700	75.0000	5025.0000	(28a)					
External Wall	46.3300	7.8700	38.4600	0.1900	7.3074	150.0000	5769.0003	(29a)					
Total net area of external elements Aum(A, m2)			113.3300					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.7782			(33)					
Main dwelling													
Corridor			14.2900	0.0000	0.0000	180.0000	2572.2000	(32)					
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999	(32)					
Party Ceiling 1			67.0000			40.0000	2680.0000	(32b)					
Internal Wall			96.0200			9.0000	864.1800	(32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		20459.9801	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							305.3728	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622							
E3 Sill				4.7700	0.0260	0.1240							
E4 Jamb				9.9000	0.0300	0.2970							
E5 Ground floor (normal)				19.5500	0.0810	1.5836							
E18 Party wall between dwellings				4.7400	0.0290	0.1375							
E7 Party floor between dwellings (in blocks of flats)				19.5500	-0.0180	-0.3519							
P1 Party wall - Ground floor				14.3500	0.1600	2.2960							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.3500	0.0000	0.0000							
E16 Corner (normal)				4.7400	0.0490	0.2323							
E17 Corner (inverted - internal area greater than external area)				2.3700	-0.0910	-0.2157							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.2649	(36)					
Point Thermal bridges							0.0000						
Total fabric heat loss					(33) + (36) + (36a) =		25.0431	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	16.9669	16.7780	16.5892	15.6450	15.4562	14.5120	14.5120	14.3231	14.8897	15.4562	15.8339	16.2115	(38)
Average = Sum(39)m / 12 =	42.0100	41.8211	41.6323	40.6881	40.4993	39.5551	39.5551	39.3662	39.9327	40.4993	40.8769	41.2546	(39)
													40.6409
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6270	0.6242	0.6214	0.6073	0.6045	0.5904	0.5904	0.5876	0.5960	0.6045	0.6101	0.6157	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.1711 (42)
Hot water usage for mixer showers													
	83.3561	82.1035	80.2780	76.7855	74.2080	71.3337	69.6999	71.5115	73.4974	76.5835	80.1511	83.0368	(42a)
Hot water usage for baths													
	26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044	(42b)
Hot water usage for other uses													
	36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647	(42c)
Average daily hot water use (litres/day)													134.6499 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	146.4138	143.4316	139.7179	133.8747	129.2004	124.1469	122.0602	125.7563	129.6749	134.9990	140.9379	146.0059	(44)
Energy conte	231.8837	204.2447	214.7411	183.2678	173.9286	152.6532	147.6212	155.7125	159.9022	183.1923	200.7919	228.6099	(45)
Energy content (annual)										Total = Sum(45)m =			2236.5492
Distribution loss (46)m = 0.15 x (45)m													
	34.7826	30.6367	32.2112	27.4902	26.0893	22.8980	22.1432	23.3569	23.9853	27.4789	30.1188	34.2915	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
WWHRS	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h													
	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613	(64)
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =				2553.8802	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000	(64a)
Heat gains from water heating, kWh/month	77.1013	67.9114	71.4014	60.9365	57.8313	50.7572	49.0841	51.7744	53.1675	60.9115	66.7633	76.0128	(65)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	22.7674	20.2218	16.4455	12.4503	9.3067	7.8571	8.4899	11.0355	14.8119	18.8070	21.9506	23.4002	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	283.8754	286.8211	279.3980	263.5949	243.6464	224.8976	212.3723	209.4266	216.8497	232.6528	252.6013	271.3501	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	(71)
Water heating gains (Table 5)													
	103.6308	101.0586	95.9697	84.6341	77.7302	70.4961	65.9732	69.5893	73.8437	81.8702	92.7268	102.1677	(72)
Total internal gains													
	503.8946	501.7225	485.4341	454.3003	424.3044	396.8719	380.4564	383.6724	399.1263	426.9511	460.8997	490.5390	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	

Northwest				7.8700	11.2829	0.2400		0.0000		0.7700	16.4096 (81)	

Solar gains	16.4096	33.4023	60.1803	98.8334	132.8514	141.6337	132.4954	105.6269	73.3307	40.8203	20.6476	13.4009 (83)
Total gains	520.3043	535.1248	545.6144	553.1337	557.1558	538.5056	512.9518	489.2993	472.4570	467.7713	481.5473	503.9399 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	135.2852	135.8961	136.5125	139.6804	140.3317	143.6815	143.6815	144.3707	142.3225	140.3317	139.0351	137.7623
alpha	10.0190	10.0597	10.1008	10.3120	10.3554	10.5788	10.5788	10.6247	10.4882	10.3554	10.2690	10.1842
util living area	0.9866	0.9779	0.9487	0.8499	0.6722	0.4700	0.3393	0.3701	0.5823	0.8570	0.9670	0.9891 (86)
MIT	20.7211	20.7776	20.8724	20.9669	20.9968	20.9999	21.0000	21.0000	20.9994	20.9698	20.8476	20.7110 (87)
Th 2	20.4057	20.4083	20.4108	20.4234	20.4260	20.4387	20.4387	20.4412	20.4336	20.4260	20.4209	20.4159 (88)
util rest of house	0.9824	0.9713	0.9345	0.8199	0.6322	0.4288	0.2960	0.3251	0.5350	0.8224	0.9563	0.9856 (89)
MIT 2	20.0912	20.1633	20.2790	20.3941	20.4238	20.4386	20.4387	20.4412	20.4333	20.4007	20.2608	20.0877 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.3667	20.4320	20.5386	20.6447	20.6744	20.6842	20.6842	20.6857	20.6809	20.6496	20.5175	20.3604 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.3667	20.4320	20.5386	20.6447	20.6744	20.6842	20.6842	20.6857	20.6809	20.6496	20.5175	20.3604 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9821	0.9716	0.9379	0.8318	0.6496	0.4469	0.3149	0.3448	0.5557	0.8364	0.9583	0.9852 (94)
Useful gains	510.9849	519.9240	511.7085	460.0794	361.9314	240.6337	161.5514	168.7088	262.5460	391.2434	461.4716	496.5003 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	674.9631	649.5664	584.4584	477.8702	363.4585	240.6602	161.5520	168.7102	262.7946	407.0028	548.4661	666.6899 (97)
Space heating kWh	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211 (98a)
Space heating requirement - total per year (kWh/year)	478.1729											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	478.1729											
Space heating per m2	(98c) / (4) = 7.1369 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	121.9998	87.1197	54.1259	12.8093	1.1361	0.0000	0.0000	0.0000	0.0000	11.7250	62.6361	126.6211 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000 (213)											
Water heating												
Water heating requirement	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (64)
Efficiency of water heater	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009 (216)
(217)m	76.4651	67.5295	71.4009	61.8462	59.3440	52.8020	51.5723	53.9626	54.9435	62.0807	67.0232	75.4980 (219)
Fuel for water heating, kWh/month	76.4651	67.5295	71.4009	61.8462	59.3440	52.8020	51.5723	53.9626	54.9435	62.0807	67.0232	75.4980 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.8207	12.4832	13.8207	13.3749	13.8207	13.3749	13.8207	13.8207	13.3749	13.8207	13.3749	13.8207 (231)
Lighting	19.9282	15.9871	14.3946	10.5461	8.1461	6.6555	7.4312	9.6593	12.5465	16.4617	18.5935	20.4821 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												478.1729	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												338.5009	
Water heating fuel used												754.4679	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												162.7280	(230a)
Total electricity for the above, kWh/year												162.7280	(231)
Electricity for lighting (calculated in Appendix L)												160.8319	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1556.2007	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	478.1729	16.4900	78.8507	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	754.4679	16.4900	124.4118	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	162.7280	16.4900	26.8338	(249)
Energy for lighting	160.8319	16.4900	26.5212	(250)
Additional standing charges			0.0000	(251)
Total energy cost			256.6175	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):				0.3600	(256)
Energy cost factor (ECF)				0.8248	(257)
SAP value				86.6293	
SAP rating (Section 12)				87	(258)
SAP band				B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	478.1729	0.1585	75.7800	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	754.4679	0.1412	106.5476	(264)
Space and water heating			182.3276	(265)
Pumps, fans and electric keep-hot	162.7280	0.1387	22.5724	(267)
Energy for lighting	160.8319	0.1443	23.2130	(268)
Total CO2, kg/year			228.1129	(272)
CO2 emissions per m2			3.4000	(273)
EI value			97.2708	
EI rating			97	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	67.0000	x	158.7900	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.0000			(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	158.7900	

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000	(6a)
-------------------------	----------	--------	------

Full SAP Calculation Printout



Number of open flues
Number of chimneys / flues attached to closed fire
Number of flues attached to solid fuel boiler
Number of flues attached to other heater
Number of blocked chimneys
Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

0 * 20 = 0.0000 (6b)
0 * 10 = 0.0000 (6c)
0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
0 * 10 = 0.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
3.7200 (17)
0.1860 (18)
3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1442 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate	0.1550	0.1514	0.1550	0.1405	0.1442	0.1225	0.1189	0.1189	0.1225	0.1369	0.1369	0.1405
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2950	0.2914	0.2950	0.2805	0.2842	0.2625	0.2589	0.2589	0.2625	0.2769	0.2769	0.2805

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			7.8700	0.7752	6.1008		(27)
Heatloss Floor 1			67.0000	0.1100	7.3700	75.0000	5025.0000 (28a)
External Wall	46.3300	7.8700	38.4600	0.1900	7.3074	150.0000	5769.0003 (29a)
Total net area of external elements Aum(A, m2)			113.3300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.7782		(33)
Main dwelling							
Corridor			14.2900	0.0000	0.0000	180.0000	2572.2000 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Ceiling 1			67.0000			40.0000	2680.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20459.9801 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							305.3728 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	4.7700	0.0340	0.1622
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240
E3 Sill	9.9000	0.0300	0.2970
E4 Jamb	19.5500	0.0810	1.5836
E5 Ground floor (normal)	4.7400	0.0290	0.1375
E18 Party wall between dwellings	19.5500	-0.0180	-0.3519
E7 Party floor between dwellings (in blocks of flats)	14.3500	0.1600	2.2960
P1 Party wall - Ground floor	14.3500	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.7400	0.0490	0.2323
E16 Corner (normal)	2.3700	-0.0910	-0.2157
E17 Corner (inverted - internal area greater than external area)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.2649 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	25.0431 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	15.4562	15.2673	15.4562	14.7008	14.8897	13.7566	13.5678	13.5678	13.7566	14.5120	14.5120	14.7008
Heat transfer coeff	40.4993	40.3104	40.4993	39.7439	39.9327	38.7997	38.6109	38.6109	38.7997	39.5551	39.5551	39.7439
Average = Sum(39)m / 12 =												39.5551

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6045	0.6016	0.6045	0.5932	0.5960	0.5791	0.5763	0.5763	0.5791	0.5904	0.5904	0.5932
HLP (average)												0.5904
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.1711 (42)

Hot water usage for mixer showers

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
83.3561	82.1035	80.2780	76.7855	74.2080	71.3337	69.6999	71.5115	73.4974	76.5835	80.1511	83.0368	83.0368

Hot water usage for baths

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
26.1929	25.8039	25.2561	24.2461	23.4898	22.6512	22.1982	22.7422	23.3344	24.2318	25.2626	26.1044	26.1044

Hot water usage for other uses

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
36.8647	35.5242	34.1837	32.8431	31.5026	30.1621	30.1621	31.5026	32.8431	34.1837	35.5242	36.8647	36.8647

Average daily hot water use (litres/day) 134.6499 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	146.4138	143.4316	139.7179	133.8747	129.2004	124.1469	122.0602	125.7563	129.6749	134.9990	140.9379	146.0059
Energy conte	231.8837	204.2447	214.7411	183.2678	173.9286	152.6532	147.6212	155.7125	159.9022	183.1923	200.7919	228.6099
Energy content (annual)												2236.5492
Distribution loss (46)m = 0.15 x (45)m												
34.7826	30.6367	32.2112	27.4902	26.0893	22.8980	22.1432	23.3569	23.9853	27.4789	30.1188	34.2915	34.2915
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514
If cylinder contains dedicated solar storage												

Full SAP Calculation Printout



Primary loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613 (64)
	Total per year (kWh/year) = Sum(64)m =											2553.8802 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	77.1013	67.9114	71.4014	60.9365	57.8313	50.7572	49.0841	51.7744	53.1675	60.9115	66.7633	76.0128 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	130.2689	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.7674	20.2218	16.4455	12.4503	9.3067	7.8571	8.4899	11.0355	14.8119	18.8070	21.9506	23.4002	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	283.8754	286.8211	279.3980	263.5949	243.6464	224.8976	212.3723	209.4266	216.8497	232.6528	252.6013	271.3501	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	50.1980	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	-86.8459	(71)
Water heating gains (Table 5)	103.6308	101.0586	95.9697	84.6341	77.7302	70.4961	65.9732	69.5893	73.8437	81.8702	92.7268	102.1677	(72)
Total internal gains	503.8946	501.7225	485.4341	454.3003	424.3044	396.8719	380.4564	383.6724	399.1263	426.9511	460.8997	490.5390	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
Northwest					7.8700	9.9768	0.2400	0.0000	0.7700		14.5100 (81)	
Solar gains	14.5100	30.3070	57.0633	95.5887	125.3089	136.7484	124.8513	98.9531	71.4475	39.5864	18.7644	12.7561 (83)
Total gains	518.4047	532.0295	542.4974	549.8890	549.6132	533.6203	505.3077	482.6255	470.5738	466.5374	479.6642	503.2951 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	140.3317	140.9891	140.3317	142.9988	142.3225	146.4787	147.1951	147.1951	146.4787	143.6815	143.6815	142.9988	
alpha	10.3554	10.3993	10.3554	10.5333	10.4882	10.7652	10.8130	10.8130	10.7652	10.5788	10.5788	10.5333	
util living area	0.9774	0.9637	0.9249	0.7913	0.5947	0.3926	0.2904	0.3200	0.5274	0.8085	0.9470	0.9818	(86)
MIT	20.7959	20.8452	20.9150	20.9851	20.9991	21.0000	21.0000	21.0000	20.9998	20.9844	20.8988	20.7829	(87)
Th 2	20.4260	20.4285	20.4260	20.4361	20.4336	20.4488	20.4514	20.4514	20.4488	20.4387	20.4387	20.4361	(88)
util rest of house	0.9707	0.9535	0.9060	0.7570	0.5541	0.3526	0.2484	0.2761	0.4822	0.7697	0.9313	0.9763	(89)
MIT 2	20.2018	20.2635	20.3418	20.4238	20.4331	20.4488	20.4514	20.4514	20.4488	20.4265	20.3368	20.1950	(90)
Living area fraction													(91)
MIT	20.4617	20.5180	20.5925	20.6693	20.6807	20.6900	20.6914	20.6914	20.6898	20.6706	20.5827	20.4522	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4617	20.5180	20.5925	20.6693	20.6807	20.6900	20.6914	20.6914	20.6898	20.6706	20.5827	20.4522	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9711	0.9552	0.9118	0.7715	0.5719	0.3701	0.2668	0.2953	0.5020	0.7861	0.9356	0.9765	(94)
Useful gains	503.4467	508.2142	494.6731	424.2180	314.3090	197.4857	134.8054	142.5275	236.2127	366.7469	448.7929	491.4539	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	622.1361	597.3182	542.3876	431.9900	314.6976	197.4885	134.8055	142.5277	236.2835	374.6090	505.6193	618.1036	(97)
Space heating kWh	88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(98a)
Space heating requirement - total per year (kWh/year)												330.5592	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												330.5592	
Space heating per m2												(98c) / (4) =	4.9337 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)

Full SAP Calculation Printout



Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	88.3049	59.8779	35.4996	5.5959	0.2892	0.0000	0.0000	0.0000	0.0000	5.8494	40.9150	94.2274	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	258.8351	228.5879	241.6925	209.3498	200.8800	178.7352	174.5726	182.6639	185.9842	210.1437	226.8739	255.5613	(64)
Efficiency of water heater													
(217)m	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	338.5009	(216)
Fuel for water heating, kWh/month	76.4651	67.5295	71.4009	61.8462	59.3440	52.8020	51.5723	53.9626	54.9435	62.0807	67.0232	75.4980	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.8207	12.4832	13.8207	13.3749	13.8207	13.3749	13.8207	13.8207	13.3749	13.8207	13.3749	13.8207	(231)
Lighting	19.9282	15.9871	14.3946	10.5461	8.1461	6.6555	7.4312	9.6593	12.5465	16.4617	18.5935	20.4821	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												330.5592	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												338.5009	
Water heating fuel used												754.4679	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												162.7280	(230a)
Total electricity for the above, kWh/year												162.7280	(231)
Electricity for lighting (calculated in Appendix L)												160.8319	(232)
Energy saving/generation technologies (Appendices M, N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1408.5870	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	330.5592	28.4300	93.9780	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	754.4679	28.4300	214.4952	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	162.7280	28.4300	46.2636	(249)
Energy for lighting	160.8319	28.4300	45.7245	(250)
Additional standing charges			0.0000	(251)
Total energy cost			400.4613	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	330.5592	0.1591	52.5767	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	754.4679	0.1412	106.5476	(264)
Space and water heating			159.1243	(265)
Pumps, fans and electric keep-hot	162.7280	0.1387	22.5724	(267)
Energy for lighting	160.8319	0.1443	23.2130	(268)
Total CO2, kg/year			204.9097	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	330.5592	1.5888	525.1887	(275)

Full SAP Calculation Printout



Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	754.4679	1.5222	1148.4544 (278)
Space and water heating			1673.6432 (279)
Pumps, fans and electric keep-hot	162.7280	1.5128	246.1749 (281)
Energy for lighting	160.8319	1.5338	246.6894 (282)
Total Primary energy kWh/year			2166.5074 (286)

Full SAP Calculation Printout



Property Reference	Plot 4			Issued on Date	27/08/2025
Assessment Reference	Plot 4	Prop Type Ref			
Property	Flat 4, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.35	TER	10.44
Environmental	97 A	% DER < TER			67.91
CO ₂ Emissions (t/year)	0.19	DFEE	20.19	TFEE	23.52
Compliance Check	See BREL	% DFEE < TFEE			14.15
% DPER < TPER	35.63	DPER	35.27	TPER	54.79
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	68.0000 (1b)	2.3700 (2b)	161.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		161.1600 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	161.1600 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9100 (17)
Infiltration rate	0.1955 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1662 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2119	0.2077	0.2036	0.1828	0.1786	0.1579	0.1579	0.1537	0.1662	0.1786	0.1869	0.1953 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3519	0.3477	0.3436	0.3228	0.3186	0.2979	0.2979	0.2937	0.3062	0.3186	0.3269	0.3353 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			68.0000	0.1100	7.4800	5100.0000	(28a)
External Wall	20.7800	8.6000	12.1800	0.1900	2.3142	150.0000	1827.0001 (29a)
Bin Store Wall	16.3500		16.3500	0.1900	3.1065	150.0000	2452.5001 (29a)
Total net area of external elements Aum(A, m ²)			105.1300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.5674		(33)
Main dwelling							
Corridor			43.9200	0.0000	0.0000	180.0000	7905.5997 (32)
Party Ceiling 1			68.0000			30.0000	2040.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20189.2798 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.9012 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E5 Ground floor (normal)	15.6700	0.0810	1.2693
E7 Party floor between dwellings (in blocks of flats)	15.6700	-0.0180	-0.2821
P1 Party wall - Ground floor	18.5300	0.1600	2.9648
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	0.0000	0.0000
E16 Corner (normal)	2.3700	0.0490	0.1161
E18 Party wall between dwellings	4.7400	0.0290	0.1375

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 24.3838 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	18.7136	18.4927	18.2717	17.1670	16.9461	15.8414	15.8414	15.6204	16.2832	16.9461	17.3879	17.8298
Average = Sum(39)m / 12 =	43.0974	42.8764	42.6555	41.5508	41.3298	40.2251	40.2251	40.0042	40.6670	41.3298	41.7717	42.2136

HLP (average)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in mont	0.6338	0.6305	0.6273	0.6110	0.6078	0.5915	0.5915	0.5883	0.5980	0.6078	0.6143	0.6208
	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.1966 (42)											
Hot water usage for mixer showers	83.9431	82.6816	80.8433	77.3261	74.7306	71.8360	70.1907	72.0151	74.0149	77.1228	80.7155	83.6214
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254
Average daily hot water use (litres/day)	135.5983 (43)											
Daily hot water use	147.4450	144.4418	140.7019	134.8176	130.1104	125.0213	122.9199	126.6420	130.5883	135.9498	141.9306	147.0342
Energy conte	233.5169	205.6832	216.2535	184.5585	175.1536	153.7283	148.6609	156.8092	161.0284	184.4826	202.2062	230.2201
Energy content (annual)	2252.3013 (45)											
Distribution loss (46)m = 0.15 x (45)m	35.0275	30.8525	32.4380	27.6838	26.2730	23.0592	22.2991	23.5214	24.1543	27.6724	30.3309	34.5330
Water storage loss:												
Store volume	201.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.8694 (55)											
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715
12Total per year (kWh/year)	2569.6323 (64)											
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)											
Heat gains from water heating, kWh/month	77.6444	68.3897	71.9043	61.3657	58.2386	51.1146	49.4298	52.1391	53.5419	61.3405	67.2335	76.5482

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.7566	121.5162	109.7566	113.4152	109.7566	113.4152	109.7566	109.7566	113.4152	109.7566	113.4152	109.7566
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643
Water heating gains (Table 5)	104.3607	101.7703	96.6456	85.2302	78.2776	70.9926	66.4378	70.0794	74.3638	82.4469	93.3799	102.8873
Total internal gains	462.6513	473.8190	451.8986	433.4208	409.2764	392.9304	376.2198	377.8629	390.8418	405.9873	434.1123	452.6806

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				8.6000	36.7938	0.2400	0.0000	0.7700	58.4757 (77)			
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)	
Total gains	521.1270	573.4247	588.1836	602.2844	598.4177	580.7040	557.2536	543.7686	538.4096	516.0729	504.1527	502.7236 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	130.1271	130.7976	131.4751	134.9706	135.6921	139.4187	139.4187	140.1887	137.9038	135.6921	134.2567	132.8513	21.0000 (85)
alpha	9.6751	9.7198	9.7650	9.9980	10.0461	10.2946	10.2946	10.3459	10.1936	10.0461	9.9504	9.8568	
util living area	0.9875	0.9677	0.9282	0.8085	0.6396	0.4433	0.3176	0.3384	0.5208	0.8073	0.9589	0.9900	(86)
MIT	20.6933	20.7974	20.8914	20.9762	20.9976	21.0000	21.0000	21.0000	20.9997	20.9802	20.8542	20.6830	(87)
Th 2	20.3997	20.4026	20.4055	20.4201	20.4230	20.4376	20.4376	20.4405	20.4318	20.4230	20.4172	20.4113	(88)
util rest of house	0.9836	0.9589	0.9109	0.7769	0.6010	0.4043	0.2770	0.2973	0.4781	0.7705	0.9466	0.9868	(89)
MIT 2	20.0519	20.1821	20.2953	20.3994	20.4213	20.4376	20.4376	20.4405	20.4316	20.4069	20.2650	20.0494	(90)
Living area fraction	fLA = Living area / (4) =												0.4200 (91)
MIT	20.3213	20.4405	20.5456	20.6417	20.6633	20.6738	20.6738	20.6755	20.6702	20.6477	20.5125	20.3155	(92)
Temperature adjustment													0.0000
adjusted MIT	20.3213	20.4405	20.5456	20.6417	20.6633	20.6738	20.6738	20.6755	20.6702	20.6477	20.5125	20.3155	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9830	0.9595	0.9152	0.7893	0.6171	0.4207	0.2941	0.3145	0.4961	0.7852	0.9488	0.9862	(94)
Useful gains	512.2896	550.2036	538.3278	475.3644	369.3059	244.2996	163.8694	171.0377	267.0850	405.2175	478.3644	495.8094	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	690.4750	666.3225	599.1236	487.8753	370.4526	244.3186	163.8698	171.0385	267.1916	415.2682	560.2618	680.2932	(97)
Space heating kWh	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(98a)
Space heating requirement - total per year (kWh/year)													469.3946
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)													0.0000
Space heating kWh	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													469.3946
Space heating per m2													(98c) / (4) = 6.9029 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715	(64)
Efficiency of water heater (217)m	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	(216)
Fuel for water heating, kWh/month	77.0159	68.0148	71.9115	62.2827	59.7589	53.1668	51.9255	54.3348	55.3253	62.5173	67.5008	76.0411	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	14.0270	12.6696	14.0270	13.5745	14.0270	13.5745	14.0270	14.0270	13.5745	14.0270	13.5745	14.0270	(231)
Lighting	19.8597	15.9322	14.3452	10.5099	8.1182	6.6326	7.4057	9.6262	12.5034	16.4052	18.5296	20.4117	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													469.3946 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													338.2005
Water heating fuel used													759.7955 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 165.1568 (230a)
 Total electricity for the above, kWh/year 165.1568 (231)
 Electricity for lighting (calculated in Appendix L) 160.2795 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1554.6264 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	469.3946	0.1592	74.7088 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	759.7955	0.1412	107.3016 (264)
Space and water heating			182.0104 (265)
Pumps, fans and electric keep-hot	165.1568	0.1387	22.9093 (267)
Energy for lighting	160.2795	0.1443	23.1333 (268)
Total CO2, kg/year			228.0530 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	469.3946	1.5891	745.9305 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	759.7955	1.5222	1156.5703 (278)
Space and water heating			1902.5008 (279)
Pumps, fans and electric keep-hot	165.1568	1.5128	249.8491 (281)
Energy for lighting	160.2795	1.5338	245.8421 (282)
Total Primary energy kWh/year			2398.1921 (286)
Dwelling Primary energy Rate (DPER)			35.2700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	68.0000 (1b)	2.3700 (2b)	161.1600 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		161.1600 (5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1241 (8)
 Pressure test
 Pressure Test Method
 Measured/design AP50
 Infiltration rate
 Number of sides sheltered
 Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3180 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4054	0.3975	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736 (22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5506	0.5584	0.5640	0.5698 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			8.6000	1.1450	9.8473		(27)
Heatloss Floor 1			68.0000	0.1300	8.8400		(28a)
External Wall	20.7800	8.6000	12.1800	0.1800	2.1924		(29a)
Bin Store Wall	16.3500		16.3500	0.1800	2.9430		(29a)
Total net area of external elements Aum(A, m2)			105.1300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.8227		(33)
Main dwelling							
Corridor			43.9200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

306.9012 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	4.7700	0.0500	0.2385
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385
E3 Sill	10.8200	0.0500	0.5410
E4 Jamb	15.6700	0.1600	2.5072
E5 Ground floor (normal)	15.6700	0.0700	1.0969
E7 Party floor between dwellings (in blocks of flats)	18.5300	0.0800	1.4824
P1 Party wall - Ground floor	18.5300	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.3700	0.0900	0.2133
E16 Corner (normal)	4.7400	0.0600	0.2844
E18 Party wall between dwellings			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.6022 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.4249 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	30.9623	30.7926	30.6262	29.8448	29.6986	29.0180	29.0180	28.8920	29.2802	29.6986	29.9944	30.3036 (38)
Average = Sum(39)m / 12 =	61.3873	61.2175	61.0512	60.2697	60.1235	59.4430	59.4430	59.3169	59.7051	60.1235	60.4193	60.7285 (39)
												60.2690
HLP	0.9028	0.9003	0.8978	0.8863	0.8842	0.8742	0.8742	0.8723	0.8780	0.8842	0.8885	0.8931 (40)
HLP (average)												0.8863
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

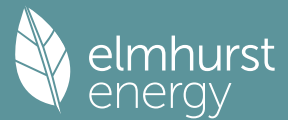
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1966 (42)
Hot water usage for mixer showers												
61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156 (42a)	
Hot water usage for baths												
26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)	
Hot water usage for other uses												
37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)	
Average daily hot water use (litres/day)												114.4912 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284 (44)
Energy content (annual)	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116 (45)
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	243.8540	215.6587	228.9612	200.7806	194.3116	174.7299	172.1041	179.0851	181.2290	202.5353	215.9360	241.1065 (62)
WWHRS	-27.9093	-24.6832	-25.8468	-21.4022	-19.9461	-17.0680	-15.9985	-17.0128	-17.6592	-20.8183	-23.5846	-27.3924 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	215.9447	190.9755	203.1144	179.3785	174.3656	157.6619	156.1056	162.0723	163.5698	181.7170	192.3514	213.7141 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2190.9707 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	102.8646	91.3816	97.9127	87.8400	86.3917	79.1781	79.0077	81.3289	81.3391	89.1261	92.8792	101.9510 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.5702	117.9884	106.5702	110.1225	106.5702	110.1225	106.5702	106.5702	110.1225	106.5702	110.1225	106.5702 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	138.2588	135.9845	131.6031	122.0000	116.1179	109.9696	106.1932	109.3131	112.9709	119.7931	128.9988	137.0310 (72)
Total internal gains	496.3630	507.5053	486.6698	469.8980	446.9302	428.6148	412.7887	413.9102	426.1564	443.1472	469.4386	486.6378 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2			Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast	8.6000			36.7938		0.6300		0.7000		0.7700		96.7042 (77)
Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586 (83)
Total gains	593.0672	672.2284	712.0510	749.1562	759.7228	739.1454	712.1733	688.2767	670.1966	625.2012	585.2679	569.3964 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	94.4336	94.6954	94.9535	96.1846	96.4185	97.5225	97.5225	97.7297	97.0942	96.4185	95.9465	95.4580
util living area	7.2956	7.3130	7.3302	7.4123	7.4279	7.5015	7.5015	7.5153	7.4729	7.4279	7.3964	7.3639
util living area	0.9921	0.9798	0.9526	0.8689	0.7144	0.5130	0.3671	0.3962	0.6084	0.8814	0.9780	0.9939 (86)
MIT	20.3933	20.5457	20.7123	20.8910	20.9772	20.9982	20.9999	20.9998	20.9941	20.8966	20.6276	20.3680 (87)
Th 2	20.1652	20.1673	20.1694	20.1791	20.1810	20.1895	20.1895	20.1911	20.1862	20.1810	20.1773	20.1734 (88)
util rest of house	0.9893	0.9730	0.9375	0.8342	0.6593	0.4489	0.2996	0.3267	0.5396	0.8423	0.9694	0.9917 (89)
MIT 2	19.4751	19.6671	19.8715	20.0811	20.1649	20.1887	20.1895	20.1910	20.1831	20.0926	19.7793	19.4498 (90)
Living area fraction	19.8607	20.0361	20.2246	20.4212	20.5061	20.5287	20.5298	20.5307	20.5237	20.4303	20.1356	19.8354 (92)
MIT	19.8607	20.0361	20.2246	20.4212	20.5061	20.5287	20.5298	20.5307	20.5237	20.4303	20.1356	19.8354 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8607	20.0361	20.2246	20.4212	20.5061	20.5287	20.5298	20.5307	20.5237	20.4303	20.1356	19.8354 (93)

8. Space heating requirement

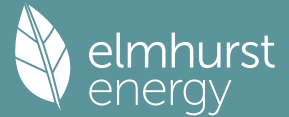
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9881	0.9718	0.9386	0.8451	0.6817	0.4758	0.3280	0.3559	0.5685	0.8551	0.9689	0.9906 (94)
Ext temp.	585.9862	653.2574	668.3489	633.1157	517.9248	351.7059	233.5652	244.9539	380.9747	534.6356	567.0374	564.0448 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	955.2306	926.5939	837.9050	694.3826	529.4517	352.4196	233.6019	245.0211	383.5296	591.0298	787.6015	949.5157 (97)
Space heating requirement - total per year (kWh/year)	274.7178	183.6821	126.1497	44.1122	8.5761	0.0000	0.0000	0.0000	0.0000	41.9573	158.8061	286.7903 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	274.7178	183.6821	126.1497	44.1122	8.5761	0.0000	0.0000	0.0000	0.0000	41.9573	158.8061	286.7903 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1124.7917
Space heating per m2										(98c) / (4) =		16.5411 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	274.7178	183.6821	126.1497	44.1122	8.5761	0.0000	0.0000	0.0000	0.0000	41.9573	158.8061	286.7903 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	297.6358	199.0055	136.6736	47.7922	9.2915	0.0000	0.0000	0.0000	0.0000	45.4576	172.0543	310.7154 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	215.9447	190.9755	203.1144	179.3785	174.3656	157.6619	156.1056	162.0723	163.5698	181.7170	192.3514	213.7141 (64)
Efficiency of water heater	84.6007	83.9725	83.0238	81.4289	80.1810	79.8000	79.8000	79.8000	79.8000	81.3465	83.6333	79.8000 (216)
Fuel for water heating, kWh/month	255.2516	227.4261	244.6459	220.2883	217.4651	197.5713	195.6210	203.0981	204.9747	223.3863	229.9938	252.2591 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.1432	17.7641	15.9946	11.7183	9.0516	7.3952	8.2571	10.7329	13.9410	18.2914	20.6601	22.7586 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-23.1872	-33.7679	-50.1175	-58.2442	-64.4481	-60.7610	-60.0348	-55.8828	-48.8053	-39.4796	-25.8792	-19.9241 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-10.0012	-21.3358	-42.9607	-65.3351	-87.1770	-87.8718	-86.8200	-73.1309	-53.1173	-30.7571	-13.4329	-7.8852 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1218.6259	1.1300	1377.0473 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2671.9813	1.1300	3019.3398 (278)
Space and water heating			4396.3861 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	178.7081	1.5338	274.1085 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-540.5317	1.4948	-808.0126
PV Unit electricity exported	-579.8251	0.4608	-267.1731
Total			-1075.1857 (283)
Total Primary energy kWh/year			3725.4097 (286)
Target Primary Energy Rate (TPER)			54.7900 (287)

Full SAP Calculation Printout



Property Reference	Plot 4			Issued on Date	27/08/2025
Assessment Reference	Plot 4	Prop Type Ref			
Property	Flat 4, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.35	TER	10.44
Environmental	97 A	% DER < TER			67.91
CO ₂ Emissions (t/year)	0.19	DFEE	20.19	TFEE	23.52
Compliance Check	See BREL	% DFEE < TFEE			14.15
% DPER < TPER	35.63	DPER	35.27	TPER	54.79
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	68.0000 (1b)	2.3700 (2b)	161.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		161.1600 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	161.1600 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1241 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9100	(17)
Infiltration rate	0.3196	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2717 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infiltr rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3464	0.3396	0.3328	0.2988	0.2920	0.2581	0.2581	0.2513	0.2717	0.2920	0.3056	0.3192 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5600	0.5577	0.5554	0.5446	0.5426	0.5333	0.5333	0.5316	0.5369	0.5426	0.5467	0.5509 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			68.0000	0.1100	7.4800	75.0000	5100.0000 (28a)
External Wall	20.7800	8.6000	12.1800	0.1900	2.3142	150.0000	1827.0001 (29a)
Bin Store Wall	16.3500		16.3500	0.1900	3.1065	150.0000	2452.5001 (29a)
Total net area of external elements Aum(A, m ²)			105.1300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.5674		(33)
Main dwelling							
Corridor			43.9200	0.0000	0.0000	180.0000	7905.5997 (32)
Party Ceiling 1			68.0000			40.0000	2720.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		20869.2798 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							306.9012 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				10.8200	0.0300	0.3246	

Full SAP Calculation Printout



E5 Ground floor (normal)	15.6700	0.0810	1.2693
E7 Party floor between dwellings (in blocks of flats)	15.6700	-0.0180	-0.2821
P1 Party wall - Ground floor	18.5300	0.1600	2.9648
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	0.0000	0.0000
E16 Corner (normal)	2.3700	0.0490	0.1161
E18 Party wall between dwellings	4.7400	0.0290	0.1375
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.8164 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.3838 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	29.7816	29.6577	29.5363	28.9659	28.8592	28.3625	28.3625	28.2705	28.5538	28.8592	29.0751	29.3008 (38)
Average = Sum(39)m / 12 =	54.1653	54.0415	53.9200	53.3497	53.2430	52.7463	52.7463	52.6543	52.9376	53.2430	53.4589	53.6845 (39)
												53.3492
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7965	0.7947	0.7929	0.7846	0.7830	0.7757	0.7757	0.7743	0.7785	0.7830	0.7862	0.7895 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

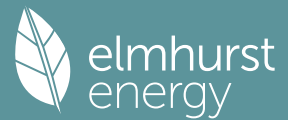
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.1966 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)
Average daily hot water use (litres/day)												58.2056 (43)
Daily hot water use	63.5020	61.7602	59.8586	57.4914	55.3798	53.1853	52.7291	54.6269	56.5734	58.8270	61.2151	63.4128 (44)
Energy content (annual)	100.5716	87.9457	92.0004	78.7029	74.5519	65.3975	63.7713	67.6396	69.7606	79.8277	87.2122	99.2891 (45)
Distribution loss (46)m = 0.15 x (45)m												966.6705
Water storage loss:												0.0000 (46)
Total storage loss												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month	85.4858	74.7539	78.2003	66.8975	63.3691	55.5879	54.2056	57.4936	59.2965	67.8536	74.1303	84.3957 (62)
WWHRS												0.0000 (63a)
PV diverter												0.0000 (63b)
Solar input												0.0000 (63c)
FGHRS												0.0000 (63d)
Output from w/h	85.4858	74.7539	78.2003	66.8975	63.3691	55.5879	54.2056	57.4936	59.2965	67.8536	74.1303	84.3957 (64)
12Total per year (kWh/year)												821.6699 (64)
Electric shower(s)	48.8905	43.5618	47.5678	45.3934	46.2452	44.1134	45.5839	46.2452	45.3934	47.5678	46.6734	48.8905 (64a)
Heat gains from water heating, kWh/month	33.5941	29.5789	31.4420	28.0727	27.4036	24.9253	24.9474	25.9347	26.1725	28.8554	30.2009	33.3216 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.7566	121.5162	109.7566	113.4152	109.7566	113.4152	109.7566	109.7566	113.4152	109.7566	113.4152	109.7566 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	45.1533	44.0163	42.2608	38.9899	36.8328	34.6185	33.5314	34.8585	36.3507	38.7841	41.9457	44.7870 (72)
Total internal gains	403.4439	416.0649	397.5139	387.1805	367.8315	356.5564	343.3134	342.6420	352.8287	362.3246	382.6781	394.5803 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Southeast	8.6000	36.7938	0.2400	0.0000	0.7700	58.4757 (77)						
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	461.9196	515.6707	533.7988	556.0441	556.9728	544.3300	524.3471	508.5477	500.3965	472.4101	452.7185	444.6233 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	107.0246	107.2699	107.5115	108.6608	108.8786	109.9040	109.9040	110.0960	109.5067	108.8786	108.4389	107.9831
alpha	8.1350	8.1513	8.1674	8.2441	8.2586	8.3269	8.3269	8.3397	8.3004	8.2586	8.2293	8.1989
util living area	0.9979	0.9942	0.9855	0.9459	0.8327	0.6157	0.4423	0.4758	0.7147	0.9486	0.9933	0.9985 (86)
MIT	20.3731	20.4948	20.6383	20.8307	20.9556	20.9966	20.9998	20.9996	20.9892	20.8505	20.5847	20.3521 (87)
Th 2	20.2563	20.2579	20.2595	20.2667	20.2681	20.2745	20.2745	20.2756	20.2720	20.2681	20.2653	20.2625 (88)
util rest of house	0.9971	0.9921	0.9800	0.9263	0.7852	0.5482	0.3696	0.4012	0.6462	0.9262	0.9904	0.9979 (89)
MIT 2	19.6859	19.8079	19.9501	20.1374	20.2414	20.2731	20.2744	20.2756	20.2672	20.1587	19.9038	19.6702 (90)
Living area fraction	19.9745	20.0964	20.2391	20.4286	20.5414	20.5770	20.5791	20.5797	FLA = Living area / (4) =	20.4493	20.1898	0.4200 (91)
MIT	19.9745	20.0964	20.2391	20.4286	20.5414	20.5770	20.5791	20.5797	20.5705	20.4493	20.1898	19.9566 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9745	20.0964	20.2391	20.4286	20.5414	20.5770	20.5791	20.5797	20.5705	20.4493	20.1898	19.9566 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9968	0.9915	0.9798	0.9311	0.8039	0.5766	0.4002	0.4325	0.6749	0.9325	0.9900	0.9976 (94)
Useful gains	460.4245	511.2869	523.0028	517.7371	447.7233	313.8493	209.8198	219.9616	337.7410	440.4991	448.1980	443.5389 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	849.0157	821.2348	740.8148	615.0459	470.7410	315.2631	209.8813	220.0772	342.5303	524.4040	699.7634	845.8855 (97)
Space heating kWh	289.1118	208.2850	162.0521	70.0623	17.1252	0.0000	0.0000	0.0000	0.0000	62.4252	181.1271	299.3458 (98a)
Space heating requirement - total per year (kWh/year)												1289.5347
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	289.1118	208.2850	162.0521	70.0623	17.1252	0.0000	0.0000	0.0000	0.0000	62.4252	181.1271	299.3458 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1289.5347
Space heating per m2										(98c) / (4) =		18.9637 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	495.8148	390.3223	400.1724	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9514	0.9853	0.9794	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	471.7226	384.5833	391.9464	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	585.7276	564.8536	548.6270	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	82.0836	134.1211	116.5704	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	20.5209	33.5303	29.1426	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												83.1938 (107)
Energy for space heating												18.9637 (99)
Energy for space cooling												1.2234 (108)
Total												20.1872 (109)
Fabric Energy Efficiency (DFEE)												20.2 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	68.0000	x	161.1600
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	161.1600 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour
Pressure test	20.0000 / (5) = 0.1241 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	5.0000 (17)
	0.3741 (18)

Full SAP Calculation Printout



Number of sides sheltered

2 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.3180 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3975	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5506	0.5584	0.5640	0.5698	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			8.6000	1.1450	9.8473			(27)
Heatloss Floor 1			68.0000	0.1300	8.8400			(28a)
External Wall	20.7800	8.6000	12.1800	0.1800	2.1924			(29a)
Bin Store Wall	16.3500		16.3500	0.1800	2.9430			(29a)
Total net area of external elements Aum(A, m2)			105.1300					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.8227		(33)
Main dwelling								
Corridor			43.9200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

306.9012 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	4.7700	0.0500	0.2385	
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385	
E3 Sill	10.8200	0.0500	0.5410	
E4 Jamb	15.6700	0.1600	2.5072	
E5 Ground floor (normal)	15.6700	0.0700	1.0969	
E7 Party floor between dwellings (in blocks of flats)	18.5300	0.0800	1.4824	
P1 Party wall - Ground floor	18.5300	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.3700	0.0900	0.2133	
E16 Corner (normal)	4.7400	0.0600	0.2844	
E18 Party wall between dwellings				6.6022 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 30.4249 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	30.9623	30.7926	30.6262	29.8448	29.6986	29.0180	29.0180	28.8920	29.2802	29.6986	29.9944	30.3036	(38)
Heat transfer coeff	61.3873	61.2175	61.0512	60.2697	60.1235	59.4430	59.4430	59.3169	59.7051	60.1235	60.4193	60.7285	(39)
Average = Sum(39)m / 12 =												60.2690	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9028	0.9003	0.8978	0.8863	0.8842	0.8742	0.8742	0.8723	0.8780	0.8842	0.8885	0.8931	(40)
HLP (average)												0.8863	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1966 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873	(42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254	(42c)
Average daily hot water use (litres/day)												58.2056	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	63.5020	61.7602	59.8586	57.4914	55.3798	53.1853	52.7291	54.6269	56.5734	58.8270	61.2151	63.4128	(44)
Energy conte	100.5716	87.9457	92.0004	78.7029	74.5519	65.3975	63.7713	67.6396	69.7606	79.8277	87.2122	99.2891	(45)
Energy content (annual)										Total = Sum(45)m =		966.6705	

Distribution loss (46)m = 0.15 x (45)m

Distribution loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
-------------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Water storage loss:

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
--------------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

If cylinder contains dedicated solar storage

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
--------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Total heat required for water heating calculated for each month	85.4858	74.7539	78.2003	66.8975	63.3691	55.5879	54.2056	57.4936	59.2965	67.8536	74.1303	84.3957	(62)
---	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
-------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
-------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

Output from w/h	85.4858	74.7539	78.2003	66.8975	63.3691	55.5879	54.2056	57.4936	59.2965	67.8536	74.1303	84.3957	(64)
-----------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

Total per year (kWh/year)												821.6699	(64)
---------------------------	--	--	--	--	--	--	--	--	--	--	--	----------	------

Electric shower(s)	48.8905	43.5618	47.5678	45.3934	46.2452	44.1134	45.5839	46.2452	45.3934	47.5678	46.6734	48.8905	(64a)
--------------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	-------

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												556.1263	(64a)
--	--	--	--	--	--	--	--	--	--	--	--	----------	-------

Heat gains from water heating, kWh/month	33.5941	29.5789	31.4420	28.0727	27.4036	24.9253	24.9474	25.9347	26.1725	28.8554	30.2009	33.3216	(65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.5702	117.9884	106.5702	110.1225	106.5702	110.1225	106.5702	106.5702	110.1225	106.5702	110.1225	106.5702	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	(71)
Water heating gains (Table 5)	45.1533	44.0163	42.2608	38.9899	36.8328	34.6185	33.5314	34.8585	36.3507	38.7841	41.9457	44.7870	(72)
Total internal gains	400.2575	412.5371	394.3274	383.8879	364.6451	353.2637	340.1269	339.4556	349.5361	359.1381	379.3855	391.3939	(73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d		Gains W

Southeast				8.6000	36.7938		0.6300	0.7000		0.7700		96.7042 (77)

Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586 (83)
Total gains	496.9617	577.2601	619.7087	663.1461	677.4376	663.7943	639.5115	613.8221	593.5763	541.1922	495.2148	474.1525 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	94.4336	94.6954	94.9535	96.1846	96.4185	97.5225	97.5225	97.7297	97.0942	96.4185	95.9465	95.4580		
alpha	7.2956	7.3130	7.3302	7.4123	7.4279	7.5015	7.5015	7.5153	7.4729	7.4279	7.3964	7.3639		
util living area	0.9974	0.9916	0.9768	0.9186	0.7822	0.5693	0.4087	0.4440	0.6795	0.9347	0.9917	0.9981	(86)	
MIT	20.2645	20.4258	20.6109	20.8327	20.9592	20.9965	20.9997	20.9995	20.9880	20.8336	20.5145	20.2390	(87)	
Th 2	20.1652	20.1673	20.1694	20.1791	20.1810	20.1895	20.1895	20.1911	20.1862	20.1810	20.1773	20.1734	(88)	
util rest of house	0.9964	0.9885	0.9683	0.8918	0.7279	0.4991	0.3336	0.3662	0.6060	0.9070	0.9880	0.9974	(89)	
MIT 2	19.5001	19.6615	19.8434	20.0560	20.1575	20.1882	20.1895	20.1910	20.1811	20.0623	19.7584	19.4818	(90)	
Living area fraction	19.8212	19.9825	20.1658	20.3822	20.4942	20.5277	20.5298	20.5306	fLA = Living area / (4) =			0.4200	(91)	
MIT	19.8212	19.9825	20.1658	20.3822	20.4942	20.5277	20.5298	20.5306	20.5200	20.3862	20.0760	19.7998	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.8212	19.9825	20.1658	20.3822	20.4942	20.5277	20.5298	20.5306	20.5200	20.3862	20.0760	19.7998	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	494.8926	570.1429	600.0314	596.1916	507.7194	350.9241	233.5200	244.8650	378.0065	495.0640	488.9836	472.6996	(94)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(95)	
Heat loss rate W	952.8019	923.3140	834.3109	692.0301	528.7409	352.3598	233.5977	245.0131	383.3071	588.3820	783.9980	947.3540	(97)	
Space heating kWh	340.6846	237.3310	174.3040	69.0037	15.6400	0.0000	0.0000	0.0000	0.0000	69.4286	212.4104	353.1429	(98a)	
Space heating requirement - total per year (kWh/year)												1471.9452		
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)												0.0000		
Space heating kWh	340.6846	237.3310	174.3040	69.0037	15.6400	0.0000	0.0000	0.0000	0.0000	69.4286	212.4104	353.1429	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1471.9452		
Space heating per m2										(98c) / (4) =		21.6463	(99)	

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b														
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000		
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	558.7637	439.8778	450.8085	0.0000	0.0000	0.0000	0.0000	(100)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9645	0.9887	0.9835	0.0000	0.0000	0.0000	0.0000	(101)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	538.9410	434.8933	443.3621	0.0000	0.0000	0.0000	0.0000	(102)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	728.9310	702.8844	675.0079	0.0000	0.0000	0.0000	0.0000	(103)	
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	136.7928	199.3854	172.3444	0.0000	0.0000	0.0000	0.0000	(104)	
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	fC = cooled area / (4) =			1.0000	(105)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	34.1982	49.8464	43.0861	0.0000	0.0000	0.0000	0.0000	(107)	
Space cooling requirement												127.1307	(107)	
Energy for space heating												21.6463	(99)	
Energy for space cooling												1.8696	(108)	
Total												23.5158	(109)	
Fabric Energy Efficiency (TFEE)												23.5	(109)	

Full SAP Calculation Printout



Property Reference	Plot 4			Issued on Date	27/08/2025
Assessment Reference	Plot 4	Prop Type Ref			
Property	Flat 4, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.35	TER	10.44
Environmental	97 A	% DER < TER			67.91
CO ₂ Emissions (t/year)	0.19	DFEE	20.19	TFEE	23.52
Compliance Check	See BREL	% DFEE < TFEE			14.15
% DPER < TPER	35.63	DPER	35.27	TPER	54.79
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	68.0000 (1b)	2.3700 (2b)	161.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		161.1600 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 161.1600 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9100	(17)
Infiltration rate	0.1955	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1662 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.2119	0.2077	0.2036	0.1828	0.1786	0.1579	0.1579	0.1537	0.1662	0.1786	0.1869	0.1953 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3519	0.3477	0.3436	0.3228	0.3186	0.2979	0.2979	0.2937	0.3062	0.3186	0.3269	0.3353 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			68.0000	0.1100	7.4800	5100.0000	(28a)
External Wall	20.7800	8.6000	12.1800	0.1900	2.3142	150.0000	1827.0001 (29a)
Bin Store Wall	16.3500		16.3500	0.1900	3.1065	150.0000	2452.5001 (29a)
Total net area of external elements Aum(A, m ²)			105.1300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.5674		(33)
Main dwelling							
Corridor			43.9200	0.0000	0.0000	180.0000	7905.5997 (32)
Party Ceiling 1			68.0000			30.0000	2040.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 20189.2798 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.9012 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E5 Ground floor (normal)	15.6700	0.0810	1.2693
E7 Party floor between dwellings (in blocks of flats)	15.6700	-0.0180	-0.2821
P1 Party wall - Ground floor	18.5300	0.1600	2.9648
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	0.0000	0.0000
E16 Corner (normal)	2.3700	0.0490	0.1161
E18 Party wall between dwellings	4.7400	0.0290	0.1375

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 24.3838 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	18.7136	18.4927	18.2717	17.1670	16.9461	15.8414	15.8414	15.6204	16.2832	16.9461	17.3879	17.8298
Average = Sum(39)m / 12 =	43.0974	42.8764	42.6555	41.5508	41.3298	40.2251	40.2251	40.0042	40.6670	41.3298	41.7717	42.2136

HLP (average)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in mont	0.6338	0.6305	0.6273	0.6110	0.6078	0.5915	0.5915	0.5883	0.5980	0.6078	0.6143	0.6208
	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.1966 (42)											
Hot water usage for mixer showers	83.9431	82.6816	80.8433	77.3261	74.7306	71.8360	70.1907	72.0151	74.0149	77.1228	80.7155	83.6214
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254
Average daily hot water use (litres/day)	135.5983 (43)											
Daily hot water use	147.4450	144.4418	140.7019	134.8176	130.1104	125.0213	122.9199	126.6420	130.5883	135.9498	141.9306	147.0342
Energy conte	233.5169	205.6832	216.2535	184.5585	175.1536	153.7283	148.6609	156.8092	161.0284	184.4826	202.2062	230.2201
Energy content (annual)	2252.3013 (45)											
Distribution loss (46)m = 0.15 x (45)m	35.0275	30.8525	32.4380	27.6838	26.2730	23.0592	22.2991	23.5214	24.1543	27.6724	30.3309	34.5330
Water storage loss:												
Store volume	201.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.8694 (55)											
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715
12Total per year (kWh/year)	2569.6323 (64)											
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)											
Heat gains from water heating, kWh/month	77.6444	68.3897	71.9043	61.3657	58.2386	51.1146	49.4298	52.1391	53.5419	61.3405	67.2335	76.5482

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.7566	121.5162	109.7566	113.4152	109.7566	113.4152	109.7566	109.7566	113.4152	109.7566	113.4152	109.7566
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643
Water heating gains (Table 5)	104.3607	101.7703	96.6456	85.2302	78.2776	70.9926	66.4378	70.0794	74.3638	82.4469	93.3799	102.8873
Total internal gains	462.6513	473.8190	451.8986	433.4208	409.2764	392.9304	376.2198	377.8629	390.8418	405.9873	434.1123	452.6806

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				8.6000	36.7938	0.2400	0.0000	0.7700	58.4757 (77)			
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)	
Total gains	521.1270	573.4247	588.1836	602.2844	598.4177	580.7040	557.2536	543.7686	538.4096	516.0729	504.1527	502.7236 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	130.1271	130.7976	131.4751	134.9706	135.6921	139.4187	139.4187	140.1887	137.9038	135.6921	134.2567	132.8513	21.0000 (85)
alpha	9.6751	9.7198	9.7650	9.9980	10.0461	10.2946	10.2946	10.3459	10.1936	10.0461	9.9504	9.8568	
util living area	0.9875	0.9677	0.9282	0.8085	0.6396	0.4433	0.3176	0.3384	0.5208	0.8073	0.9589	0.9900	(86)
MIT	20.6933	20.7974	20.8914	20.9762	20.9976	21.0000	21.0000	21.0000	20.9997	20.9802	20.8542	20.6830	(87)
Th 2	20.3997	20.4026	20.4055	20.4201	20.4230	20.4376	20.4376	20.4405	20.4318	20.4230	20.4172	20.4113	(88)
util rest of house	0.9836	0.9589	0.9109	0.7769	0.6010	0.4043	0.2770	0.2973	0.4781	0.7705	0.9466	0.9868	(89)
MIT 2	20.0519	20.1821	20.2953	20.3994	20.4213	20.4376	20.4376	20.4405	20.4316	20.4069	20.2650	20.0494	(90)
Living area fraction	fLA = Living area / (4) =												0.4200 (91)
MIT	20.3213	20.4405	20.5456	20.6417	20.6633	20.6738	20.6738	20.6755	20.6702	20.6477	20.5125	20.3155	(92)
Temperature adjustment													0.0000
adjusted MIT	20.3213	20.4405	20.5456	20.6417	20.6633	20.6738	20.6738	20.6755	20.6702	20.6477	20.5125	20.3155	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9830	0.9595	0.9152	0.7893	0.6171	0.4207	0.2941	0.3145	0.4961	0.7852	0.9488	0.9862	(94)
Useful gains	512.2896	550.2036	538.3278	475.3644	369.3059	244.2996	163.8694	171.0377	267.0850	405.2175	478.3644	495.8094	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	690.4750	666.3225	599.1236	487.8753	370.4526	244.3186	163.8698	171.0385	267.1916	415.2682	560.2618	680.2932	(97)
Space heating kWh	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(98a)
Space heating requirement - total per year (kWh/year)													469.3946
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)													0.0000
Space heating kWh	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													469.3946
Space heating per m2													(98c) / (4) = 6.9029 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	132.5699	78.0319	45.2321	9.0079	0.8531	0.0000	0.0000	0.0000	0.0000	7.4777	58.9661	137.2559	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715	(64)
Efficiency of water heater (217)m	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	(216)
Fuel for water heating, kWh/month	77.0159	68.0148	71.9115	62.2827	59.7589	53.1668	51.9255	54.3348	55.3253	62.5173	67.5008	76.0411	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	14.0270	12.6696	14.0270	13.5745	14.0270	13.5745	14.0270	14.0270	13.5745	14.0270	13.5745	14.0270	(231)
Lighting	19.8597	15.9322	14.3452	10.5099	8.1182	6.6326	7.4057	9.6262	12.5034	16.4052	18.5296	20.4117	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													469.3946 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													338.2005
Water heating fuel used													759.7955 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 165.1568 (230a)
 Total electricity for the above, kWh/year 165.1568 (231)
 Electricity for lighting (calculated in Appendix L) 160.2795 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1554.6264 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	469.3946	0.1592	74.7088 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	759.7955	0.1412	107.3016 (264)
Space and water heating			182.0104 (265)
Pumps, fans and electric keep-hot	165.1568	0.1387	22.9093 (267)
Energy for lighting	160.2795	0.1443	23.1333 (268)
Total CO2, kg/year			228.0530 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	469.3946	1.5891	745.9305 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	759.7955	1.5222	1156.5703 (278)
Space and water heating			1902.5008 (279)
Pumps, fans and electric keep-hot	165.1568	1.5128	249.8491 (281)
Energy for lighting	160.2795	1.5338	245.8421 (282)
Total Primary energy kWh/year			2398.1921 (286)
Dwelling Primary energy Rate (DPER)			35.2700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	68.0000 (1b)	2.3700 (2b)	161.1600 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		161.1600 (5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1241 (8)
 Pressure test
 Pressure Test Method
 Measured/design AP50
 Infiltration rate
 Number of sides sheltered
 Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3180 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4054	0.3975	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736 (22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5506	0.5584	0.5640	0.5698 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			8.6000	1.1450	9.8473		(27)
Heatloss Floor 1			68.0000	0.1300	8.8400		(28a)
External Wall	20.7800	8.6000	12.1800	0.1800	2.1924		(29a)
Bin Store Wall	16.3500		16.3500	0.1800	2.9430		(29a)
Total net area of external elements Aum(A, m2)			105.1300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.8227		(33)
Main dwelling							
Corridor			43.9200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

306.9012 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	4.7700	0.0500	0.2385
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385
E3 Sill	10.8200	0.0500	0.5410
E4 Jamb	15.6700	0.1600	2.5072
E5 Ground floor (normal)	15.6700	0.0700	1.0969
E7 Party floor between dwellings (in blocks of flats)	18.5300	0.0800	1.4824
P1 Party wall - Ground floor	18.5300	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.3700	0.0900	0.2133
E16 Corner (normal)	4.7400	0.0600	0.2844
E18 Party wall between dwellings			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.6022 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.4249 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	30.9623	30.7926	30.6262	29.8448	29.6986	29.0180	29.0180	28.8920	29.2802	29.6986	29.9944	30.3036 (38)
Average = Sum(39)m / 12 =	61.3873	61.2175	61.0512	60.2697	60.1235	59.4430	59.4430	59.3169	59.7051	60.1235	60.4193	60.7285 (39)
												60.2690
HLP	0.9028	0.9003	0.8978	0.8863	0.8842	0.8742	0.8742	0.8723	0.8780	0.8842	0.8885	0.8931 (40)
HLP (average)												0.8863
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

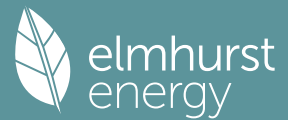
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1966 (42)
Hot water usage for mixer showers												
61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156 (42a)	
Hot water usage for baths												
26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)	
Hot water usage for other uses												
37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)	
Average daily hot water use (litres/day)												114.4912 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284 (44)
Energy content (annual)	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116 (45)
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	243.8540	215.6587	228.9612	200.7806	194.3116	174.7299	172.1041	179.0851	181.2290	202.5353	215.9360	241.1065 (62)
WWHRS	-27.9093	-24.6832	-25.8468	-21.4022	-19.9461	-17.0680	-15.9985	-17.0128	-17.6592	-20.8183	-23.5846	-27.3924 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	215.9447	190.9755	203.1144	179.3785	174.3656	157.6619	156.1056	162.0723	163.5698	181.7170	192.3514	213.7141 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2190.9707 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	102.8646	91.3816	97.9127	87.8400	86.3917	79.1781	79.0077	81.3289	81.3391	89.1261	92.8792	101.9510 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.5702	117.9884	106.5702	110.1225	106.5702	110.1225	106.5702	106.5702	110.1225	106.5702	110.1225	106.5702 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	138.2588	135.9845	131.6031	122.0000	116.1179	109.9696	106.1932	109.3131	112.9709	119.7931	128.9988	137.0310 (72)
Total internal gains	496.3630	507.5053	486.6698	469.8980	446.9302	428.6148	412.7887	413.9102	426.1564	443.1472	469.4386	486.6378 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast			8.6000	36.7938	0.6300	0.7000	0.7700	96.7042 (77)	
Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402
Total gains	593.0672	672.2284	712.0510	749.1562	759.7228	739.1454	712.1733	688.2767	670.1966

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	94.4336	94.6954	94.9535	96.1846	96.4185	97.5225	97.5225	97.7297	97.0942	96.4185	95.9465	95.4580
util living area	7.2956	7.3130	7.3302	7.4123	7.4279	7.5015	7.5015	7.5153	7.4729	7.4279	7.3964	7.3639
util living area	0.9921	0.9798	0.9526	0.8689	0.7144	0.5130	0.3671	0.3962	0.6084	0.8814	0.9780	0.9939 (86)
MIT	20.3933	20.5457	20.7123	20.8910	20.9772	20.9982	20.9999	20.9998	20.9941	20.8966	20.6276	20.3680 (87)
Th 2	20.1652	20.1673	20.1694	20.1791	20.1810	20.1895	20.1895	20.1911	20.1862	20.1810	20.1773	20.1734 (88)
util rest of house	0.9893	0.9730	0.9375	0.8342	0.6593	0.4489	0.2996	0.3267	0.5396	0.8423	0.9694	0.9917 (89)
MIT 2	19.4751	19.6671	19.8715	20.0811	20.1649	20.1887	20.1895	20.1910	20.1831	20.0926	19.7793	19.4498 (90)
Living area fraction	19.8607	20.0361	20.2246	20.4212	20.5061	20.5287	20.5298	20.5307	20.5237	20.4303	20.1356	19.8354 (92)
MIT	19.8607	20.0361	20.2246	20.4212	20.5061	20.5287	20.5298	20.5307	20.5237	20.4303	20.1356	19.8354 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8607	20.0361	20.2246	20.4212	20.5061	20.5287	20.5298	20.5307	20.5237	20.4303	20.1356	19.8354 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9881	0.9718	0.9386	0.8451	0.6817	0.4758	0.3280	0.3559	0.5685	0.8551	0.9689	0.9906 (94)
Ext temp.	585.9862	653.2574	668.3489	633.1157	517.9248	351.7059	233.5652	244.9539	380.9747	534.6356	567.0374	564.0448 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	955.2306	926.5939	837.9050	694.3826	529.4517	352.4196	233.6019	245.0211	383.5296	591.0298	787.6015	949.5157 (97)
Space heating requirement - total per year (kWh/year)	274.7178	183.6821	126.1497	44.1122	8.5761	0.0000	0.0000	0.0000	0.0000	41.9573	158.8061	286.7903 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	274.7178	183.6821	126.1497	44.1122	8.5761	0.0000	0.0000	0.0000	0.0000	41.9573	158.8061	286.7903 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	274.7178	183.6821	126.1497	44.1122	8.5761	0.0000	0.0000	0.0000	0.0000	41.9573	158.8061	286.7903 (98c)
Space heating per m2	(98c) / (4) =											16.5411 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	274.7178	183.6821	126.1497	44.1122	8.5761	0.0000	0.0000	0.0000	0.0000	41.9573	158.8061	286.7903 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	297.6358	199.0055	136.6736	47.7922	9.2915	0.0000	0.0000	0.0000	0.0000	45.4576	172.0543	310.7154 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating requirement	215.9447	190.9755	203.1144	179.3785	174.3656	157.6619	156.1056	162.0723	163.5698	181.7170	192.3514	213.7141 (64)
Efficiency of water heater (217)m	84.6007	83.9725	83.0238	81.4289	80.1810	79.8000	79.8000	79.8000	79.8000	81.3465	83.6333	79.8000 (216)
Fuel for water heating, kWh/month	255.2516	227.4261	244.6459	220.2883	217.4651	197.5713	195.6210	203.0981	204.9747	223.3863	229.9938	252.2591 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.1432	17.7641	15.9946	11.7183	9.0516	7.3952	8.2571	10.7329	13.9410	18.2914	20.6601	22.7586 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-23.1872	-33.7679	-50.1175	-58.2442	-64.4481	-60.7610	-60.0348	-55.8828	-48.8053	-39.4796	-25.8792	-19.9241 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-10.0012	-21.3358	-42.9607	-65.3351	-87.1770	-87.8718	-86.8200	-73.1309	-53.1173	-30.7571	-13.4329	-7.8852 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	1218.6259	1.1300	1377.0473 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2671.9813	1.1300	3019.3388 (278)
Space and water heating			4396.3861 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	178.7081	1.5338	274.1085 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-540.5317	1.4948	-808.0126
PV Unit electricity exported	-579.8251	0.4608	-267.1731
Total			-1075.1857 (283)
Total Primary energy kWh/year			3725.4097 (286)
Target Primary Energy Rate (TPER)			54.7900 (287)

Full SAP Calculation Printout



Property Reference	Plot 4			Issued on Date	27/08/2025
Assessment Reference	Plot 4	Prop Type Ref			
Property	Flat 4, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.35	TER	10.44
Environmental	97 A	% DER < TER			67.91
CO ₂ Emissions (t/year)	0.19	DFEE	20.19	TFEE	23.52
Compliance Check	See BREL	% DFEE < TFEE			14.15
% DPER < TPER	35.63	DPER	35.27	TPER	54.79
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	68.0000 (1b)	2.3700 (2b)	161.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	161.1600 (5)

2. Ventilation rate

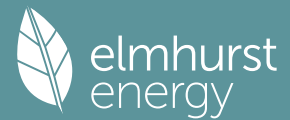
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9100 (17)
Infiltration rate	0.1955 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1662 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2119	0.2077	0.2036	0.1828	0.1786	0.1579	0.1579	0.1537	0.1662	0.1786	0.1869	0.1953 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3519	0.3477	0.3436	0.3228	0.3186	0.2979	0.2979	0.2937	0.3062	0.3186	0.3269	0.3353 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			68.0000	0.1100	7.4800	5100.0000	(28a)
External Wall	20.7800	8.6000	12.1800	0.1900	2.3142	1827.0001	(29a)
Bin Store Wall	16.3500		16.3500	0.1900	3.1065	2452.5001	(29a)
Total net area of external elements Aum(A, m ²)			105.1300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.5674		(33)
Main dwelling							
Corridor			43.9200	0.0000	0.0000	7905.5997	(32)
Party Ceiling 1			68.0000			2720.0000	(32b)
Internal Wall			96.0200			864.1800	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20869.2798 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							306.9012 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E5 Ground floor (normal)	15.6700	0.0810	1.2693
E7 Party floor between dwellings (in blocks of flats)	15.6700	-0.0180	-0.2821
P1 Party wall - Ground floor	18.5300	0.1600	2.9648
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	0.0000	0.0000
E16 Corner (normal)	2.3700	0.0490	0.1161
E18 Party wall between dwellings	4.7400	0.0290	0.1375

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal Bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 24.3838 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	18.7136	18.4927	18.2717	17.1670	16.9461	15.8414	15.8414	15.6204	16.2832	16.9461	17.3879	17.8298 (38)
Average = Sum(39)m / 12 =	43.0974	42.8764	42.6555	41.5508	41.3298	40.2251	40.2251	40.0042	40.6670	41.3298	41.7717	42.2136 (39)

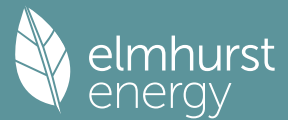
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6338	0.6305	0.6273	0.6110	0.6078	0.5915	0.5915	0.5883	0.5980	0.6078	0.6143	0.6208 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.1966 (42)
Hot water usage for mixer showers	83.9431	82.6816	80.8433	77.3261	74.7306	71.8360	70.1907	72.0151	74.0149	77.1228	80.7155	83.6214 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)
Average daily hot water use (litres/day)												135.5983 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	147.4450	144.4418	140.7019	134.8176	130.1104	125.0213	122.9199	126.6420	130.5883	135.9498	141.9306	147.0342 (44)
Energy content (annual)	233.5169	205.6832	216.2535	184.5585	175.1536	153.7283	148.6609	156.8092	161.0284	184.4826	202.2062	230.2201 (45)
Distribution loss (46)m = 0.15 x (45)m	35.0275	30.8525	32.4380	27.6838	26.2730	23.0592	22.2991	23.5214	24.1543	27.6724	30.3309	34.5330 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	77.6444	68.3897	71.9043	61.3657	58.2386	51.1146	49.4298	52.1391	53.5419	61.3405	67.2335	76.5482 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	22.6892	20.1524	16.3890	12.4075	9.2748	7.8302	8.4608	10.9976	14.7610	18.7425	21.8752	23.3198 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575 (68)
Pumps, fans	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Total internal gains	104.3607	101.7703	96.6456	85.2302	78.2776	70.9926	66.4378	70.0794	74.3638	82.4469	93.3799	102.8873 (72)
FGHRS	508.7984	506.6539	490.2494	458.8511	428.5668	400.8529	384.2461	387.4418	403.0060	431.0720	465.3368	495.2731 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	W/m2	Specific data	factor	W						
				or Table 6b	Table 6c							
Southeast	8.6000	36.7938	0.2400	0.0000	0.7700	58.4757 (77)						
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	567.2742	606.2597	626.5344	627.7147	617.7081	588.6265	565.2799	553.3475	550.5737	541.1576	535.3772	545.3161 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	134.5099	135.2030	135.9033	139.5166	140.2624	144.1145	144.1145	144.9104	142.5485	140.2624	138.7786	137.3259
alpha	9.9673	10.0135	10.0602	10.3011	10.3508	10.6076	10.6076	10.6607	10.5032	10.3508	10.2519	10.1551
util living area	0.9787	0.9564	0.9036	0.7833	0.6205	0.4373	0.3131	0.3326	0.5094	0.7780	0.9433	0.9831 (86)
MIT	20.7611	20.8395	20.9239	20.9839	20.9984	21.0000	21.0000	21.0000	20.9998	20.9872	20.8899	20.7482 (87)
Th 2	20.3997	20.4026	20.4055	20.4201	20.4230	20.4376	20.4376	20.4405	20.4318	20.4230	20.4172	20.4113 (88)
util rest of house	0.9725	0.9451	0.8827	0.7509	0.5827	0.3989	0.2731	0.2921	0.4676	0.7403	0.9275	0.9780 (89)
MIT 2	20.1348	20.2316	20.3307	20.4064	20.4219	20.4376	20.4376	20.4405	20.4317	20.4129	20.3056	20.1294 (90)
Living area fraction	fLA = Living area / (4) =											0.4200 (91)
MIT	20.3979	20.4869	20.5799	20.6489	20.6641	20.6738	20.6738	20.6755	20.6703	20.6541	20.5510	20.3893 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.3979	20.4869	20.5799	20.6489	20.6641	20.6738	20.6738	20.6755	20.6703	20.6541	20.5510	20.3893 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9725	0.9468	0.8892	0.7639	0.5986	0.4150	0.2899	0.3091	0.4852	0.7557	0.9315	0.9778 (94)
Useful gains	551.6481	574.0217	557.0844	479.5300	369.7342	244.3064	163.8695	171.0381	267.1251	408.9404	498.6813	533.2066 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	693.7754	668.3120	600.5829	488.1777	370.4830	244.3191	163.8698	171.0385	267.1944	415.5346	561.8712	683.4076 (97)
Space heating kWh	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (98a)
Space heating requirement - total per year (kWh/year)												370.4044
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												370.4044
Space heating per m2	(98c) / (4) =											5.4471 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715 (64)
Efficiency of water heater	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005 (216)
Fuel for water heating, kWh/month	77.0159	68.0148	71.9115	62.2827	59.7589	53.1668	51.9255	54.3348	55.3253	62.5173	67.5008	76.0411 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	14.0270	12.6696	14.0270	13.5745	14.0270	13.5745	14.0270	14.0270	13.5745	14.0270	13.5745	14.0270 (231)
Lighting	19.8597	15.9322	14.3452	10.5099	8.1182	6.6326	7.4057	9.6262	12.5034	16.4052	18.5296	20.4117 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												370.4044 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												338.2005
Water heating fuel used												759.7955 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												165.1568 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	165.1568	(231)
Electricity for lighting (calculated in Appendix L)	160.2795	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1455.6361	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	370.4044	16.4900	61.0797 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	759.7955	16.4900	125.2903 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	165.1568	16.4900	27.2343 (249)
Energy for lighting	160.2795	16.4900	26.4301 (250)
Additional standing charges			0.0000 (251)
Total energy cost			240.0344 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7647 (257)
SAP value		87.6040
SAP rating (Section 12)		88 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	370.4044	0.1594	59.0420 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	759.7955	0.1412	107.3016 (264)
Space and water heating			166.3436 (265)
Pumps, fans and electric keep-hot	165.1568	0.1387	22.9093 (267)
Energy for lighting	160.2795	0.1443	23.1333 (268)
Total CO2, kg/year			212.3862 (272)
CO2 emissions per m2			3.1200 (273)
EI value			97.4814
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	68.0000	2.3700	161.1600
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		
Dwelling volume			161.1600

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9100 (17)
Infiltration rate	0.1955 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.1662 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1786	0.1745	0.1786	0.1620	0.1662	0.1412	0.1371	0.1371	0.1412	0.1579	0.1579	0.1620	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3186	0.3145	0.3186	0.3020	0.3062	0.2812	0.2771	0.2771	0.2812	0.2979	0.2979	0.3020	(25)

3. Heat losses and heat loss parameter

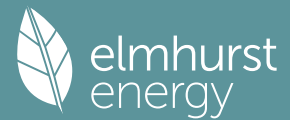
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.6000	0.7752	6.6667			(27)
Heatloss Floor 1			68.0000	0.1100	7.4800	75.0000	5100.0000	(28a)
External Wall	20.7800	8.6000	12.1800	0.1900	2.3142	150.0000	1827.0001	(29a)
Bin Store Wall	16.3500		16.3500	0.1900	3.1065	150.0000	2452.5001	(29a)
Total net area of external elements Aum(A, m2)			105.1300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.5674			(33)
Main dwelling								
Corridor			43.9200	0.0000	0.0000	180.0000	7905.5997	(32)
Party Ceiling 1			68.0000			40.0000	2720.0000	(32b)
Internal Wall			96.0200			9.0000	864.1800	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 20869.2798 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								306.9012 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340		0.1622	
E3 Sill				4.7700	0.0260		0.1240	
E4 Jamb				10.8200	0.0300		0.3246	
E5 Ground floor (normal)				15.6700	0.0810		1.2693	
E7 Party floor between dwellings (in blocks of flats)				15.6700	-0.0180		-0.2821	
P1 Party wall - Ground floor				18.5300	0.1600		2.9648	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				18.5300	0.0000		0.0000	
E16 Corner (normal)				2.3700	0.0490		0.1161	
E18 Party wall between dwellings				4.7400	0.0290		0.1375	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.8164 (36)
Point Thermal Bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	24.3838 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	16.9461	16.7251	16.9461	16.0623	16.2832	14.9576	14.7367	14.7367	14.9576	15.8414	15.8414	16.0623	(38)
Average = Sum(39)m / 12 =	41.3298	41.1089	41.3298	40.4461	40.6670	39.3414	39.1204	39.1204	39.3414	40.2251	40.2251	40.4461	(39)
													40.2251
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6078	0.6045	0.6078	0.5948	0.5980	0.5785	0.5753	0.5753	0.5785	0.5915	0.5915	0.5948	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
													0.5915
													31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1966 (42)
Hot water usage for mixer showers													
Hot water usage for baths	83.9431	82.6816	80.8433	77.3261	74.7306	71.8360	70.1907	72.0151	74.0149	77.1228	80.7155	83.6214	(42a)
Hot water usage for other uses	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873	(42b)
Average daily hot water use (litres/day)	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254	(42c)
													135.5983 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	147.4450	144.4418	140.7019	134.8176	130.1104	125.0213	122.9199	126.6420	130.5883	135.9498	141.9306	147.0342	(44)
Energy content (annual)	233.5169	205.6832	216.2535	184.5585	175.1536	153.7283	148.6609	156.8092	161.0284	184.4826	202.2062	230.2201	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	35.0275	30.8525	32.4380	27.6838	26.2730	23.0592	22.2991	23.5214	24.1543	27.6724	30.3309	34.5330	(46)
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715	(64)
													2569.6323 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month	77.6444	68.3897	71.9043	61.3657	58.2386	51.1146	49.4298	52.1391	53.5419	61.3405	67.2335	76.5482	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.6892	20.1524	16.3890	12.4075	9.2748	7.8302	8.4608	10.9976	14.7610	18.7425	21.8752	23.3198	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	(71)
Water heating gains (Table 5)	104.3607	101.7703	96.6456	85.2302	78.2776	70.9926	66.4378	70.0794	74.3638	82.4469	93.3799	102.8873	(72)
Total internal gains	508.7984	506.6539	490.2494	458.8511	428.5668	400.8529	384.2461	387.4418	403.0060	431.0720	465.3368	495.2731	(73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g m2	Specific data or Table 6c	FF	Access factor Table 6d		Gains W
Southeast				8.6000	32.4665	0.2400		0.0000		0.7700		51.5984 (77)
Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405 (83)
Total gains	560.3968	596.8128	619.1479	621.8048	606.6524	581.8731	554.5559	542.5452	546.4292	537.5637	528.8497	542.8136 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	140.2624	141.0163	140.2624	143.3272	142.5485	147.3518	148.1840	148.1840	147.3518	144.1145	144.1145	143.3272	21.0000 (85)
alpha	10.3508	10.4011	10.3508	10.5551	10.5032	10.8235	10.8789	10.8789	10.8235	10.6076	10.6076	10.5551	
util living area	0.9661	0.9342	0.8700	0.7213	0.5492	0.3651	0.2681	0.2884	0.4607	0.7258	0.9157	0.9722	(86)
MIT	20.8313	20.8958	20.9538	20.9935	20.9996	21.0000	21.0000	21.0000	21.0000	20.9941	20.9317	20.8196	(87)
Th 2	20.4230	20.4259	20.4230	20.4347	20.4318	20.4493	20.4523	20.4523	20.4493	20.4376	20.4376	20.4347	(88)
util rest of house	0.9567	0.9186	0.8451	0.6873	0.5114	0.3279	0.2294	0.2489	0.4211	0.6869	0.8947	0.9644	(89)
MIT 2	20.2412	20.3190	20.3795	20.4295	20.4315	20.4493	20.4523	20.4523	20.4493	20.4333	20.3716	20.2381	(90)
Living area fraction	0.9567	0.9186	0.8451	0.6873	0.5114	0.3279	0.2294	0.2489	0.4211	0.6869	0.8947	0.9644	(91)
MIT	20.4890	20.5613	20.6207	20.6664	20.6701	20.6806	20.6823	20.6823	20.6806	20.6688	20.6068	20.4823	(92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
adjusted MIT	20.4890	20.5613	20.6207	20.6664	20.6701	20.6806	20.6823	20.6823	20.6806	20.6688	20.6068	20.4823	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9579	0.9226	0.8539	0.7014	0.5273	0.3435	0.2457	0.2655	0.4378	0.7031	0.9014	0.9651	(94)
Useful gains	536.8207	550.5945	528.7185	436.1340	319.8704	199.8772	136.2299	144.0540	239.2010	377.9598	476.6878	523.8738	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	636.0269	610.9300	554.6744	439.5028	320.0536	199.8784	136.2299	144.0540	239.2186	380.8847	515.1560	630.2444	(97)
Space heating kWh	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397	(98a)
Space heating requirement - total per year (kWh/year)												245.2408	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												245.2408	
Space heating per m ²										(98c) / (4) =		3.6065	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from main system(s)													0.0000 (201)
Fraction of main heating from main system 2													1.0000 (202)
Fraction of total heating from main system 1													0.0000 (203)
Fraction of total heating from main system 2													1.0000 (204)
Efficiency of main space heating system 1 (in %)													0.0000 (205)
Efficiency of main space heating system 2 (in %)													100.0000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
Space heating requirement	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)

elmhurst
energy

B 88
A 97

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£378	£378	£0
Space heating	£117	£117	£0
Water heating	£216	£216	£0
Lighting	£46	£46	£0
Total cost of fuels	£378	£378	£0
Total cost of uses	£379	£379	£0
Delivered energy	20 kWh/m ²	20 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	30 kWh/m ²	30 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	68.0000 (1b)	x 2.3700 (2b)	= 161.1600 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 161.1600 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9100	(17)
Infiltration rate	0.1955	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1662 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2119	0.2077	0.2036	0.1828	0.1786	0.1579	0.1579	0.1537	0.1662	0.1786	0.1869	0.1953 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3519	0.3477	0.3436	0.3228	0.3186	0.2979	0.2979	0.2937	0.3062	0.3186	0.3269	0.3353 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							

Full SAP Calculation Printout



Window					8.6000	0.7752	6.6667					(27)
Heatloss Floor 1					68.0000	0.1100	7.4800	75.0000	5100.0000			(28a)
External Wall	20.7800	8.6000			12.1800	0.1900	2.3142	150.0000	1827.0001			(29a)
Bin Store Wall	16.3500				16.3500	0.1900	3.1065	150.0000	2452.5001			(29a)
Total net area of external elements Aum(A, m2)					105.1300							(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =				19.5674			(33)
Main dwelling												
Corridor					43.9200	0.0000	0.0000	180.0000	7905.5997			(32)
Party Ceiling 1					68.0000			40.0000	2720.0000			(32b)
Internal Wall					96.0200			9.0000	864.1800			(32c)
Heat capacity Cm = Sum(A x k)												
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											20869.2798	(34)
List of Thermal Bridges											306.9012	(35)
K1 Element							Length	Psi-value	Total			
E2 Other lintels (including other steel lintels)							4.7700	0.0340	0.1622			
E3 Sill							4.7700	0.0260	0.1240			
E4 Jamb							10.8200	0.0300	0.3246			
E5 Ground floor (normal)							15.6700	0.0810	1.2693			
E7 Party floor between dwellings (in blocks of flats)							15.6700	-0.0180	-0.2821			
P1 Party wall - Ground floor							18.5300	0.1600	2.9648			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							18.5300	0.0000	0.0000			
E16 Corner (normal)							2.3700	0.0490	0.1161			
E18 Party wall between dwellings							4.7400	0.0290	0.1375			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											4.8164	(36)
Point Thermal bridges											(36a) =	0.0000
Total fabric heat loss											(33) + (36) + (36a) =	24.3838 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	18.7136	18.4927	18.2717	17.1670	16.9461	15.8414	15.8414	15.6204	16.2832	16.9461	17.3879	17.8298 (38)
Average = Sum(39)m / 12 =	43.0974	42.8764	42.6555	41.5508	41.3298	40.2251	40.2251	40.0042	40.6670	41.3298	41.7717	42.2136 (39)
												41.4955
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6338	0.6305	0.6273	0.6110	0.6078	0.5915	0.5915	0.5883	0.5980	0.6078	0.6143	0.6208 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1966 (42)
Hot water usage for mixer showers													
Hot water usage for baths	83.9431	82.6816	80.8433	77.3261	74.7306	71.8360	70.1907	72.0151	74.0149	77.1228	80.7155	83.6214	(42a)
Hot water usage for other uses	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873	(42b)
Average daily hot water use (litres/day)	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254	(42c)
													135.5983 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	147.4450	144.4418	140.7019	134.8176	130.1104	125.0213	122.9199	126.6420	130.5883	135.9498	141.9306	147.0342	(44)
Energy content (annual)	233.5169	205.6832	216.2535	184.5585	175.1536	153.7283	148.6609	156.8092	161.0284	184.4826	202.2062	230.2201	(45)
Distribution loss (46)m = 0.15 x (45)m	35.0275	30.8525	32.4380	27.6838	26.2730	23.0592	22.2991	23.5214	24.1543	27.6724	30.3309	34.5330	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	77.6444	68.3897	71.9043	61.3657	58.2386	51.1146	49.4298	52.1391	53.5419	61.3405	67.2335	76.5482	(65)
													0.0000 (64a)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.6892	20.1524	16.3890	12.4075	9.2748	7.8302	8.4608	10.9976	14.7610	18.7425	21.8752	23.3198	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	(71)
Water heating gains (Table 5)	104.3607	101.7703	96.6456	85.2302	78.2776	70.9926	66.4378	70.0794	74.3638	82.4469	93.3799	102.8873	(72)
Total internal gains	508.7984	506.6539	490.2494	458.8511	428.5668	400.8529	384.2461	387.4418	403.0060	431.0720	465.3368	495.2731	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Southeast	8.6000				36.7938		0.2400		0.0000	0.7700	58.4757 (77)
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	50.0430 (83)
Total gains	567.2742	606.2597	626.5344	627.7147	617.7081	588.6265	565.2799	553.3475	550.5737	541.1576	545.3161 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	134.5099	135.2030	135.9033	139.5166	140.2624	144.1145	144.1145	144.9104	142.5485	140.2624	138.7786	137.3259
alpha	9.9673	10.0135	10.0602	10.3011	10.3508	10.6076	10.6076	10.6607	10.5032	10.3508	10.2519	10.1551
util living area												
	0.9787	0.9564	0.9036	0.7833	0.6205	0.4373	0.3131	0.3326	0.5094	0.7780	0.9433	0.9831 (86)
MIT	20.7611	20.8395	20.9239	20.9839	20.9984	21.0000	21.0000	21.0000	20.9998	20.9872	20.8899	20.7482 (87)
Th 2	20.3997	20.4026	20.4055	20.4201	20.4230	20.4376	20.4376	20.4405	20.4318	20.4230	20.4172	20.4113 (88)
util rest of house												
	0.9725	0.9451	0.8827	0.7509	0.5827	0.3989	0.2731	0.2921	0.4676	0.7403	0.9275	0.9780 (89)
MIT 2	20.1348	20.2316	20.3307	20.4064	20.4219	20.4376	20.4376	20.4405	20.4317	20.4129	20.3056	20.1294 (90)
Living area fraction												
	20.3979	20.4869	20.5799	20.6489	20.6641	20.6738	20.6738	20.6755	20.6703	20.6541	20.5510	0.4200 (91)
MIT	20.3979	20.4869	20.5799	20.6489	20.6641	20.6738	20.6738	20.6755	20.6703	20.6541	20.5510	20.3893 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3979	20.4869	20.5799	20.6489	20.6641	20.6738	20.6738	20.6755	20.6703	20.6541	20.5510	20.3893 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9725	0.9468	0.8892	0.7639	0.5986	0.4150	0.2899	0.3091	0.4852	0.7557	0.9315	0.9778 (94)
Useful gains	551.6481	574.0217	557.0844	479.5300	369.7342	244.3064	163.8695	171.0381	267.1251	408.9404	498.6813	533.2066 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	693.7754	668.3120	600.5829	488.1777	370.4830	244.3191	163.8698	171.0385	267.1944	415.5346	561.8712	683.4076 (97)
Space heating kWh	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (98a)
Space heating requirement - total per year (kWh/year)												370.4044
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												370.4044
Space heating per m2										(98c) / (4) =		5.4471 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	105.7427	63.3631	32.3629	6.2263	0.5571	0.0000	0.0000	0.0000	0.0000	4.9061	45.4967	111.7495 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715 (64)
Efficiency of water heater	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005 (216)
Fuel for water heating, kWh/month	77.0159	68.0148	71.9115	62.2827	59.7589	53.1668	51.9255	54.3348	55.3253	62.5173	67.5008	76.0411 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	14.0270	12.6696	14.0270	13.5745	14.0270	13.5745	14.0270	14.0270	13.5745	14.0270	13.5745	14.0270 (231)
Lighting	19.8597	15.9322	14.3452	10.5099	8.1182	6.6326	7.4057	9.6262	12.5034	16.4052	18.5296	20.4117 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													370.4044	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													338.2005	
Water heating fuel used													759.7955	(219)
Space cooling fuel													0.0000	(221)

Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													165.1568	(230a)
Total electricity for the above, kWh/year													165.1568	(231)
Electricity for lighting (calculated in Appendix L)													160.2795	(232)

Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1455.6361	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	370.4044	16.4900	61.0797	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	759.7955	16.4900	125.2903	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	165.1568	16.4900	27.2343	(249)
Energy for lighting	160.2795	16.4900	26.4301	(250)
Additional standing charges			0.0000	(251)
Total energy cost			240.0344	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7647	(257)
SAP value		87.6040	
SAP rating (Section 12)		88	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	370.4044	0.1594	59.0420	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	759.7955	0.1412	107.3016	(264)
Space and water heating			166.3436	(265)
Pumps, fans and electric keep-hot	165.1568	0.1387	22.9093	(267)
Energy for lighting	160.2795	0.1443	23.1333	(268)
Total CO2, kg/year			212.3862	(272)
CO2 emissions per m2			3.1200	(273)
EI value			97.4814	
EI rating			97	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	68.0000 (1b)	x 2.3700 (2b)	= 161.1600 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	161.1600 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

Full SAP Calculation Printout



Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.9100 (17)
Infiltration rate 0.1955 (18)
Number of sides sheltered 2 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1662 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate												
	0.1786	0.1745	0.1786	0.1620	0.1662	0.1412	0.1371	0.1371	0.1412	0.1579	0.1579	0.1620
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3186	0.3145	0.3186	0.3020	0.3062	0.2812	0.2771	0.2771	0.2812	0.2979	0.2979	0.3020 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			68.0000	0.1100	7.4800	75.0000	5100.0000 (28a)
External Wall	20.7800	8.6000	12.1800	0.1900	2.3142	150.0000	1827.0001 (29a)
Bin Store Wall	16.3500		16.3500	0.1900	3.1065	150.0000	2452.5001 (29a)
Total net area of external elements Aum(A, m2)			105.1300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 19.5674		(33)
Main dwelling							
Corridor			43.9200	0.0000	0.0000	180.0000	7905.5997 (32)
Party Ceiling 1			68.0000			40.0000	2720.0000 (32b)
Internal Wall			96.0200			9.0000	864.1800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 20869.2798 (34)
List of Thermal Bridges 306.9012 (35)

	Length	Psi-value	Total
K1 Element	4.7700	0.0340	0.1622
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240
E3 Sill	10.8200	0.0300	0.3246
E4 Jamb	15.6700	0.0810	1.2693
E5 Ground floor (normal)	15.6700	-0.0180	-0.2821
E7 Party floor between dwellings (in blocks of flats)	18.5300	0.1600	2.9648
P1 Party wall - Ground floor	18.5300	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.3700	0.0490	0.1161
E16 Corner (normal)	4.7400	0.0290	0.1375
E18 Party wall between dwellings			4.8164 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.0000
Point Thermal bridges			(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 24.3838 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(38)m 16.9461 16.7251 16.9461 16.0623 16.2832 14.9576 14.7367 14.7367 14.9576 15.8414 15.8414 16.0623 (38)
Heat transfer coeff 41.3298 41.1089 41.3298 40.4461 40.6670 39.3414 39.1204 39.1204 39.3414 40.2251 40.2251 40.4461 (39)
Average = Sum(39)m / 12 = 40.2251

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6078	0.6045	0.6078	0.5948	0.5980	0.5785	0.5753	0.5753	0.5785	0.5915	0.5915	0.5948 (40)
HLP (average)												0.5915
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.1966 (42)
Hot water usage for mixer showers 83.9431 82.6816 80.8433 77.3261 74.7306 71.8360 70.1907 72.0151 74.0149 77.1228 80.7155 83.6214 (42a)
Hot water usage for baths 26.3765 25.9848 25.4331 24.4160 23.6544 22.8099 22.3538 22.9015 23.4980 24.4016 25.4397 26.2873 (42b)
Hot water usage for other uses 37.1254 35.7754 34.4254 33.0754 31.7254 30.3754 30.3754 31.7254 33.0754 34.4254 35.7754 37.1254 (42c)
Average daily hot water use (litres/day) 135.5983 (43)
Daily hot water use
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
147.4450 144.4418 140.7019 134.8176 130.1104 125.0213 122.9199 126.6420 130.5883 135.9498 141.9306 147.0342 (44)
Energy conte 233.5169 205.6832 216.2535 184.5585 175.1536 153.7283 148.6609 156.8092 161.0284 184.4826 202.2062 230.2201 (45)
Energy content (annual) Total = Sum(45)m = 2252.3013
Distribution loss (46)m = 0.15 x (45)m 35.0275 30.8525 32.4380 27.6838 26.2730 23.0592 22.2991 23.5214 24.1543 27.6724 30.3309 34.5330 (46)
Water storage loss:
Store volume 201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.8694 (55)
Total storage loss
26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (56)
If cylinder contains dedicated solar storage
26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month

Full SAP Calculation Printout



WWHRS	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	77.6444	68.3897	71.9043	61.3657	58.2386	51.1146	49.4298	52.1391	53.5419	61.3405	67.2335	76.5482 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.6892	20.1524	16.3890	12.4075	9.2748	7.8302	8.4608	10.9976	14.7610	18.7425	21.8752	23.3198 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	104.3607	101.7703	96.6456	85.2302	78.2776	70.9926	66.4378	70.0794	74.3638	82.4469	93.3799	102.8873 (72)
Total internal gains	508.7984	506.6539	490.2494	458.8511	428.5668	400.8529	384.2461	387.4418	403.0060	431.0720	465.3368	495.2731 (73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
Southeast				8.6000	32.4665		0.2400	0.0000	0.7700		51.5984 (77)	
Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405 (83)
Total gains	560.3968	596.8128	619.1479	621.8048	606.6524	581.8731	554.5559	542.5452	546.4292	537.5637	528.8497	542.8136 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	140.2624	141.0163	140.2624	143.3272	142.5485	147.3518	148.1840	148.1840	147.3518	144.1145	144.1145	143.3272
alpha	10.3508	10.4011	10.3508	10.5551	10.5032	10.8235	10.8789	10.8789	10.8235	10.6076	10.6076	10.5551
util living area	0.9661	0.9342	0.8700	0.7213	0.5492	0.3651	0.2681	0.2884	0.4607	0.7258	0.9157	0.9722 (86)
MIT	20.8313	20.8958	20.9538	20.9935	20.9996	21.0000	21.0000	21.0000	21.0000	20.9941	20.9317	20.8196 (87)
Th 2	20.4230	20.4259	20.4230	20.4347	20.4318	20.4493	20.4523	20.4523	20.4493	20.4376	20.4376	20.4347 (88)
util rest of house	0.9567	0.9186	0.8451	0.6873	0.5114	0.3279	0.2294	0.2489	0.4211	0.6869	0.8947	0.9644 (89)
MIT 2	20.2412	20.3190	20.3795	20.4295	20.4315	20.4493	20.4523	20.4523	20.4493	20.4333	20.3716	20.2381 (90)
Living area fraction	20.4890	20.5613	20.6207	20.6664	20.6701	20.6806	20.6823	20.6823	20.6806	20.6688	20.6068	20.4823 (91)
MIT	20.4890	20.5613	20.6207	20.6664	20.6701	20.6806	20.6823	20.6823	20.6806	20.6688	20.6068	20.4823 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4890	20.5613	20.6207	20.6664	20.6701	20.6806	20.6823	20.6823	20.6806	20.6688	20.6068	20.4823 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	536.8207	550.5945	528.7185	436.1340	319.8704	199.8772	136.2299	144.0540	239.2010	377.9598	476.6878	523.8738 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	636.0269	610.9300	554.6744	439.5028	320.0536	199.8784	136.2299	144.0540	239.2186	380.8847	515.1560	630.2444 (97)
Space heating kWh	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397 (98a)
Space heating requirement - total per year (kWh/year)												245.2408
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												245.2408
Space heating per m2										(98c) / (4) =		3.6065 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Fraction of main heating from main system 2	0.0000 (203)
Fraction of total heating from main system 1	1.0000 (204)
Fraction of total heating from main system 2	0.0000 (205)
Efficiency of main space heating system 1 (in %)	100.0000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	73.8094	40.5455	19.3112	2.4255	0.1363	0.0000	0.0000	0.0000	0.0000	2.1762	27.6971	79.1397	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	260.4683	230.0264	243.2049	210.6405	202.1050	179.8103	175.6123	183.7606	187.1104	211.4340	228.2882	257.1715	(64)
Efficiency of water heater (217)m	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	338.2005	(216)
Fuel for water heating, kWh/month	77.0159	68.0148	71.9115	62.2827	59.7589	53.1668	51.9255	54.3348	55.3253	62.5173	67.5008	76.0411	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	14.0270	12.6696	14.0270	13.5745	14.0270	13.5745	14.0270	14.0270	13.5745	14.0270	13.5745	14.0270	(231)
Lighting	19.8597	15.9322	14.3452	10.5099	8.1182	6.6326	7.4057	9.6262	12.5034	16.4052	18.5296	20.4117	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												245.2408	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												338.2005	
Water heating fuel used												759.7955	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												165.1568	(230a)
Total electricity for the above, kWh/year												165.1568	(231)
Electricity for lighting (calculated in Appendix L)												160.2795	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1330.4726	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	245.2408	28.4300	69.7220	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	759.7955	28.4300	216.0098	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	165.1568	28.4300	46.9541	(249)
Energy for lighting	160.2795	28.4300	45.5675	(250)
Additional standing charges			0.0000	(251)
Total energy cost			378.2534	(255)

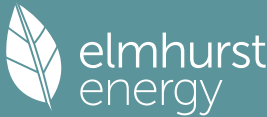
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	245.2408	0.1599	39.2157	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	759.7955	0.1412	107.3016	(264)
Space and water heating			146.5173	(265)
Pumps, fans and electric keep-hot	165.1568	0.1387	22.9093	(267)
Energy for lighting	160.2795	0.1443	23.1333	(268)
Total CO2, kg/year			192.5599	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	245.2408	1.5919	390.3904	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	759.7955	1.5222	1156.5703	(278)
Space and water heating			1546.9607	(279)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	165.1568	1.5128	249.8491 (281)
Energy for lighting	160.2795	1.5338	245.8421 (282)
Total Primary energy kWh/year			2042.6520 (286)

Full SAP Calculation Printout



Property Reference	Plot 5			Issued on Date	27/08/2025	
Assessment Reference	Plot 5		Prop Type Ref			
Property	Flat 5, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	89 B	DER	3.20	TER	11.22	
Environmental	98 A	% DER < TER				71.48
CO ₂ Emissions (t/year)	0.14	DFEE	17.69	TFEE	19.34	
Compliance Check	See BREL	% DFEE < TFEE				8.51
% DPER < TPER	42.71	DPER	33.95	TPER	59.26	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9000	(17)
Infiltration rate	0.1950	(18)
Number of sides sheltered	2	(19)

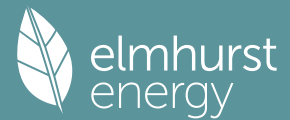
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2113	0.2072	0.2030	0.1823	0.1782	0.1575	0.1575	0.1533	0.1658	0.1782	0.1865	0.1948 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3513	0.3472	0.3430	0.3223	0.3182	0.2975	0.2975	0.2933	0.3058	0.3182	0.3265	0.3348 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.5738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 16895.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							337.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E5 Ground floor (normal)	5.7300	0.0810	0.4641	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031	
P1 Party wall - Ground floor	23.1200	0.1600	3.6992	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.7586 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 16.3324 (37)

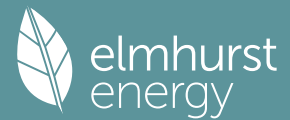
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.7388	13.5768	13.4147	12.6045	12.4425	11.6323	11.6323	11.4702	11.9564	12.4425	12.7666	13.0906 (38)
Average = Sum(39)m / 12 =	30.0712	29.9092	29.7472	28.9369	28.7749	27.9647	27.9647	27.8027	28.2888	28.7749	29.0990	29.4231 (39)
												28.8964
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6014	0.5982	0.5949	0.5787	0.5755	0.5593	0.5593	0.5561	0.5658	0.5755	0.5820	0.5885 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												2256.2377 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Southeast	5.9700	36.7938	0.2400	0.0000	0.7700	40.5930 (77)						
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	156.0700	156.9155	157.7703	162.1877	163.1010	167.8265	167.8265	168.8046	165.9038	163.1010	161.2845	159.5081	
alpha	11.4047	11.4610	11.5180	11.8125	11.8734	12.1884	12.1884	12.2536	12.0603	11.8734	11.7523	11.6339	
util living area	0.9799	0.9487	0.8921	0.7486	0.5834	0.4029	0.2886	0.3064	0.4702	0.7396	0.9308	0.9835 (86)	
MIT	20.8189	20.8970	20.9554	20.9941	20.9997	21.0000	21.0000	21.0000	21.0000	20.9956	20.9348	20.8112 (87)	
Th 2	20.4287	20.4316	20.4346	20.4492	20.4521	20.4668	20.4668	20.4697	20.4609	20.4521	20.4462	20.4404 (88)	
util rest of house	0.9735	0.9354	0.8694	0.7168	0.5492	0.3693	0.2536	0.2711	0.4335	0.7029	0.9121	0.9782 (89)	
MIT 2	20.2304	20.3252	20.3924	20.4445	20.4519	20.4668	20.4668	20.4697	20.4609	20.4489	20.3830	20.2318 (90)	
Living area fraction	fLA = Living area / (4) =												0.4518 (91)
MIT	20.4963	20.5836	20.6468	20.6928	20.6994	20.7077	20.7077	20.7093	20.7045	20.6959	20.6323	20.4936 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.4963	20.5836	20.6468	20.6928	20.6994	20.7077	20.7077	20.7093	20.7045	20.6959	20.6323	20.4936 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9744	0.9392	0.8783	0.7310	0.5647	0.3845	0.2694	0.2870	0.4501	0.7194	0.9188	0.9787 (94)
Useful gains	400.4413	420.7100	400.5205	338.7794	258.8279	170.7986	114.8702	119.8099	186.8251	288.7541	363.9822	388.9123 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	487.0432	469.0825	420.8255	341.2486	258.9560	170.7995	114.8702	119.8099	186.8318	290.5094	393.7753	479.4071 (97)
Space heating kWh	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (98a)
Space heating requirement - total per year (kWh/year)												204.0033
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												204.0033
Space heating per m2												(98c) / (4) = 4.0801 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												204.0033 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1105.5384 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	204.0033	0.1602	32.6728 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			125.2200 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			160.0411 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.2000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	204.0033	1.5928	324.9309 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1322.6951 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1697.4426 (286)
Dwelling Primary energy Rate (DPER)			33.9500 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3560 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4538	0.4449	0.4361	0.3916	0.3827	0.3382	0.3382	0.3293	0.3560	0.3827	0.4005	0.4183 (22b)
Effective ac	0.6030	0.5990	0.5951	0.5767	0.5732	0.5572	0.5572	0.5542	0.5634	0.5732	0.5802	0.5875 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
Heatloss Floor 1			50.0000	0.1300	6.5000			(28a)					
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)					
Total net area of external elements Aum(A, m2)			63.5800					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	14.7057			(33)					
Main dwelling													
Corridor			34.1800	0.0000	0.0000			(32)					
Party Wall			20.6200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							347.9116	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E5 Ground floor (normal)				5.7300	0.1600		0.9168						
E18 Party wall between dwellings				2.3700	0.0600		0.1422						
E7 Party floor between dwellings (in blocks of flats)				5.7300	0.0700		0.4011						
P1 Party wall - Ground floor				23.1200	0.0800		1.8496						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.1200	0.0000		0.0000						
E25 Staggered party wall between dwellings				2.3700	0.0600		0.1422						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.1459	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	18.8516	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 23.5799	Feb 23.4235	Mar 23.2702	Apr 22.5502	May 22.4155	Jun 21.7884	Jul 21.7884	Aug 21.6723	Sep 22.0299	Oct 22.4155	Nov 22.6880	Dec 22.9729	(38)
Heat transfer coeff	42.4315	42.2751	42.1218	41.4018	41.2671	40.6400	40.6400	40.5238	40.8815	41.2671	41.5396	41.8245	(39)
Average = Sum(39)m / 12 =												41.4011	
HLP	Jan 0.8486	Feb 0.8455	Mar 0.8424	Apr 0.8280	May 0.8253	Jun 0.8128	Jul 0.8128	Aug 0.8105	Sep 0.8176	Oct 0.8253	Nov 0.8308	Dec 0.8365	(40)
HLP (average)												0.8280	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)	
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)													98.5597	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy content (annual)	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
WWHRS	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
PV diverter	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
12Total per year (kWh/year)													1962.4258	(64)
Electric shower(s)													1962	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													0.0000	(64a)
Heat gains from water heating, kWh/month														
	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 84.5050	Feb 84.5050	Mar 84.5050	Apr 84.5050	May 84.5050	Jun 84.5050	Jul 84.5050	Aug 84.5050	Sep 84.5050	Oct 84.5050	Nov 84.5050	Dec 84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W

Southeast					5.9700	36.7938	0.6300	0.7000			0.7700	67.1307 (77)

Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	113.8802	114.3015	114.7175	116.7125	117.0935	118.9003	118.9003	119.2411	118.1978	117.0935	116.3253	115.5329
alpha	8.5920	8.6201	8.6478	8.7808	8.8062	8.9267	8.9267	8.9494	8.8799	8.8062	8.7550	8.7022
util living area	0.9893	0.9719	0.9335	0.8218	0.6512	0.4581	0.3268	0.3510	0.5417	0.8282	0.9663	0.9916 (86)
MIT	20.5908	20.7168	20.8423	20.9572	20.9943	20.9998	21.0000	21.0000	20.9990	20.9614	20.7823	20.5729 (87)
Th 2	20.2114	20.2141	20.2167	20.2291	20.2314	20.2423	20.2423	20.2443	20.2381	20.2314	20.2267	20.2218 (88)
util rest of house	0.9852	0.9622	0.9131	0.7821	0.5998	0.4040	0.2705	0.2934	0.4824	0.7820	0.9531	0.9883 (89)
MIT 2	19.7555	19.9123	20.0619	20.1938	20.2278	20.2422	20.2423	20.2443	20.2376	20.2018	20.0045	19.7420 (90)
Living area fraction	20.1329	20.2758	20.4145	20.5387	20.5741	20.5844	20.5846	20.5857	20.5816	20.5450	20.3559	20.1174 (92)
MIT	20.1329	20.2758	20.4145	20.5387	20.5741	20.5844	20.5846	20.5857	20.5816	20.5450	20.3559	20.1174 (93)
Temperature adjustment												0.0000
adjusted MIT	20.1329	20.2758	20.4145	20.5387	20.5741	20.5844	20.5846	20.5857	20.5816	20.5450	20.3559	20.1174 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9847	0.9631	0.9187	0.7987	0.6229	0.4285	0.2959	0.3194	0.5092	0.8017	0.9556	0.9878 (94)
Useful gains	466.9751	510.2991	510.3396	462.5761	363.9541	243.1357	161.9318	169.6162	264.6507	393.6212	445.3720	451.4248 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	671.8127	650.0125	586.1028	481.8645	366.2100	243.2079	161.9340	169.6204	264.9789	410.3996	550.6467	665.7386 (97)
Space heating kWh	152.3992	93.8874	56.3678	13.8877	1.6784	0.0000	0.0000	0.0000	0.0000	12.4832	75.7978	159.4495 (98a)
Space heating requirement - total per year (kWh/year)												565.9509
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	152.3992	93.8874	56.3678	13.8877	1.6784	0.0000	0.0000	0.0000	0.0000	12.4832	75.7978	159.4495 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												565.9509
Space heating per m2										(98c) / (4) =		11.3190 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	152.3992	93.8874	56.3678	13.8877	1.6784	0.0000	0.0000	0.0000	0.0000	12.4832	75.7978	159.4495 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	165.1129	101.7198	61.0702	15.0463	1.8184	0.0000	0.0000	0.0000	0.0000	13.5246	82.1211	172.7513 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater	83.5427	82.7822	81.7652	80.4486	79.8859	79.8000	79.8000	79.8000	79.8000	80.3798	82.3546	79.8000 (216)
Fuel for water heating, kWh/month	230.2749	205.6680	221.7744	199.7449	196.0123	177.9421	176.5248	182.9609	184.3137	202.6794	208.6813	227.6457 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											613.1646	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											79.8000	
Water heating fuel used											2414.2225	(219)
Space cooling fuel											0.0000	(221)

Electricity for pumps and fans:												
Total electricity for the above, kWh/year											86.0000	(231)
Electricity for lighting (calculated in Appendix L)											138.3788	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-823.7918	(233)
Wind generation											0.0000	(234)
Hydro-electric generation (Appendix N)											0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)											0.0000	(235)
Appendix Q - special features												
Energy saved or generated											-0.0000	(236)
Energy used											0.0000	(237)
Total delivered energy for all uses											2427.9741	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	613.1646	0.2100	128.7646 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2414.2225	0.2100	506.9867 (264)
Space and water heating			635.7513 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			560.8831 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.2200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	613.1646	1.1300	692.8760 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2414.2225	1.1300	2728.0714 (278)
Space and water heating			3420.9473 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2962.9309 (286)
Target Primary Energy Rate (TPER)			59.2600 (287)

Full SAP Calculation Printout



Property Reference	Plot 5			Issued on Date	27/08/2025
Assessment Reference	Plot 5	Prop Type Ref			
Property	Flat 5, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.20	TER	11.22
Environmental	98 A	% DER < TER			71.48
CO ₂ Emissions (t/year)	0.14	DFEE	17.69	TFEE	19.34
Compliance Check	See BREL	% DFEE < TFEE			8.51
% DPER < TPER	42.71	DPER	33.95	TPER	59.26
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

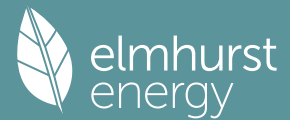
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1688 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9000	(17)
Infiltration rate	0.3638	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3092 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3942	0.3865	0.3788	0.3401	0.3324	0.2937	0.2937	0.2860	0.3092	0.3324	0.3479	0.3633 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5777	0.5747	0.5717	0.5578	0.5552	0.5431	0.5431	0.5409	0.5478	0.5552	0.5605	0.5660 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.5738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17395.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							347.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E5 Ground floor (normal)	5.7300	0.0810	0.4641
E18 Party wall between dwellings	2.3700	0.0290	0.0687
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031
P1 Party wall - Ground floor	23.1200	0.1600	3.6992
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7586 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	16.3324 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.5915	22.4735	22.3578	21.8145	21.7129	21.2397	21.2397	21.1520	21.4219	21.7129	21.9185	22.1335 (38)
Average = Sum(39)m / 12 =	38.9239	38.8059	38.6902	38.1469	38.0453	37.5721	37.5721	37.4845	37.7544	38.0453	38.2509	38.4659 (39)
												38.1464
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7785	0.7761	0.7738	0.7629	0.7609	0.7514	0.7514	0.7497	0.7551	0.7609	0.7650	0.7693 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.7244 (42b)
Hot water usage for other uses												31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss	(46)m = 0.15 x (45)m											832.1197
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (47)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (48)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (49)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (50)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (51)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (52)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (53)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (54)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (55)
12Total per year (kWh/year)												707.3017 (56)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (57)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (58)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (59)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600 (60)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (61)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (62)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (64)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (65)
Total internal gains	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (66)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Southeast	5.9700	36.7938	0.2400	0.0000	0.7700	40.5930 (77)						
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	360.0081	398.2120	409.2103	423.6459	422.6872	412.9395	397.9965	387.1093	382.3458	363.7852	351.8865	347.3425 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	124.1423	124.5198	124.8921	126.6709	127.0093	128.6089	128.6089	128.9096	127.9880	127.0093	126.3265	125.6205
alpha	9.2762	9.3013	9.3261	9.4447	9.4673	9.5739	9.5739	9.5940	9.5325	9.4673	9.4218	9.3747
util living area	0.9981	0.9945	0.9852	0.9382	0.8071	0.5809	0.4153	0.4453	0.6756	0.9378	0.9930	0.9986 (86)
MIT	20.4982	20.6049	20.7273	20.8891	20.9781	20.9990	21.0000	20.9999	20.9962	20.9057	20.6847	20.4825 (87)
Th 2	20.2720	20.2741	20.2761	20.2856	20.2873	20.2956	20.2956	20.2971	20.2924	20.2873	20.2838	20.2800 (88)
util rest of house	0.9973	0.9921	0.9789	0.9151	0.7565	0.5178	0.3489	0.3773	0.6093	0.9102	0.9896	0.9980 (89)
MIT 2	19.8186	19.9261	20.0473	20.2049	20.2753	20.2953	20.2956	20.2971	20.2910	20.2226	20.0138	19.8100 (90)
Living area fraction	20.1257	20.2328	20.3545	20.5140	20.5928	20.6132	20.6138	20.6147	20.6096	20.5312	20.3169	20.1139 (92)
MIT	20.1257	20.2328	20.3545	20.5140	20.5928	20.6132	20.6138	20.6147	20.6096	20.5312	20.3169	20.1139 (93)
Temperature adjustment												0.0000
adjusted MIT	20.1257	20.2328	20.3545	20.5140	20.5928	20.6132	20.6138	20.6147	20.6096	20.5312	20.3169	20.1139 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9971	0.9920	0.9797	0.9232	0.7789	0.5464	0.3789	0.4081	0.6394	0.9207	0.9898	0.9979 (94)
Useful gains	358.9780	395.0176	400.8909	391.1072	329.2390	225.6110	150.7995	157.9669	244.4538	334.9256	348.2841	346.5995 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	615.9964	595.0026	536.0349	443.0383	338.3299	225.9295	150.8082	157.9841	245.7659	377.8351	505.5594	612.1414 (97)
Space heating kWh	191.2217	134.3899	100.5472	37.3904	6.7636	0.0000	0.0000	0.0000	0.0000	31.9247	113.2382	197.5631 (98a)
Space heating requirement - total per year (kWh/year)												813.0388
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	191.2217	134.3899	100.5472	37.3904	6.7636	0.0000	0.0000	0.0000	0.0000	31.9247	113.2382	197.5631 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												813.0388
Space heating per m2												16.2608 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	353.1776	278.0334	284.8819	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9750	0.9944	0.9918	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	344.3551	276.4737	282.5418	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	444.3213	428.8194	417.8150	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	71.9757	113.3452	100.6433	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			0.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	17.9939	28.3363	25.1608	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												71.4910 (107)
Energy for space heating												16.2608 (99)
Energy for space cooling												1.4298 (108)
Total												17.6906 (109)
Fabric Energy Efficiency (DFEE)												17.7 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			118.5000

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)

Full SAP Calculation Printout



Number of sides sheltered

2 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.3560 \quad (21)$$

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4538	0.4449	0.4361	0.3916	0.3827	0.3382	0.3382	0.3293	0.3560	0.3827	0.4005	0.4183	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.6030	0.5990	0.5951	0.5767	0.5732	0.5572	0.5572	0.5542	0.5634	0.5732	0.5802	0.5875	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
Heatloss Floor 1			50.0000	0.1300	6.5000			(28a)
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)
Total net area of external elements Aum(A, m2)			63.5800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.7057			(33)
Main dwelling								
Corridor			34.1800	0.0000	0.0000			(32)
Party Wall			20.6200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

347.9116 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	3.1800	0.0500	0.1590	
E4 Jamb	7.5200	0.0500	0.3760	
E5 Ground floor (normal)	5.7300	0.1600	0.9168	
E18 Party wall between dwellings	2.3700	0.0600	0.1422	
E7 Party floor between dwellings (in blocks of flats)	5.7300	0.0700	0.4011	
P1 Party wall - Ground floor	23.1200	0.0800	1.8496	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000	
E25 Staggered party wall between dwellings	2.3700	0.0600	0.1422	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

4.1459 (36)

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 18.8516 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	23.5799	23.4235	23.2702	22.5502	22.4155	21.7884	21.7884	21.6723	22.0299	22.4155	22.6880	22.9729	(38)
Average = Sum(39)m / 12 =	42.4315	42.2751	42.1218	41.4018	41.2671	40.6400	40.6400	40.5238	40.8815	41.2671	41.5396	41.8245	(39)
												41.4011	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8486	0.8455	0.8424	0.8280	0.8253	0.8128	0.8128	0.8105	0.8176	0.8253	0.8308	0.8365	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476		(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383		(42c)
Average daily hot water use (litres/day)													50.1040 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)										Total = Sum(45)m =			832.1197

Distribution loss (46)m = 0.15 x (45)m

0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (46)

Water storage loss:

Total storage loss

0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)

If cylinder contains dedicated solar storage

0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (57)

Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month

73.5866 64.3489 67.3161 57.5864 54.5493 47.8512 46.6610 49.4910 51.0427 58.4086 63.8117 72.6481 (62)

WWHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)

PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)

Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)

Output from w/h 73.5866 64.3489 67.3161 57.5864 54.5493 47.8512 46.6610 49.4910 51.0427 58.4086 63.8117 72.6481 (64)

Total per year (kWh/year) 707.3017 (64)

Electric shower(s) 42.0893 37.5019 40.9507 39.0787 39.8120 37.9768 39.2427 39.8120 39.0787 40.9507 40.1807 42.0893 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 478.7637 (64a)

Heat gains from water heating, kWh/month 28.9190 25.4627 27.0667 24.1663 23.5903 21.4570 21.4759 22.3258 22.5304 24.8398 25.9981 28.6844 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637 (73)

6. Solar gains

[Jan]												Gains
	Area				Solar flux		g		FF		Access	W
	m2				Table 6a		Specific data		Specific data		factor	
					W/m2		or Table 6b		or Table 6c		Table 6d	
Southeast	5.9700				36.7938		0.6300		0.7000		0.7700	67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	384.1061	440.7145	468.6200	497.7593	506.0844	495.6347	477.7143	459.9616	446.7946	411.3050	381.1515	367.6136 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	113.8802	114.3015	114.7175	116.7125	117.0935	118.9003	118.9003	119.2411	118.1978	117.0935	116.3253	115.5329
alpha	8.5920	8.6201	8.6478	8.7808	8.8062	8.9267	8.9267	8.9494	8.8799	8.8062	8.7550	8.7022
util living area	0.9976	0.9916	0.9745	0.9006	0.7412	0.5240	0.3743	0.4052	0.6274	0.9160	0.9909	0.9983 (86)
MIT	20.4440	20.5835	20.7364	20.9097	20.9851	20.9993	21.0000	20.9999	20.9970	20.9102	20.6578	20.4254 (87)
Th 2	20.2114	20.2141	20.2167	20.2291	20.2314	20.2423	20.2423	20.2443	20.2381	20.2314	20.2267	20.2218 (88)
util rest of house	0.9966	0.9881	0.9644	0.8691	0.6867	0.4624	0.3098	0.3387	0.5602	0.8820	0.9865	0.9976 (89)
MIT 2	19.7119	19.8518	20.0015	20.1667	20.2237	20.2420	20.2422	20.2443	20.2370	20.1719	19.9367	19.7025 (90)
Living area fraction	20.0426	20.1824	20.3335	20.5024	20.5677	20.5842	20.5846	20.5857	20.5803	20.5055	20.2625	20.0291 (92)
MIT	20.0426	20.1824	20.3335	20.5024	20.5677	20.5842	20.5846	20.5857	20.5803	20.5055	20.2625	20.0291 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0426	20.1824	20.3335	20.5024	20.5677	20.5842	20.5846	20.5857	20.5803	20.5055	20.2625	20.0291 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9963	0.9879	0.9661	0.8811	0.7111	0.4902	0.3390	0.3687	0.5906	0.8952	0.9867	0.9973 (94)
Useful gains	382.6929	435.3993	452.7372	438.5591	359.8592	242.9816	161.9267	169.6053	263.8791	368.2106	376.0991	366.6328 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	667.9827	646.0637	582.6934	480.3592	365.9436	243.1969	161.9335	169.6195	264.9255	408.7695	546.7664	662.0454 (97)
Space heating kWh	212.2556	141.5665	96.6874	30.0961	4.5268	0.0000	0.0000	0.0000	0.0000	30.1758	122.8804	219.7869 (98a)
Space heating requirement - total per year (kWh/year)												857.9755
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	212.2556	141.5665	96.6874	30.0961	4.5268	0.0000	0.0000	0.0000	0.0000	30.1758	122.8804	219.7869 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												857.9755
Space heating per m2										(98c) / (4) =		17.1595 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan 4.3000	Feb 4.9000	Mar 6.5000	Apr 8.9000	May 11.7000	Jun 14.6000	Jul 16.6000	Aug 16.4000	Sep 14.1000	Oct 10.6000	Nov 7.1000	Dec 4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	382.0157	300.7358	307.9812	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9869	0.9970	0.9953	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	377.0000	299.8386	306.5439	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	543.7112	524.6170	505.5189	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	120.0320	167.2352	148.0374	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	30.0080	41.8088	37.0093	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												108.8261 (107)
Energy for space heating												17.1595 (99)
Energy for space cooling												2.1765 (108)
Total												19.3360 (109)
Fabric Energy Efficiency (TFEE)												19.3 (109)

Full SAP Calculation Printout



Property Reference	Plot 5			Issued on Date	27/08/2025	
Assessment Reference	Plot 5		Prop Type Ref			
Property	Flat 5, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	89 B	DER	3.20	TER	11.22	
Environmental	98 A	% DER < TER				71.48
CO ₂ Emissions (t/year)	0.14	DFEE	17.69	TFEE	19.34	
Compliance Check	See BREL	% DFEE < TFEE				8.51
% DPER < TPER	42.71	DPER	33.95	TPER	59.26	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling				
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(4)
Dwelling volume			118.5000 (5)	(3a)+(3b)+(3c)+(3d)+(3e)...(3n)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9000	(17)
Infiltration rate	0.1950	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2113	0.2072	0.2030	0.1823	0.1782	0.1575	0.1575	0.1533	0.1658	0.1782	0.1865	0.1948 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3513	0.3472	0.3430	0.3223	0.3182	0.2975	0.2975	0.2933	0.3058	0.3182	0.3265	0.3348 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	11.5738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 16895.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							337.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E5 Ground floor (normal)	5.7300	0.0810	0.4641
E18 Party wall between dwellings	2.3700	0.0290	0.0687
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031
P1 Party wall - Ground floor	23.1200	0.1600	3.6992
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7586 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	16.3324 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.7388	13.5768	13.4147	12.6045	12.4425	11.6323	11.6323	11.4702	11.9564	12.4425	12.7666	13.0906 (38)
Average = Sum(39)m / 12 =	30.0712	29.9092	29.7472	28.9369	28.7749	27.9647	27.9647	27.8027	28.2888	28.7749	29.0990	29.4231 (39)
												28.8964
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6014	0.5982	0.5949	0.5787	0.5755	0.5593	0.5593	0.5561	0.5658	0.5755	0.5820	0.5885 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6901 (42)											
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d	Gains W		
Southeast				5.9700	36.7938	0.2400	0.0000		0.7700	40.5930 (77)		
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	156.0700	156.9155	157.7703	162.1877	163.1010	167.8265	167.8265	168.8046	165.9038	163.1010	161.2845	159.5081
alpha	11.4047	11.4610	11.5180	11.8125	11.8734	12.1884	12.1884	12.2536	12.0603	11.8734	11.7523	11.6339
util living area	0.9799	0.9487	0.8921	0.7486	0.5834	0.4029	0.2886	0.3064	0.4702	0.7396	0.9308	0.9835 (86)
MIT	20.8189	20.8970	20.9554	20.9941	20.9997	21.0000	21.0000	21.0000	21.0000	20.9956	20.9348	20.8112 (87)
Th 2	20.4287	20.4316	20.4346	20.4492	20.4521	20.4668	20.4668	20.4697	20.4609	20.4521	20.4462	20.4404 (88)
util rest of house	0.9735	0.9354	0.8694	0.7168	0.5492	0.3693	0.2536	0.2711	0.4335	0.7029	0.9121	0.9782 (89)
MIT 2	20.2304	20.3252	20.3924	20.4445	20.4519	20.4668	20.4668	20.4697	20.4609	20.4489	20.3830	20.2318 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.4963	20.5836	20.6468	20.6928	20.6994	20.7077	20.7077	20.7093	20.7045	20.6959	20.6323	20.4936 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.4963	20.5836	20.6468	20.6928	20.6994	20.7077	20.7077	20.7093	20.7045	20.6959	20.6323	20.4936 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9744	0.9392	0.8783	0.7310	0.5647	0.3845	0.2694	0.2870	0.4501	0.7194	0.9188	0.9787 (94)
Useful gains	400.4413	420.7100	400.5205	338.7794	258.8279	170.7986	114.8702	119.8099	186.8251	288.7541	363.9822	388.9123 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	487.0432	469.0825	420.8255	341.2486	258.9560	170.7995	114.8702	119.8099	186.8318	290.5094	393.7753	479.4071 (97)
Space heating kWh	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (98a)
Space heating requirement - total per year (kWh/year)												204.0033
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												204.0033
Space heating per m2												(98c) / (4) = 4.0801 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	64.4318	32.5063	15.1069	1.7778	0.0953	0.0000	0.0000	0.0000	0.0000	1.3059	21.4510	67.3282 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater												344.1753 (216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												204.0033 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1105.5384 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	204.0033	0.1602	32.6728 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			125.2200 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			160.0411 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.2000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	204.0033	1.5928	324.9309 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1322.6951 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1697.4426 (286)
Dwelling Primary energy Rate (DPER)			33.9500 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1688 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000 (17)	
Infiltration rate		0.4188 (18)	
Number of sides sheltered		2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3560 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4538	0.4449	0.4361	0.3916	0.3827	0.3382	0.3382	0.3293	0.3560	0.3827	0.4005	0.4183 (22b)
Effective ac	0.6030	0.5990	0.5951	0.5767	0.5732	0.5572	0.5572	0.5542	0.5634	0.5732	0.5802	0.5875 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			5.9700	1.1450	6.8359		(27)
Heatloss Floor 1			50.0000	0.1300	6.5000		(28a)
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698		(29a)
Total net area of external elements Aum(A, m2)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.7057		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000		(32)
Party Wall			20.6200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

347.9116 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	3.1800	0.0500	0.1590
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	7.5200	0.0500	0.3760
E4 Jamb	5.7300	0.1600	0.9168
E5 Ground floor (normal)	2.3700	0.0600	0.1422
E18 Party wall between dwellings	5.7300	0.0700	0.4011
E7 Party floor between dwellings (in blocks of flats)	23.1200	0.0800	1.8496
P1 Party wall - Ground floor	23.1200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.3700	0.0600	0.1422
E25 Staggered party wall between dwellings			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

4.1459 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 18.8516 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
23.5799	23.4235	23.2702	22.5502	22.4155	21.7884	21.7884	21.6723	22.0299	22.4155	22.6880	22.9729	(38)
Heat transfer coeff	42.4315	42.2751	42.1218	41.4018	41.2671	40.6400	40.6400	40.5238	40.8815	41.2671	41.5396	41.8245 (39)
Average = Sum(39)m / 12 =												41.4011
HLP	0.8486	0.8455	0.8424	0.8280	0.8253	0.8128	0.8128	0.8105	0.8176	0.8253	0.8308	0.8365 (40)
HLP (average)												0.8280
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													98.5597 (43)
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)										Total = Sum(45)m =		1637.0557	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	82.5203	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]												Gains
	Area				Solar flux		g		FF		Access	W
	m2				Table 6a		Specific data		Specific data		factor	
					W/m2		or Table 6b		or Table 6c		Table 6d	
Southeast	5.9700				36.7938		0.6300		0.7000		0.7700	67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	113.8802	114.3015	114.7175	116.7125	117.0935	118.9003	118.9003	119.2411	118.1978	117.0935	116.3253	115.5329
alpha	8.5920	8.6201	8.6478	8.7808	8.8062	8.9267	8.9267	8.9494	8.8799	8.8062	8.7550	8.7022
util living area	0.9893	0.9719	0.9335	0.8218	0.6512	0.4581	0.3268	0.3510	0.5417	0.8282	0.9663	0.9916 (86)
MIT	20.5908	20.7168	20.8423	20.9572	20.9943	20.9998	21.0000	21.0000	20.9990	20.9614	20.7823	20.5729 (87)
Th 2	20.2114	20.2141	20.2167	20.2291	20.2314	20.2423	20.2423	20.2443	20.2381	20.2314	20.2267	20.2218 (88)
util rest of house	0.9852	0.9622	0.9131	0.7821	0.5998	0.4040	0.2705	0.2934	0.4824	0.7820	0.9531	0.9883 (89)
MIT 2	19.7555	19.9123	20.0619	20.1938	20.2278	20.2422	20.2423	20.2443	20.2376	20.2018	20.0045	19.7420 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.1329	20.2758	20.4145	20.5387	20.5741	20.5844	20.5846	20.5857	20.5816	20.5450	20.3559	20.1174 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.1329	20.2758	20.4145	20.5387	20.5741	20.5844	20.5846	20.5857	20.5816	20.5450	20.3559	20.1174 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9847	0.9631	0.9187	0.7987	0.6229	0.4285	0.2959	0.3194	0.5092	0.8017	0.9556	0.9878 (94)
Useful gains	466.9751	510.2991	510.3396	462.5761	363.9541	243.1357	161.9318	169.6162	264.6507	393.6212	445.3720	451.4248 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	671.8127	650.0125	586.1028	481.8645	366.2100	243.2079	161.9340	169.6204	264.9789	410.3996	550.6467	665.7386 (97)
Space heating kWh	152.3992	93.8874	56.3678	13.8877	1.6784	0.0000	0.0000	0.0000	0.0000	12.4832	75.7978	159.4495 (98a)
Space heating requirement - total per year (kWh/year)												565.9509
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	152.3992	93.8874	56.3678	13.8877	1.6784	0.0000	0.0000	0.0000	0.0000	12.4832	75.7978	159.4495 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												565.9509
Space heating per m2												(98c) / (4) = 11.3190 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

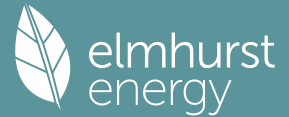
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	152.3992	93.8874	56.3678	13.8877	1.6784	0.0000	0.0000	0.0000	0.0000	12.4832	75.7978	159.4495 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	165.1129	101.7198	61.0702	15.0463	1.8184	0.0000	0.0000	0.0000	0.0000	13.5246	82.1211	172.7513 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating													
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)	
Efficiency of water heater	83.5427	82.7822	81.7652	80.4486	79.8859	79.8000	79.8000	79.8000	79.8000	80.3798	82.3546	79.8000 (216)	
Fuel for water heating, kWh/month	230.2749	205.6680	221.7744	199.7449	196.0123	177.9421	176.5248	182.9609	184.3137	202.6794	208.6813	227.6457 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	613.1646	1.1300	692.8760 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2414.2225	1.1300	2728.0714 (278)
Space and water heating			3420.9473 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2962.9309 (286)
Target Primary Energy Rate (TPER)			59.2600 (287)

Full SAP Calculation Printout



Property Reference	Plot 5			Issued on Date	27/08/2025
Assessment Reference	Plot 5	Prop Type Ref			
Property	Flat 5, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.20	TER	11.22
Environmental	98 A	% DER < TER			71.48
CO ₂ Emissions (t/year)	0.14	DFEE	17.69	TFEE	19.34
Compliance Check	See BREL	% DFEE < TFEE			8.51
% DPER < TPER	42.71	DPER	33.95	TPER	59.26
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9000 (17)
Infiltration rate	0.1950 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2113	0.2072	0.2030	0.1823	0.1782	0.1575	0.1575	0.1533	0.1658	0.1782	0.1865	0.1948 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3513	0.3472	0.3430	0.3223	0.3182	0.2975	0.2975	0.2933	0.3058	0.3182	0.3265	0.3348 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.5738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 17395.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							347.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E5 Ground floor (normal)	5.7300	0.0810	0.4641	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031	
P1 Party wall - Ground floor	23.1200	0.1600	3.6992	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.7586 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 16.3324 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.7388	13.5768	13.4147	12.6045	12.4425	11.6323	11.6323	11.4702	11.9564	12.4425	12.7666	13.0906 (38)
Average = Sum(39)m / 12 =	30.0712	29.9092	29.7472	28.9369	28.7749	27.9647	27.9647	27.8027	28.2888	28.7749	29.0990	29.4231 (39)
												28.8964
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6014	0.5982	0.5949	0.5787	0.5755	0.5593	0.5593	0.5561	0.5658	0.5755	0.5820	0.5885 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)												Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
												Total per year (kWh/year) = Sum(64)m = 2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Pumps, fans	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											
		36.7938										
			0.2400									
				0.0000								
					0.7700							
						40.5930						
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	160.6886	161.5592	162.4393	166.9874	167.9278	172.7931	172.7931	173.8001	170.8135	167.9278	166.0575	164.2285
alpha	11.7126	11.7706	11.8293	12.1325	12.1952	12.5195	12.5195	12.5867	12.3876	12.1952	12.0705	11.9486
util living area	0.9627	0.9278	0.8546	0.7181	0.5630	0.3957	0.2832	0.2997	0.4577	0.7049	0.9022	0.9694 (86)
MIT	20.8751	20.9277	20.9738	20.9966	20.9998	21.0000	21.0000	21.0000	21.0000	20.9977	20.9581	20.8661 (87)
Th 2	20.4287	20.4316	20.4346	20.4492	20.4521	20.4668	20.4668	20.4697	20.4609	20.4521	20.4462	20.4404 (88)
util rest of house	0.9523	0.9109	0.8290	0.6868	0.5299	0.3627	0.2489	0.2651	0.4220	0.6690	0.8794	0.9605 (89)
MIT 2	20.2969	20.3594	20.4108	20.4466	20.4520	20.4668	20.4668	20.4697	20.4609	20.4505	20.4073	20.2973 (90)
Living area fraction										fLA = Living area / (4) =		0.4518 (91)
MIT	20.5581	20.6161	20.6652	20.6951	20.6995	20.7077	20.7077	20.7093	20.7045	20.6977	20.6561	20.5543 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5581	20.6161	20.6652	20.6951	20.6995	20.7077	20.7077	20.7093	20.7045	20.6977	20.6561	20.5543 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9549	0.9167	0.8397	0.7009	0.5449	0.3776	0.2644	0.2807	0.4381	0.6852	0.8884	0.9625 (94)
Useful gains	428.2019	435.5073	409.3194	339.8729	258.8876	170.7990	114.8702	119.8099	186.8282	289.6136	375.0740	415.9037 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	488.9025	470.0568	421.3742	341.3136	258.9595	170.7995	114.8702	119.8099	186.8320	290.5601	394.4692	481.1932 (97)
Space heating kWh	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (98a)
Space heating requirement - total per year (kWh/year)												141.6821
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												141.6821
Space heating per m2										(98c) / (4) =		2.8336 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												141.6821 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1043.2172	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	141.6821	16.4900	23.3634 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			172.0265 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.6519 (257)
SAP value		89.4329
SAP rating (Section 12)		89 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	141.6821	0.1604	22.7259 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			115.2731 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			150.0942 (272)
CO2 emissions per m2			3.0000 (273)
EI value			97.8829
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000	x	118.5000 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9000 (17)
Infiltration rate	0.1950 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.1658 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1782	0.1740	0.1782	0.1616	0.1658	0.1409	0.1367	0.1367	0.1409	0.1575	0.1575	0.1616	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3182	0.3140	0.3182	0.3016	0.3058	0.2809	0.2767	0.2767	0.2809	0.2975	0.2975	0.3016	(25)

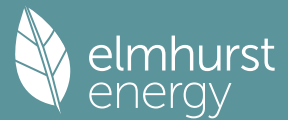
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000	(28a)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000	(29a)
Total net area of external elements Aum(A, m2)			63.5800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		11.5738			(33)
Main dwelling								
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001	(32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002	(32)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								(28)... (30) + (32) + (32a)... (32e) = 17395.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								347.9116 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340		0.1081	
E3 Sill				3.1800	0.0260		0.0827	
E4 Jamb				7.5200	0.0300		0.2256	
E5 Ground floor (normal)				5.7300	0.0810		0.4641	
E18 Party wall between dwellings				2.3700	0.0290		0.0687	
E7 Party floor between dwellings (in blocks of flats)				5.7300	-0.0180		-0.1031	
P1 Party wall - Ground floor				23.1200	0.1600		3.6992	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.1200	0.0000		0.0000	
E25 Staggered party wall between dwellings				2.3700	0.0900		0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.7586 (36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	16.3324 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]	Area		Solar flux		Specific data		Specific data		Access		Gains	
	m2		Table 6a		or Table 6b		or Table 6c		factor		W	
			W/m2						Table 6d			
Southeast	5.9700		32.4665		0.2400		0.0000		0.7700		35.8189 (77)	
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	167.9278	168.8788	167.9278	171.7976	170.8135	176.8931	177.9487	177.9487	176.8931	172.7931	172.7931	171.7976
alpha	12.1952	12.2586	12.1952	12.4532	12.3876	12.7929	12.8632	12.8632	12.7929	12.5195	12.5195	12.4532
util living area	0.9376	0.8894	0.8086	0.6540	0.4962	0.3296	0.2416	0.2590	0.4128	0.6511	0.8569	0.9469 (86)
MIT	20.9261	20.9625	20.9874	20.9990	21.0000	21.0000	21.0000	21.0000	21.0000	20.9992	20.9799	20.9192 (87)
Th 2	20.4521	20.4550	20.4521	20.4638	20.4609	20.4785	20.4815	20.4815	20.4785	20.4668	20.4668	20.4638 (88)
util rest of house	0.9222	0.8679	0.7807	0.6232	0.4636	0.2977	0.2087	0.2255	0.3791	0.6162	0.8298	0.9333 (89)
MIT 2	20.3777	20.4195	20.4412	20.4631	20.4609	20.4785	20.4815	20.4815	20.4785	20.4662	20.4492	20.3813 (90)
Living area fraction	20.6254	20.6648	20.6880	20.7052	20.7044	20.7141	20.7158	20.7158	20.7141	20.7070	20.6890	20.6243 (92)
MIT	20.6254	20.6648	20.6880	20.7052	20.7044	20.7141	20.7158	20.7158	20.7141	20.7070	20.6890	20.6243 (93)
Temperature adjustment												0.0000
adjusted MIT	20.6254	20.6648	20.6880	20.7052	20.7044	20.7141	20.7158	20.7158	20.7141	20.7070	20.6890	20.6243 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9274	0.8765	0.7929	0.6371	0.4783	0.3121	0.2236	0.2406	0.3943	0.6320	0.8414	0.9376 (94)
Useful gains	411.4453	410.6408	382.4384	306.3159	223.5943	139.7005	95.4685	100.8994	167.0163	265.5436	351.3964	403.5345 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	446.7433	428.1864	388.1153	306.7284	223.6069	139.7005	95.4685	100.8994	167.0170	265.8611	360.4367	442.2736 (97)
Space heating kWh	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219 (98a)
Space heating requirement - total per year (kWh/year)												78.1494
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												78.1494
Space heating per m2										(98c) / (4) =		1.5630 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)

B 89
A 98

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£279	£279	£0
Space heating	£57	£57	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£279	£279	£0
Total cost of uses	£278	£278	£0
Delivered energy	20 kWh/m ²	20 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	30 kWh/m ²	30 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9000 (17)
Infiltration rate	0.1950 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2113	0.2072	0.2030	0.1823	0.1782	0.1575	0.1575	0.1533	0.1658	0.1782	0.1865	0.1948 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3513	0.3472	0.3430	0.3223	0.3182	0.2975	0.2975	0.2933	0.3058	0.3182	0.3265	0.3348 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							

Full SAP Calculation Printout



Window			5.9700	0.7752	4.6279			(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000	(28a)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000	(29a)
Total net area of external elements Aum(A, m2)			63.5800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.5738			(33)
Main dwelling								
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001	(32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002	(32)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =		17395.5802			(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					347.9116			(35)
List of Thermal Bridges								
K1 Element			Length	Psi-value	Total			
E2 Other lintels (including other steel lintels)			3.1800	0.0340	0.1081			
E3 Sill			3.1800	0.0260	0.0827			
E4 Jamb			7.5200	0.0300	0.2256			
E5 Ground floor (normal)			5.7300	0.0810	0.4641			
E18 Party wall between dwellings			2.3700	0.0290	0.0687			
E7 Party floor between dwellings (in blocks of flats)			5.7300	-0.0180	-0.1031			
P1 Party wall - Ground floor			23.1200	0.1600	3.6992			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			23.1200	0.0000	0.0000			
E25 Staggered party wall between dwellings			2.3700	0.0900	0.2133			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)					4.7586			(36)
Point Thermal bridges					(36a) =	0.0000		
Total fabric heat loss					(33) + (36) + (36a) =	16.3324		(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat transfer coeff	13.7388	13.5768	13.4147	12.6045	12.4425	11.6323	11.6323	11.4702	11.9564	12.4425	12.7666	13.0906	(38)	
Average = Sum(39)m / 12 =	30.0712	29.9092	29.7472	28.9369	28.7749	27.9647	27.9647	27.8027	28.2888	28.7749	29.0990	29.4231	(39)	
												28.8964		
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	0.6014	0.5982	0.5949	0.5787	0.5755	0.5593	0.5593	0.5561	0.5658	0.5755	0.5820	0.5885	(40)	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)

Assumed occupancy														1.6901	(42)
Hot water usage for mixer showers															
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)		
Hot water usage for baths															
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)		
Hot water usage for other uses															
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)		
Average daily hot water use (litres/day)														116.7306	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)		
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)		
Energy content (annual)														1938.9067	
Distribution loss (46)m = 0.15 x (45)m															
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)		
Water storage loss:															
Store volume														201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):														1.6100	(48)
Temperature factor from Table 2b														0.5400	(49)
Enter (49) or (54) in (55)														0.8694	(55)
Total storage loss															
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)		
If cylinder contains dedicated solar storage															
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)		
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)		
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)		
Total heat required for water heating calculated for each month															
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)		
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)		
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)		
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)		
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)		
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)		
														2256.2377	(64)
Electric shower(s)															
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)		
														0.0000	(64a)
Heat gains from water heating, kWh/month															
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)		

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts															
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5															
	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)		
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5															
	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)		
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5															
	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)		
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)		
Losses e.g. evaporation (negative values) (Table 5)															
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)		
Water heating gains (Table 5)															
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)		
Total internal gains															
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)		

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		FF	Access factor Table 6d		Gains W
Southeast	5.9700				36.7938	0.2400		0.0000			0.7700		40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392	(83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	160.6886	161.5592	162.4393	166.9874	167.9278	172.7931	172.7931	173.8001	170.8135	167.9278	166.0575	164.2285
alpha	11.7126	11.7706	11.8293	12.1325	12.1952	12.5195	12.5195	12.5867	12.3876	12.1952	12.0705	11.9486
util living area	0.9627	0.9278	0.8546	0.7181	0.5630	0.3957	0.2832	0.2997	0.4577	0.7049	0.9022	0.9694 (86)
MIT	20.8751	20.9277	20.9738	20.9966	20.9998	21.0000	21.0000	21.0000	21.0000	20.9977	20.9581	20.8661 (87)
Th 2	20.4287	20.4316	20.4346	20.4492	20.4521	20.4668	20.4668	20.4697	20.4609	20.4521	20.4462	20.4404 (88)
util rest of house	0.9523	0.9109	0.8290	0.6868	0.5299	0.3627	0.2489	0.2651	0.4220	0.6690	0.8794	0.9605 (89)
MIT 2	20.2969	20.3594	20.4108	20.4466	20.4520	20.4668	20.4668	20.4697	20.4609	20.4505	20.4073	20.2973 (90)
Living area fraction	20.5581	20.6161	20.6652	20.6951	20.6995	20.7077	20.7077	20.7093	20.7045	20.6977	20.6561	0.4518 (91)
MIT	20.5581	20.6161	20.6652	20.6951	20.6995	20.7077	20.7077	20.7093	20.7045	20.6977	20.6561	20.5543 (92)
Temperature adjustment	20.5581	20.6161	20.6652	20.6951	20.6995	20.7077	20.7077	20.7093	20.7045	20.6977	20.6561	0.0000
adjusted MIT	20.5581	20.6161	20.6652	20.6951	20.6995	20.7077	20.7077	20.7093	20.7045	20.6977	20.6561	20.5543 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9549	0.9167	0.8397	0.7009	0.5449	0.3776	0.2644	0.2807	0.4381	0.6852	0.8884	0.9625 (94)
Useful gains	428.2019	435.5073	409.3194	339.8729	258.8876	170.7990	114.8702	119.8099	186.8282	289.6136	375.0740	415.9037 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	488.9025	470.0568	421.3742	341.3136	258.9595	170.7995	114.8702	119.8099	186.8320	290.5601	394.4692	481.1932 (97)
Space heating kWh	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (98a)
Space heating requirement - total per year (kWh/year)												141.6821
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												141.6821
Space heating per m2										(98c) / (4) =		2.8336 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	45.1613	23.2173	8.9687	1.0373	0.0535	0.0000	0.0000	0.0000	0.0000	0.7042	13.9645	48.5754 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													141.6821	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													344.1753	
Water heating fuel used													655.5490	(219)
Space cooling fuel													0.0000	(221)

Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													121.4388	(230a)
Total electricity for the above, kWh/year													121.4388	(231)
Electricity for lighting (calculated in Appendix L)													124.5474	(232)

Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1043.2172	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	141.6821	16.4900	23.3634	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	124.5474	16.4900	20.5379	(250)
Additional standing charges			0.0000	(251)
Total energy cost			172.0265	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.6519	(257)
SAP value		89.4329	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	141.6821	0.1604	22.7259	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			115.2731	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			150.0942	(272)
CO2 emissions per m2			3.0000	(273)
EI value			97.8829	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

Full SAP Calculation Printout



Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.9000 (17)
Infiltration rate 0.1950 (18)
Number of sides sheltered 2 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate												
	0.1782	0.1740	0.1782	0.1616	0.1658	0.1409	0.1367	0.1367	0.1409	0.1575	0.1575	0.1616
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3182	0.3140	0.3182	0.3016	0.3058	0.2809	0.2767	0.2767	0.2809	0.2975	0.2975	0.3016

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	75.0000	3750.0000 (28a)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m2)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.5738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 17395.5802 (34)
List of Thermal Bridges 347.9116 (35)

	Length	Psi-value	Total
K1 Element	3.1800	0.0340	0.1081
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827
E3 Sill	7.5200	0.0300	0.2256
E4 Jamb	5.7300	0.0810	0.4641
E5 Ground floor (normal)	2.3700	0.0290	0.0687
E18 Party wall between dwellings	5.7300	-0.0180	-0.1031
E7 Party floor between dwellings (in blocks of flats)	23.1200	0.1600	3.6992
P1 Party wall - Ground floor	23.1200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.3700	0.0900	0.2133
E25 Staggered party wall between dwellings			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7586 (36)
Point Thermal bridges			0.0000 (36a)
Total fabric heat loss			(33) + (36) + (36a) = 16.3324 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	12.4425	12.2804	12.4425	11.7943	11.9564	10.9841	10.8221	10.8221	10.9841	11.6323	11.6323	11.7943
Heat transfer coeff	28.7749	28.6129	28.7749	28.1267	28.2888	27.3165	27.1545	27.1545	27.3165	27.9647	27.9647	28.1267
Average = Sum(39)m / 12 =												
	27.9647											
HLP	0.5755	0.5723	0.5755	0.5625	0.5658	0.5463	0.5431	0.5431	0.5463	0.5593	0.5593	0.5625
HLP (average)												0.5593
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889
Hot water usage for baths												
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476
Hot water usage for other uses												
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use												
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month												

Full SAP Calculation Printout



WWHRS	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66m)	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W

Southeast					5.9700	32.4665		0.2400	0.0000	0.7700		35.8189 (77)

Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	167.9278	168.8788	167.9278	171.7976	170.8135	176.8931	177.9487	177.9487	176.8931	172.7931	172.7931	171.7976	
alpha	12.1952	12.2586	12.1952	12.4532	12.3876	12.7929	12.8632	12.8632	12.7929	12.5195	12.5195	12.4532	
util living area	0.9376	0.8894	0.8086	0.6540	0.4962	0.3296	0.2416	0.2590	0.4128	0.6511	0.8569	0.9469	(86)
MIT	20.9261	20.9625	20.9874	20.9990	21.0000	21.0000	21.0000	21.0000	21.0000	20.9992	20.9799	20.9192	(87)
Th 2	20.4521	20.4550	20.4521	20.4638	20.4609	20.4785	20.4815	20.4815	20.4785	20.4668	20.4668	20.4638	(88)
util rest of house	0.9222	0.8679	0.7807	0.6232	0.4636	0.2977	0.2087	0.2255	0.3791	0.6162	0.8298	0.9333	(89)
MIT 2	20.3777	20.4195	20.4412	20.4631	20.4609	20.4785	20.4815	20.4815	20.4785	20.4662	20.4492	20.3813	(90)
Living area fraction	20.6254	20.6648	20.6880	20.7052	20.7044	20.7141	20.7158	20.7158	20.7141	20.7070	20.6890	20.6243	(91)
MIT	20.6254	20.6648	20.6880	20.7052	20.7044	20.7141	20.7158	20.7158	20.7141	20.7070	20.6890	20.6243	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.6254	20.6648	20.6880	20.7052	20.7044	20.7141	20.7158	20.7158	20.7141	20.7070	20.6890	20.6243	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	411.4453	410.6408	382.4384	306.3159	223.5943	139.7005	95.4685	100.8994	167.0163	265.5436	351.3964	403.5345	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	446.7433	428.1864	388.1153	306.7284	223.6069	139.7005	95.4685	100.8994	167.0170	265.8611	360.4367	442.2736	(96)
Space heating kWh	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219	(98a)
Space heating requirement - total per year (kWh/year)												78.1494	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												78.1494	
Space heating per m2										(98c) / (4) =		1.5630	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	26.2617	11.7906	4.2236	0.2970	0.0094	0.0000	0.0000	0.0000	0.0000	0.2362	6.5091	28.8219	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												78.1494	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												979.6845	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	78.1494	28.4300	22.2179	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	124.5474	28.4300	35.4088	(250)
Additional standing charges			0.0000	(251)
Total energy cost			278.5243	(255)

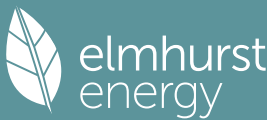
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	78.1494	0.1608	12.5700	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			105.1173	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			139.9384	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	78.1494	1.5953	124.6712	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	1.5220	997.7642	(278)
Space and water heating			1122.4354	(279)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1497.1829 (286)

Full SAP Calculation Printout



Property Reference	Plot 6			Issued on Date	27/08/2025
Assessment Reference	Plot 6	Prop Type Ref			
Property	Flat 6, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.33	TER	10.41
Environmental	97 A	% DER < TER			68.01
CO ₂ Emissions (t/year)	0.19	DFEE	20.09	TFEE	23.66
Compliance Check	See BREL	% DFEE < TFEE			15.06
% DPER < TPER	35.80	DPER	35.06	TPER	54.62
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	69.0000 (1b)	2.3700 (2b)	163.5300 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		163.5300 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 163.5300 (5)

2. Ventilation rate

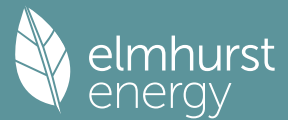
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8600 (17)
Infiltration rate	0.1930 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1641 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2092	0.2051	0.2010	0.1805	0.1764	0.1558	0.1558	0.1517	0.1641	0.1764	0.1846	0.1928 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3492	0.3451	0.3410	0.3205	0.3164	0.2958	0.2958	0.2917	0.3041	0.3164	0.3246	0.3328 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			69.0000	0.1100	7.5900	75.0000	5175.0000 (28a)
External Wall	39.0800	8.6000	30.4800	0.1900	5.7912	150.0000	4572.0003 (29a)
Total net area of external elements Aum(A, m ²)			108.0800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.0479		(33)
Main dwelling							
Corridor			18.2700	0.0000	0.0000	180.0000	3288.6001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			69.0000			30.0000	2070.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 19681.3805 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							285.2374 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						4.7700		0.0340		0.1622		
E3 Sill						4.7700		0.0260		0.1240		
E4 Jamb						10.8200		0.0300		0.3246		
E5 Ground floor (normal)						16.4900		0.0810		1.3357		
E18 Party wall between dwellings						4.7400		0.0290		0.1375		
E7 Party floor between dwellings (in blocks of flats)						16.4900		-0.0180		-0.2968		
P1 Party wall - Ground floor						16.4100		0.1600		2.6256		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						16.4100		0.0000		0.0000		
E16 Corner (normal)						2.3700		0.0490		0.1161		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											4.5289	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss									(33) + (36) + (36a) =		24.5767	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	18.8426	18.6213	18.3999	17.2933	17.0720	15.9654	15.9654	15.7441	16.4080	17.0720	17.5146	17.9573 (38)
Average = Sum(39)m / 12 =	43.4193	43.1980	42.9767	41.8700	41.6487	40.5421	40.5421	40.3208	40.9848	41.6487	42.0914	42.5340 (39)
												41.8147
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6293	0.6261	0.6229	0.6068	0.6036	0.5876	0.5876	0.5844	0.5940	0.6036	0.6100	0.6164 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	0.6060
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.2216 (42)
Hot water usage for mixer showers												
	84.5194	83.2492	81.3983	77.8570	75.2436	72.3292	70.6726	72.5095	74.5230	77.6522	81.2696	84.1955 (42a)
Hot water usage for baths												
	26.5567	26.1623	25.6069	24.5829	23.8161	22.9658	22.5065	23.0580	23.6585	24.5684	25.6135	26.4670 (42b)
Hot water usage for other uses												
	37.3814	36.0221	34.6628	33.3035	31.9441	30.5848	30.5848	31.9441	33.3035	34.6628	36.0221	37.3814 (42c)
Average daily hot water use (litres/day)												136.5295 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	148.4576	145.4337	141.6681	135.7434	131.0038	125.8798	123.7639	127.5117	131.4850	136.8834	142.9053	148.0440 (44)
Energy conte	235.1205	207.0956	217.7385	185.8259	176.3563	154.7839	149.6818	157.8861	162.1342	185.7495	203.5948	231.8011 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
	35.2681	31.0643	32.6608	27.8739	26.4534	23.2176	22.4523	23.6829	24.3201	27.8624	30.5392	34.7702 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (64)
12Total per year (kWh/year)												2585.0991 (64)
Electric shower(s)												2585 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	78.1776	68.8593	72.3981	61.7871	58.6385	51.4656	49.7692	52.4971	53.9096	61.7617	67.6953	77.0739 (65)

5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	111.4590	123.4010	111.4590	115.1743	111.4590	115.1743	111.4590	111.4590	115.1743	111.4590	115.1743	111.4590 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	194.9520	196.9749	191.8771	181.0243	167.3246	154.4489	145.8471	143.8241	148.9220	159.7747	173.4744	186.3502 (68)
Pumps, fans	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642 (71)
Water heating gains (Table 5)												
	105.0774	102.4692	97.3092	85.8154	78.8152	71.4801	66.8941	70.5606	74.8745	83.0130	94.0212	103.5939 (72)
Total internal gains												
	467.8124	479.1692	456.9693	438.3381	413.9228	397.4273	380.5242	382.1678	395.2948	410.5708	438.9939	457.7271 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	8.6000											
	36.7938											
	0.2400											
	0.0000											
	0.7700											
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	526.2881	578.7750	593.2543	607.2017	603.0642	585.2009	561.5580	548.0735	542.8625	520.6564	509.0343	507.7701 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	125.9129	126.5580	127.2097	130.5719	131.2657	134.8487	134.8487	135.5889	133.3923	131.2657	129.8853	128.5336
alpha	9.3942	9.4372	9.4806	9.7048	9.7510	9.9899	9.9899	10.0393	9.8928	9.7510	9.6590	9.5689
util living area	0.9860	0.9652	0.9253	0.8065	0.6392	0.4433	0.3177	0.3384	0.5205	0.8049	0.9562	0.9887 (86)
MIT	20.6849	20.7908	20.8864	20.9741	20.9971	20.9999	21.0000	21.0000	20.9997	20.9784	20.8492	20.6744 (87)
Th 2	20.4037	20.4066	20.4095	20.4239	20.4268	20.4412	20.4412	20.4441	20.4354	20.4268	20.4210	20.4152 (88)
util rest of house	0.9819	0.9562	0.9080	0.7755	0.6010	0.4046	0.2773	0.2975	0.4781	0.7687	0.9437	0.9853 (89)
MIT 2	20.0460	20.1782	20.2934	20.4010	20.4247	20.4412	20.4412	20.4441	20.4352	20.4089	20.2629	20.0430 (90)
Living area fraction									fLA = Living area / (4) =			0.4014 (91)
MIT	20.3025	20.4241	20.5315	20.6310	20.6545	20.6655	20.6655	20.6673	20.6618	20.6376	20.4983	20.2965 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3025	20.4241	20.5315	20.6310	20.6545	20.6655	20.6655	20.6673	20.6618	20.6376	20.4983	20.2965 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9811	0.9565	0.9118	0.7869	0.6162	0.4202	0.2935	0.3139	0.4952	0.7824	0.9455	0.9845 (94)
Useful gains	516.3443	553.6232	540.9310	477.8108	371.6242	245.8829	164.8246	172.0583	268.8046	407.3497	481.3036	499.9236 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	694.8157	670.6109	603.0257	491.1786	372.9439	245.9076	164.8252	172.0593	268.9350	418.0512	563.9519	684.6486 (97)
Space heating kWh	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354 (98a)
Space heating requirement - total per year (kWh/year)												473.1077
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												473.1077
Space heating per m2										(98c) / (4) =		6.8566 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

0.0000 (201)

Fraction of space heat from main system(s)

1.0000 (202)

Fraction of main heating from main system 2

0.0000 (203)

Fraction of total heating from main system 1

1.0000 (204)

Fraction of total heating from main system 2

0.0000 (205)

Efficiency of main space heating system 1 (in %)

100.0000 (206)

Efficiency of main space heating system 2 (in %)

0.0000 (207)

Efficiency of secondary/supplementary heating system, %

0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (64)
Efficiency of water heater (217)m	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057 (216)
Fuel for water heating, kWh/month	77.5577	68.4921	72.4137	62.7121	60.1670	53.5256	52.2729	54.7009	55.7008	62.9468	67.9707	76.5754 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	14.2333	12.8559	14.2333	13.7742	14.2333	13.7742	14.2333	14.2333	13.7742	14.2333	13.7742	14.2333 (231)
Lighting	20.1678	16.1793	14.5677	10.6729	8.2441	6.7355	7.5205	9.7755	12.6974	16.6596	18.8170	20.7283 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												473.1077 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												337.9057
Water heating fuel used												765.0357 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 167.5855 (230a)
 Total electricity for the above, kWh/year 167.5855 (231)
 Electricity for lighting (calculated in Appendix L) 162.7656 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1568.4945 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	473.1077	0.1591	75.2667 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	765.0357	0.1412	108.0433 (264)
Space and water heating			183.3100 (265)
Pumps, fans and electric keep-hot	167.5855	0.1387	23.2462 (267)
Energy for lighting	162.7656	0.1443	23.4921 (268)
Total CO2, kg/year			230.0483 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	473.1077	1.5889	751.7106 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	765.0357	1.5222	1164.5532 (278)
Space and water heating			1916.2638 (279)
Pumps, fans and electric keep-hot	167.5855	1.5128	253.5234 (281)
Energy for lighting	162.7656	1.5338	249.6553 (282)
Total Primary energy kWh/year			2419.4425 (286)
Dwelling Primary energy Rate (DPER)			35.0600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
 CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.0000 (1b)	2.3700 (2b)	163.5300 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	163.5300 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1223 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3723 (18)
 Number of sides sheltered 2 (19)
 Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3165 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4035	0.3956	0.3877	0.3481	0.3402	0.3006	0.3006	0.2927	0.3165	0.3402	0.3560	0.3718 (22b)
Effective ac	0.5814	0.5782	0.5751	0.5606	0.5579	0.5452	0.5452	0.5428	0.5501	0.5579	0.5634	0.5691 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			8.6000	1.1450	9.8473			(27)					
Heatloss Floor 1			69.0000	0.1300	8.9700			(28a)					
External Wall	39.0800	8.6000	30.4800	0.1800	5.4864			(29a)					
Total net area of external elements Aum(A, m2)			108.0800					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	24.3037			(33)					
Main dwelling													
Corridor			18.2700	0.0000	0.0000			(32)					
Party Wall			20.6200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							295.2374	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				4.7700	0.0500		0.2385						
E3 Sill				4.7700	0.0500		0.2385						
E4 Jamb				10.8200	0.0500		0.5410						
E5 Ground floor (normal)				16.4900	0.1600		2.6384						
E18 Party wall between dwellings				4.7400	0.0600		0.2844						
E7 Party floor between dwellings (in blocks of flats)				16.4900	0.0700		1.1543						
P1 Party wall - Ground floor				16.4100	0.0800		1.3128						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				16.4100	0.0000		0.0000						
E16 Corner (normal)				2.3700	0.0900		0.2133						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								6.6212 (36)					
Point Thermal bridges						(36a) =		0.0000					
Total fabric heat loss						(33) + (36) + (36a) =		30.9249 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 31.3751	Feb 31.2046	Mar 31.0374	Apr 30.2520	May 30.1051	Jun 29.4211	Jul 29.4211	Aug 29.2945	Sep 29.6846	Oct 30.1051	Nov 30.4024	Dec 30.7131	(38)
Heat transfer coeff	62.3001	62.1295	61.9623	61.1770	61.0300	60.3461	60.3461	60.2194	60.6095	61.0300	61.3273	61.6380	(39)
Average = Sum(39)m / 12 =												61.1763	
HLP	Jan 0.9029	Feb 0.9004	Mar 0.8980	Apr 0.8866	May 0.8845	Jun 0.8746	Jul 0.8746	Aug 0.8727	Sep 0.8784	Oct 0.8845	Nov 0.8888	Dec 0.8933	(40)
HLP (average)												0.8866	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2216 (42)
Hot water usage for mixer showers	61.4686	60.5449	59.1988	56.6233	54.7226	52.6030	51.3983	52.7342	54.1986	56.4744	59.1052	61.2331 (42a)	
Hot water usage for baths	26.5567	26.1623	25.6069	24.5829	23.8161	22.9658	22.5065	23.0580	23.6585	24.5684	25.6135	26.4670 (42b)	
Hot water usage for other uses	37.3814	36.0221	34.6628	33.3035	31.9441	30.5848	30.5848	31.9441	33.3035	34.6628	36.0221	37.3814 (42c)	
Average daily hot water use (litres/day)												115.2774 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	125.4068	122.7293	119.4685	114.5096	110.4828	106.1537	104.4896	107.7363	111.1606	115.7055	120.7408	125.0815 (44)	
Distribution loss (46)m = 0.15 x (45)m	198.6138	174.7650	183.6187	156.7580	148.7311	130.5283	126.3711	133.4001	137.0721	157.0113	172.0174	195.8475 (45)	
Water storage loss:										Total = Sum(45)m =		1914.7343	
Store volume	29.7921	26.2147	27.5428	23.5137	22.3097	19.5792	18.9557	20.0100	20.5608	23.5517	25.8026	29.3771 (46)	
a) If manufacturer declared loss factor is known (kWh/day):												150.0000 (47)	
Temperature factor from Table 2b												1.3938 (48)	
Enter (49) or (54) in (55)												0.5400 (49)	
Total storage loss												0.7527 (55)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
Primary loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
WWHRS	245.2087	216.8507	230.2136	201.8498	195.3260	175.6201	172.9660	179.9950	182.1639	203.6062	217.1093	242.4424 (62)	
PV diverter	-28.1009	-24.8527	-26.0243	-21.5491	-20.0830	-17.1852	-16.1084	-17.1296	-17.7804	-20.9612	-23.7465	-27.5805 (63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
12Total per year (kWh/year)	217.1078	191.9980	204.1893	180.3007	175.2430	158.4350	156.8577	162.8654	164.3835	182.6450	193.3628	214.8619 (64)	
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =				2202.2500 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000 (64a)	
Heat gains from water heating, kWh/month													
	103.3150	91.7779	98.3291	88.1955	86.7290	79.4741	79.2943	81.6315	81.6499	89.4822	93.2693	102.3952 (65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2301	119.8261	108.2301	111.8377	108.2301	111.8377	108.2301	108.2301	111.8377	108.2301	111.8377	108.2301	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.9520	196.9749	191.8771	181.0243	167.3246	154.4489	145.8471	143.8241	148.9220	159.7747	173.4744	186.3502	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	(71)
Water heating gains (Table 5)	138.8642	136.5743	132.1628	122.4937	116.5713	110.3807	106.5784	109.7197	113.4027	120.2717	129.5407	137.6280	(72)
Total internal gains	501.3703	512.6994	491.5940	474.6798	451.4500	432.9914	416.9796	418.0979	430.4865	447.6006	474.1768	491.5322	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]												Gains
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	W

Southeast					8.6000	36.7938	0.6300	0.7000			0.7700	96.7042 (77)

Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586 (83)
Total gains	598.0745	677.4224	716.9752	753.9381	764.2425	743.5220	716.3642	692.4644	674.5266	629.6546	590.0062	574.2909 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	90.8300	91.0794	91.3252	92.4975	92.7202	93.7711	93.7711	93.9683	93.3635	92.7202	92.2708	91.8056
util living area	7.0553	7.0720	7.0883	7.1665	7.1813	7.2514	7.2514	7.2646	7.2242	7.1813	7.1514	7.1204
	0.9913	0.9786	0.9513	0.8694	0.7179	0.5173	0.3705	0.3997	0.6124	0.8813	0.9767	0.9932 (86)
MIT	20.3668	20.5225	20.6936	20.8797	20.9732	20.9977	20.9998	20.9997	20.9927	20.8867	20.6083	20.3409 (87)
Th 2	20.1650	20.1671	20.1692	20.1789	20.1807	20.1892	20.1892	20.1907	20.1859	20.1807	20.1770	20.1732 (88)
util rest of house	0.9884	0.9717	0.9364	0.8354	0.6634	0.4528	0.3023	0.3296	0.5437	0.8429	0.9679	0.9909 (89)
MIT 2	19.4438	19.6399	19.8501	20.0693	20.1614	20.1881	20.1891	20.1906	20.1820	20.0824	19.7569	19.4177 (90)
Living area fraction	19.8143	19.9942	20.1887	20.3946	20.4873	20.5131	20.5146	20.5154	20.5074	20.4053	20.0987	19.7883 (92)
MIT	19.8143	19.9942	20.1887	20.3946	20.4873	20.5131	20.5146	20.5154	20.5074	20.4053	20.0987	19.7883 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8143	19.9942	20.1887	20.3946	20.4873	20.5131	20.5146	20.5154	20.5074	20.4053	20.0987	19.7883 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9868	0.9700	0.9368	0.8449	0.6843	0.4787	0.3297	0.3578	0.5712	0.8543	0.9669	0.9895 (94)
Ext temp.	590.1983	657.0945	671.6286	637.0013	522.9858	355.9252	236.1782	247.7378	385.2669	537.9189	570.5062	568.2810 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	966.5446	937.7945	848.1843	703.2062	536.2878	356.8322	236.2290	247.8291	388.3525	598.4182	797.1733	960.8318 (97)
Space heating requirement - total per year (kWh/year)	280.0017	188.6304	131.3575	47.6675	9.8967	0.0000	0.0000	0.0000	0.0000	45.0115	163.2003	292.0578 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	280.0017	188.6304	131.3575	47.6675	9.8967	0.0000	0.0000	0.0000	0.0000	45.0115	163.2003	292.0578 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)
Space heating per m2												

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	280.0017	188.6304	131.3575	47.6675	9.8967	0.0000	0.0000	0.0000	0.0000	45.0115	163.2003	292.0578 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	303.3605	204.3666	142.3158	51.6441	10.7223	0.0000	0.0000	0.0000	0.0000	48.7665	176.8150	316.4223 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating	217.1078	191.9980	204.1893	180.3007	175.2430	158.4350	156.8577	162.8654	164.3835	182.6450	193.3628	214.8619 (64)	
Water heating requirement	84.6314	84.0201	83.0970	81.5278	80.2347	79.8000	79.8000	79.8000	79.8000	81.4318	83.6819	79.8000 (216)	
Efficiency of water heater (217)m	256.5335	228.5144	245.7241	221.1525	218.4130	198.5401	196.5635	204.0920	205.9944	224.2920	231.0688	84.7487 (217)	
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Space cooling fuel requirement (221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Pumps and Fa	22.4881	18.0408	16.2437	11.9008	9.1925	7.5104	8.3857	10.9001	14.1582	18.5763	20.9819	23.1131 (232)	
Lighting	-23.5152	-34.2383	-50.8044	-59.0276	-65.3005	-61.5579	-60.8210	-56.6216	-49.4612	-40.0225	-26.2425	-20.2066 (233a)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	-10.1613	-21.6757	-43.6426	-66.3691	-88.5544	-89.2608	-88.1934	-74.2894	-53.9603	-31.2471	-13.6477	-8.0116 (233b)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m													

13a. Primary energy - Individual heating systems including micro-CHP				
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year	
Space heating - main system 1	1254.4131	1.1300	1417.4868	(275)
Total CO ₂ associated with community systems			0.0000	(473)
Water heating (other fuel)	2684.4163	1.1300	3033.3904	(278)
Space and water heating			4450.8772	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	181.4916	1.5338	278.3779	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-547.8193	1.4949	-818.9175	
PV Unit electricity exported	-589.0133	0.4608	-271.4091	
Total			-1090.3266	(283)
Total Primary energy kWh/year			3769.0293	(286)
Target Primary Energy Rate (TPER)			54.6200	(287)

Full SAP Calculation Printout



Property Reference	Plot 6			Issued on Date	27/08/2025
Assessment Reference	Plot 6	Prop Type Ref			
Property	Flat 6, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.33	TER	10.41
Environmental	97 A	% DER < TER			68.01
CO ₂ Emissions (t/year)	0.19	DFEE	20.09	TFEE	23.66
Compliance Check	See BREL	% DFEE < TFEE			15.06
% DPER < TPER	35.80	DPER	35.06	TPER	54.62
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	69.0000 (1b)	2.3700 (2b)	163.5300 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		163.5300 (4)
Dwelling volume			163.5300 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1223 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8600 (17)
Infiltration rate	0.3153 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2680 (21)

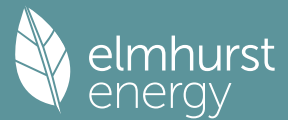
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3417	0.3350	0.3283	0.2948	0.2881	0.2546	0.2546	0.2479	0.2680	0.2881	0.3015	0.3149 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5584	0.5561	0.5539	0.5435	0.5415	0.5324	0.5324	0.5307	0.5359	0.5415	0.5455	0.5496 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			69.0000	0.1100	7.5900	75.0000	5175.0000 (28a)
External Wall	39.0800	8.6000	30.4800	0.1900	5.7912	150.0000	4572.0003 (29a)
Total net area of external elements Aum(A, m ²)			108.0800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 20.0479		(33)
Main dwelling							
Corridor			18.2700	0.0000	0.0000	180.0000	3288.6001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			69.0000			40.0000	2760.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20371.3805 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							295.2374 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				10.8200	0.0300	0.3246	

7. Mean internal temperature (heating season)	
Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	103.4316	103.6634	103.8916	104.9772	105.1828	106.1508	106.1508	106.3320	105.7758	105.1828	104.7677	104.3371
alpha	7.8954	7.9109	7.9261	7.9985	8.0122	8.0767	8.0767	8.0888	8.0517	8.0122	7.9845	7.9558
util living area	0.9976	0.9935	0.9842	0.9437	0.8316	0.6168	0.4435	0.4769	0.7147	0.9463	0.9925	0.9982 (86)
MIT	20.3542	20.4787	20.6254	20.8222	20.9516	20.9959	20.9997	20.9995	20.9877	20.8434	20.5713	20.3324 (87)
Th 2	20.2595	20.2610	20.2625	20.2696	20.2710	20.2772	20.2772	20.2783	20.2748	20.2710	20.2683	20.2655 (88)
util rest of house	0.9967	0.9911	0.9784	0.9242	0.7849	0.5496	0.3709	0.4025	0.6470	0.9238	0.9893	0.9975 (89)
MIT 2	19.6715	19.7961	19.9413	20.1328	20.2413	20.2755	20.2771	20.2782	20.2692	20.1555	19.8945	19.6549 (90)
Living area fraction	19.9456	20.0701	20.2159	20.4096	20.5265	20.5647	20.5672	20.5678	FLA = Living area / (4) =	20.4317	20.1662	0.4014 (91)
MIT	19.9456	20.0701	20.2159	20.4096	20.5265	20.5647	20.5672	20.5678	20.5577	20.4317	20.1662	19.9269 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9456	20.0701	20.2159	20.4096	20.5265	20.5647	20.5672	20.5678	20.5577	20.4317	20.1662	19.9269 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9962	0.9904	0.9780	0.9284	0.8021	0.5766	0.4001	0.4324	0.6741	0.9294	0.9888	0.9971 (94)
Useful gains	464.9007	515.6268	526.6338	520.4813	450.2641	316.3251	211.4068	221.6546	340.1364	443.0501	452.1101	447.9707 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	855.9645	828.0978	747.0733	620.4151	474.8541	317.9699	211.4846	221.7982	345.4667	528.9339	705.7334	852.9470 (97)
Space heating kWh	290.9515	209.9805	164.0070	71.9523	18.2949	0.0000	0.0000	0.0000	0.0000	63.8976	182.6088	301.3024 (98a)
Space heating requirement - total per year (kWh/year)												1302.9950
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	290.9515	209.9805	164.0070	71.9523	18.2949	0.0000	0.0000	0.0000	0.0000	63.8976	182.6088	301.3024 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1302.9950
Space heating per m2										(98c) / (4) =		18.8840 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	501.0980	394.4814	404.4526	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9477	0.9834	0.9771	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	474.8845	387.9375	395.2027	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	589.5881	568.5627	552.3569	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	82.5866	134.3852	116.9228	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	20.6466	33.5963	29.2307	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												83.4736 (107)
Energy for space heating												18.8840 (99)
Energy for space cooling												1.2098 (108)
Total												20.0937 (109)
Fabric Energy Efficiency (DFEE)												20.1 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.0000	x	163.5300
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	163.5300 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour
Pressure test	20.0000 / (5) = 0.1223 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	5.0000 (17)
	0.3723 (18)

Full SAP Calculation Printout



Number of sides sheltered

2 (19)

Shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3165 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4035	0.3956	0.3877	0.3481	0.3402	0.3006	0.3006	0.2927	0.3165	0.3402	0.3560	0.3718	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5814	0.5782	0.5751	0.5606	0.5579	0.5452	0.5452	0.5428	0.5501	0.5579	0.5634	0.5691	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			8.6000	1.1450	9.8473			(27)
Heatloss Floor 1			69.0000	0.1300	8.9700			(28a)
External Wall	39.0800	8.6000	30.4800	0.1800	5.4864			(29a)
Total net area of external elements Aum(A, m2)			108.0800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	24.3037			(33)
Main dwelling								
Corridor			18.2700	0.0000	0.0000			(32)
Party Wall			20.6200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

295.2374 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385	
E3 Sill	4.7700	0.0500	0.2385	
E4 Jamb	10.8200	0.0500	0.5410	
E5 Ground floor (normal)	16.4900	0.1600	2.6384	
E18 Party wall between dwellings	4.7400	0.0600	0.2844	
E7 Party floor between dwellings (in blocks of flats)	16.4900	0.0700	1.1543	
P1 Party wall - Ground floor	16.4100	0.0800	1.3128	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.4100	0.0000	0.0000	
E16 Corner (normal)	2.3700	0.0900	0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

6.6212 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 30.9249 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	31.3751	31.2046	31.0374	30.2520	30.1051	29.4211	29.4211	29.2945	29.6846	30.1051	30.4024	30.7131	(38)
Average = Sum(39)m / 12 =	62.3001	62.1295	61.9623	61.1770	61.0300	60.3461	60.3461	60.2194	60.6095	61.0300	61.3273	61.6380	(39)
												61.1763	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9029	0.9004	0.8980	0.8866	0.8845	0.8746	0.8746	0.8727	0.8784	0.8845	0.8888	0.8933	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2216 (42)
Hot water usage for mixer showers													(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	26.5567	26.1623	25.6069	24.5829	23.8161	22.9658	22.5065	23.0580	23.6585	24.5684	25.6135	26.4670	(42c)
Average daily hot water use (litres/day)	37.3814	36.0221	34.6628	33.3035	31.9441	30.5848	30.5848	31.9441	33.3035	34.6628	36.0221	37.3814	(43)
												58.6054	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	63.9382	62.1845	60.2697	57.8863	55.7602	53.5506	53.0913	55.0022	56.9620	59.2312	61.6356	63.8484	(44)
Energy content (annual)	101.2625	88.5499	92.6323	79.2435	75.0640	65.8467	64.2094	68.1042	70.2399	80.3761	87.8113	99.9712	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		973.3109	(46)
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	86.0731	75.2674	78.7375	67.3570	63.8044	55.9697	54.5780	57.8886	59.7039	68.3197	74.6396	84.9755	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	86.0731	75.2674	78.7375	67.3570	63.8044	55.9697	54.5780	57.8886	59.7039	68.3197	74.6396	84.9755	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				827.3142	(64)
Electric shower(s)	49.2261	43.8609	47.8944	45.7050	46.5627	44.4163	45.8968	46.5627	45.7050	47.8944	46.9938	49.2261	(64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				559.9444	(64a)
Heat gains from water heating, kWh/month	33.8248	29.7821	31.6580	28.2655	27.5918	25.0965	25.1187	26.1128	26.3522	29.0535	30.4083	33.5504	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	111.0802	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2301	119.8261	108.2301	111.8377	108.2301	111.8377	108.2301	108.2301	111.8377	108.2301	111.8377	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.9520	196.9749	191.8771	181.0243	167.3246	154.4489	145.8471	143.8241	148.9220	159.7747	173.4744	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	(71)
Water heating gains (Table 5)	45.4635	44.3185	42.5510	39.2576	37.0857	34.8563	33.7617	35.0979	36.6003	39.0504	42.2338	(72)
Total internal gains	404.9695	417.4437	398.9822	388.4437	368.9645	357.4669	344.1629	343.4761	353.6841	363.3793	383.8700	(73)

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W

Southeast						8.6000	36.7938	0.6300	0.7000			0.7700			96.7042 (77)

Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586	(83)		
Total gains	501.6737	582.1667	624.3634	667.7020	681.7570	667.9975	643.5475	617.8426	597.7243	545.4333	499.6993	478.7575	(84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	90.8300	91.0794	91.3252	92.4975	92.7202	93.7711	93.7711	93.9683	93.3635	92.7202	92.2708	91.8056		
alpha	7.0553	7.0720	7.0883	7.1665	7.1813	7.2514	7.2514	7.2646	7.2242	7.1813	7.1514	7.1204		
util living area	0.9970	0.9908	0.9756	0.9178	0.7844	0.5735	0.4122	0.4476	0.6829	0.9334	0.9908	0.9978	(86)	
MIT	20.2356	20.4006	20.5903	20.8192	20.9534	20.9956	20.9996	20.9994	20.9857	20.8217	20.4932	20.2095	(87)	
Th 2	20.1650	20.1671	20.1692	20.1789	20.1807	20.1892	20.1892	20.1907	20.1859	20.1807	20.1770	20.1732	(88)	
util rest of house	0.9959	0.9875	0.9669	0.8915	0.7309	0.5032	0.3365	0.3693	0.6097	0.9060	0.9869	0.9970	(89)	
MIT 2	19.4735	19.6383	19.8247	20.0444	20.1534	20.1875	20.1891	20.1906	20.1796	20.0522	19.7391	19.4544	(90)	
Living area fraction	19.7794	19.9443	20.1321	20.3555	20.4746	20.5119	20.5145	20.5153	20.5032	20.3611	20.0418	19.7575	(92)	
MIT	19.7794	19.9443	20.1321	20.3555	20.4746	20.5119	20.5145	20.5153	20.5032	20.3611	20.0418	19.7575	(93)	
Temperature adjustment												0.0000		
adjusted MIT	19.7794	19.9443	20.1321	20.3555	20.4746	20.5119	20.5145	20.5153	20.5032	20.3611	20.0418	19.7575	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	499.2679	574.2776	603.4297	599.3970	511.9595	354.9902	236.1191	247.6240	381.9097	497.8838	492.7731	477.0466	(94)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(95)	
Heat loss rate W	964.3691	934.6949	844.6745	700.8111	535.5117	356.7598	236.2235	247.8188	388.0976	595.7223	793.6872	958.9341	(97)	
Space heating kWh	346.0353	242.2004	179.4861	73.0181	17.5228	0.0000	0.0000	0.0000	0.0000	72.7919	216.6582	358.5243	(98a)	
Space heating requirement - total per year (kWh/year)												1506.2372		
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)												0.0000		
Space heating kWh	346.0353	242.2004	179.4861	73.0181	17.5228	0.0000	0.0000	0.0000	0.0000	72.7919	216.6582	358.5243	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1506.2372		
Space heating per m ²												21.8295	(99)	

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b														
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000		
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9599	0.9865	0.0000	0.0000	0.0000	0.0000	(100)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	544.4872	440.5271	448.8141	0.0000	0.0000	0.0000	0.0000	(102)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	732.7878	706.5896	678.7326	0.0000	0.0000	0.0000	0.0000	(103)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	135.5764	197.9505	171.0593	0.0000	0.0000	0.0000	0.0000	(104)	
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)	
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	33.8941	49.4876	42.7648	0.0000	0.0000	0.0000	0.0000	(107)	
Space cooling requirement												126.1466	(107)	
Energy for space heating												21.8295	(99)	
Energy for space cooling												1.8282	(108)	
Total												23.6577	(109)	
Fabric Energy Efficiency (TFEE)												23.7	(109)	

Full SAP Calculation Printout



Property Reference	Plot 6			Issued on Date	27/08/2025
Assessment Reference	Plot 6	Prop Type Ref			
Property	Flat 6, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.33	TER	10.41
Environmental	97 A	% DER < TER			68.01
CO ₂ Emissions (t/year)	0.19	DFEE	20.09	TFEE	23.66
Compliance Check	See BREL	% DFEE < TFEE			15.06
% DPER < TPER	35.80	DPER	35.06	TPER	54.62
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	69.0000 (1b)	2.3700 (2b)	163.5300 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		163.5300 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 163.5300 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8600 (17)
Infiltration rate	0.1930 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1641 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2092	0.2051	0.2010	0.1805	0.1764	0.1558	0.1558	0.1517	0.1641	0.1764	0.1846	0.1928 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3492	0.3451	0.3410	0.3205	0.3164	0.2958	0.2958	0.2917	0.3041	0.3164	0.3246	0.3328 (25)

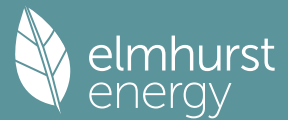
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			69.0000	0.1100	7.5900	75.0000	5175.0000 (28a)
External Wall	39.0800	8.6000	30.4800	0.1900	5.7912	150.0000	4572.0003 (29a)
Total net area of external elements Aum(A, m ²)			108.0800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.0479		(33)
Main dwelling							
Corridor			18.2700	0.0000	0.0000	180.0000	3288.6001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			69.0000			30.0000	2070.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 19681.3805 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							285.2374 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

elmhurst
energy

SAP 10 Online 2.22.2 Page 2 of 7

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	125.9129	126.5580	127.2097	130.5719	131.2657	134.8487	134.8487	135.5889	133.3923	131.2657	129.8853	128.5336
alpha	9.3942	9.4372	9.4806	9.7048	9.7510	9.9899	9.9899	10.0393	9.8928	9.7510	9.6590	9.5689
util living area	0.9860	0.9652	0.9253	0.8065	0.6392	0.4433	0.3177	0.3384	0.5205	0.8049	0.9562	0.9887 (86)
MIT	20.6849	20.7908	20.8864	20.9741	20.9971	20.9999	21.0000	21.0000	20.9997	20.9784	20.8492	20.6744 (87)
Th 2	20.4037	20.4066	20.4095	20.4239	20.4268	20.4412	20.4412	20.4441	20.4354	20.4268	20.4210	20.4152 (88)
util rest of house	0.9819	0.9562	0.9080	0.7755	0.6010	0.4046	0.2773	0.2975	0.4781	0.7687	0.9437	0.9853 (89)
MIT 2	20.0460	20.1782	20.2934	20.4010	20.4247	20.4412	20.4412	20.4441	20.4352	20.4089	20.2629	20.0430 (90)
Living area fraction									fLA = Living area / (4) =			0.4014 (91)
MIT	20.3025	20.4241	20.5315	20.6310	20.6545	20.6655	20.6655	20.6673	20.6618	20.6376	20.4983	20.2965 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3025	20.4241	20.5315	20.6310	20.6545	20.6655	20.6655	20.6673	20.6618	20.6376	20.4983	20.2965 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9811	0.9565	0.9118	0.7869	0.6162	0.4202	0.2935	0.3139	0.4952	0.7824	0.9455	0.9845	(94)
Useful gains	516.3443	553.6232	540.9310	477.8108	371.6242	245.8829	164.8246	172.0583	268.8046	407.3497	481.3036	499.9236	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	694.8157	670.6109	603.0257	491.1786	372.9439	245.9076	164.8252	172.0593	268.9350	418.0512	563.9519	684.6486	(97)
Space heating kWh	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354	(98a)
Space heating requirement - total per year (kWh/year)												473.1077	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												473.1077	
Space heating per m2											(98c) / (4) =	6.8566	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	132.7827	78.6157	46.1985	9.6249	0.9819	0.0000	0.0000	0.0000	0.0000	7.9620	59.5068	137.4354 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (64)	
Efficiency of water heater (217)m	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057 (217)	
Fuel for water heating, kWh/month	77.5577	68.4921	72.4137	62.7121	60.1670	53.5256	52.2729	54.7009	55.7008	62.9468	67.9707	76.5754 (219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	14.2333	12.8559	14.2333	13.7742	14.2333	13.7742	14.2333	14.2333	13.7742	14.2333	13.7742	14.2333 (231)	
Lighting	20.1678	16.1793	14.5677	10.6729	8.2441	6.7355	7.5205	9.7755	12.6974	16.6596	18.8170	20.7283 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													473.1077 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													337.9057
Water heating fuel used													765.0357 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 167.5855 (230a)
 Total electricity for the above, kWh/year 167.5855 (231)
 Electricity for lighting (calculated in Appendix L) 162.7656 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1568.4945 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	473.1077	0.1591	75.2667 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	765.0357	0.1412	108.0433 (264)
Space and water heating			183.3100 (265)
Pumps, fans and electric keep-hot	167.5855	0.1387	23.2462 (267)
Energy for lighting	162.7656	0.1443	23.4921 (268)
Total CO2, kg/year			230.0483 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	473.1077	1.5889	751.7106 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	765.0357	1.5222	1164.5532 (278)
Space and water heating			1916.2638 (279)
Pumps, fans and electric keep-hot	167.5855	1.5128	253.5234 (281)
Energy for lighting	162.7656	1.5338	249.6553 (282)
Total Primary energy kWh/year			2419.4425 (286)
Dwelling Primary energy Rate (DPER)			35.0600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.0000 (1b)	2.3700 (2b)	163.5300 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	163.5300 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1223 (8)
 Pressure test
 Pressure Test Method
 Measured/design AP50
 Infiltration rate
 Number of sides sheltered
 Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3165 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4035	0.3956	0.3877	0.3481	0.3402	0.3006	0.3006	0.2927	0.3165	0.3402	0.3560	0.3718 (22b)
Effective ac	0.5814	0.5782	0.5751	0.5606	0.5579	0.5452	0.5452	0.5428	0.5501	0.5579	0.5634	0.5691 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			8.6000	1.1450	9.8473		(27)						
Heatloss Floor 1			69.0000	0.1300	8.9700		(28a)						
External Wall	39.0800	8.6000	30.4800	0.1800	5.4864		(29a)						
Total net area of external elements Aum(A, m2)			108.0800				(31)						
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		24.3037		(33)						
Main dwelling													
Corridor			18.2700	0.0000	0.0000		(32)						
Party Wall			20.6200	0.0000	0.0000		(32)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							295.2374 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				4.7700	0.0500	0.2385							
E3 Sill				4.7700	0.0500	0.2385							
E4 Jamb				10.8200	0.0500	0.5410							
E5 Ground floor (normal)				16.4900	0.1600	2.6384							
E18 Party wall between dwellings				4.7400	0.0600	0.2844							
E7 Party floor between dwellings (in blocks of flats)				16.4900	0.0700	1.1543							
P1 Party wall - Ground floor				16.4100	0.0800	1.3128							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				16.4100	0.0000	0.0000							
E16 Corner (normal)				2.3700	0.0900	0.2133							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.6212 (36)						
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	30.9249 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 31.3751	Feb 31.2046	Mar 31.0374	Apr 30.2520	May 30.1051	Jun 29.4211	Jul 29.4211	Aug 29.2945	Sep 29.6846	Oct 30.1051	Nov 30.4024	Dec 30.7131	(38)
Heat transfer coeff	62.3001	62.1295	61.9623	61.1770	61.0300	60.3461	60.3461	60.2194	60.6095	61.0300	61.3273	61.6380	(39)
Average = Sum(39)m / 12 =												61.1763	
HLP	Jan 0.9029	Feb 0.9004	Mar 0.8980	Apr 0.8866	May 0.8845	Jun 0.8746	Jul 0.8746	Aug 0.8727	Sep 0.8784	Oct 0.8845	Nov 0.8888	Dec 0.8933	(40)
HLP (average)												0.8866	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2216 (42)
Hot water usage for mixer showers													
61.4686	60.5449	59.1988	56.6233	54.7226	52.6030	51.3983	52.7342	54.1986	56.4744	59.1052	61.2331	61.2331	(42a)
Hot water usage for baths													
26.5567	26.1623	25.6069	24.5829	23.8161	22.9658	22.5065	23.0580	23.6585	24.5684	25.6135	26.4670	26.4670	(42b)
Hot water usage for other uses													
37.3814	36.0221	34.6628	33.3035	31.9441	30.5848	30.5848	31.9441	33.3035	34.6628	36.0221	37.3814	37.3814	(42c)
Average daily hot water use (litres/day)												115.2774	(43)
Daily hot water use	Jan 125.4068	Feb 122.7293	Mar 119.4685	Apr 114.5096	May 110.4828	Jun 106.1537	Jul 104.4896	Aug 107.7363	Sep 111.1606	Oct 115.7055	Nov 120.7408	Dec 125.0815	(44)
Energy conte	198.6138	174.7650	183.6187	156.7580	148.7311	130.5283	126.3711	133.4001	137.0721	157.0113	172.0174	195.8475	(45)
Energy content (annual)										Total = Sum(45)m =		1914.7343	
Distribution loss (46)m = 0.15 x (45)m	29.7921	26.2147	27.5428	23.5137	22.3097	19.5792	18.9557	20.0100	20.5608	23.5517	25.8026	29.3771	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	245.2087	216.8507	230.2136	201.8498	195.3260	175.6201	172.9660	179.9950	182.1639	203.6062	217.1093	242.4424	(62)
WWHRS	-28.1009	-24.8527	-26.0243	-21.5491	-20.0830	-17.1852	-16.1084	-17.1296	-17.7804	-20.9612	-23.7465	-27.5805	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	217.1078	191.9980	204.1893	180.3007	175.2430	158.4350	156.8577	162.8654	164.3835	182.6450	193.3628	214.8619	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2202.2500	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	103.3150	91.7779	98.3291	88.1955	86.7290	79.4741	79.2943	81.6315	81.6499	89.4822	93.2693	102.3952	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 111.0802	Feb 111.0802	Mar 111.0802	Apr 111.0802	May 111.0802	Jun 111.0802	Jul 111.0802	Aug 111.0802	Sep 111.0802	Oct 111.0802	Nov 111.0802	Dec 111.0802	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2301	119.8261	108.2301	111.8377	108.2301	111.8377	108.2301	108.2301	111.8377	108.2301	111.8377	108.2301	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.9520	196.9749	191.8771	181.0243	167.3246	154.4489	145.8471	143.8241	148.9220	159.7747	173.4744	186.3502	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	34.1080	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	(71)
Water heating gains (Table 5)	138.8642	136.5743	132.1628	122.4937	116.5713	110.3807	106.5784	109.7197	113.4027	120.2717	129.5407	137.6280	(72)
Total internal gains	501.3703	512.6994	491.5940	474.6798	451.4500	432.9914	416.9796	418.0979	430.4865	447.6006	474.1768	491.5322	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]													
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W		
-----				8.6000	36.7938	0.6300		0.7000		0.7700	96.7042 (77)		

Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586 (83)	
Total gains	598.0745	677.4224	716.9752	753.9381	764.2425	743.5220	716.3642	692.4644	674.5266	629.6546	590.0062	574.2909 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	90.8300	91.0794	91.3252	92.4975	92.7202	93.7711	93.7711	93.9683	93.3635	92.7202	92.2708	91.8056
util living area	7.0553	7.0720	7.0883	7.1665	7.1813	7.2514	7.2514	7.2646	7.2242	7.1813	7.1514	7.1204
	0.9913	0.9786	0.9513	0.8694	0.7179	0.5173	0.3705	0.3997	0.6124	0.8813	0.9767	0.9932 (86)
MIT	20.3668	20.5225	20.6936	20.8797	20.9732	20.9977	20.9998	20.9997	20.9927	20.8867	20.6083	20.3409 (87)
Th 2	20.1650	20.1671	20.1692	20.1789	20.1807	20.1892	20.1892	20.1907	20.1859	20.1807	20.1770	20.1732 (88)
util rest of house	0.9884	0.9717	0.9364	0.8354	0.6634	0.4528	0.3023	0.3296	0.5437	0.8429	0.9679	0.9909 (89)
MIT 2	19.4438	19.6399	19.8501	20.0693	20.1614	20.1881	20.1891	20.1906	20.1820	20.0824	19.7569	19.4177 (90)
Living area fraction	19.8143	19.9942	20.1887	20.3946	20.4873	20.5131	20.5146	20.5154	20.5074	20.4053	20.0987	19.7883 (92)
MIT	19.8143	19.9942	20.1887	20.3946	20.4873	20.5131	20.5146	20.5154	20.5074	20.4053	20.0987	19.7883 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8143	19.9942	20.1887	20.3946	20.4873	20.5131	20.5146	20.5154	20.5074	20.4053	20.0987	19.7883 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9868	0.9700	0.9368	0.8449	0.6843	0.4787	0.3297	0.3578	0.5712	0.8543	0.9669	0.9895 (94)
Ext temp.	590.1983	657.0945	671.6286	637.0013	522.9858	355.9252	236.1782	247.7378	385.2669	537.9189	570.5062	568.2810 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	966.5446	937.7945	848.1843	703.2062	536.2878	356.8322	236.2290	247.8291	388.3525	598.4182	797.1733	960.8318 (97)
Space heating requirement - total per year (kWh/year)	280.0017	188.6304	131.3575	47.6675	9.8967	0.0000	0.0000	0.0000	0.0000	45.0115	163.2003	292.0578 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	280.0017	188.6304	131.3575	47.6675	9.8967	0.0000	0.0000	0.0000	0.0000	45.0115	163.2003	292.0578 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)
Space heating per m2												

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	280.0017	188.6304	131.3575	47.6675	9.8967	0.0000	0.0000	0.0000	0.0000	45.0115	163.2003	292.0578 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	303.3605	204.3666	142.3158	51.6441	10.7223	0.0000	0.0000	0.0000	0.0000	48.7665	176.8150	316.4223 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	217.1078	191.9980	204.1893	180.3007	175.2430	158.4350	156.8577	162.8654	164.3835	182.6450	193.3628	214.8619 (64)
Efficiency of water heater	84.6314	84.0201	83.0970	81.5278	80.2347	79.8000	79.8000	79.8000	79.8000	81.4318	83.6819	79.8000 (216)
Fuel for water heating, kWh/month	256.5335	228.5144	245.7241	221.1525	218.4130	198.5401	196.5635	204.0920	205.9944	224.2920	231.0688	253.5282 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.4881	18.0408	16.2437	11.9008	9.1925	7.5104	8.3857	10.9001	14.1582	18.5763	20.9819	23.1131 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-23.5152	-34.2383	-50.8044	-59.0276	-65.3005	-61.5579	-60.8210	-56.6216	-49.4612	-40.0225	-26.2425	-20.2066 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-10.1613	-21.6757	-43.6426	-66.3691	-88.5544	-89.2608	-88.1934	-74.2894	-53.9603	-31.2471	-13.6477	-8.0116 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											1254.4131	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											79.8000	
Water heating fuel used											2684.4163	(219)
Space cooling fuel											0.0000	(221)

Electricity for pumps and fans:												
Total electricity for the above, kWh/year											86.0000	(231)
Electricity for lighting (calculated in Appendix L)											181.4916	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-1136.8326	(233)
Wind generation											0.0000	(234)
Hydro-electric generation (Appendix N)											0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)											0.0000	(235)
Appendix Q - special features												
Energy saved or generated											-0.0000	(236)
Energy used											0.0000	(237)
Total delivered energy for all uses											3069.4884	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1254.4131	0.2100	263.4267 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2684.4163	0.2100	563.7274 (264)
Space and water heating			827.1542 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	181.4916	0.1443	26.1948 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-547.8193	0.1339	-73.3581
PV Unit electricity exported	-589.0133	0.1255	-73.9423
Total			-147.3004 (269)
Total CO2, kg/year			717.9779 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.4100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1254.4131	1.1300	1417.4868 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2684.4163	1.1300	3033.3904 (278)
Space and water heating			4450.8772 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	181.4916	1.5338	278.3779 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-547.8193	1.4949	-818.9175
PV Unit electricity exported	-589.0133	0.4608	-271.4091
Total			-1090.3266 (283)
Total Primary energy kWh/year			3769.0293 (286)
Target Primary Energy Rate (TPER)			54.6200 (287)

Full SAP Calculation Printout



Property Reference	Plot 6			Issued on Date	27/08/2025
Assessment Reference	Plot 6	Prop Type Ref			
Property	Flat 6, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.33	TER	10.41
Environmental	97 A	% DER < TER			68.01
CO ₂ Emissions (t/year)	0.19	DFEE	20.09	TFEE	23.66
Compliance Check	See BREL	% DFEE < TFEE			15.06
% DPER < TPER	35.80	DPER	35.06	TPER	54.62
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	69.0000 (1b)	2.3700 (2b)	163.5300 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		163.5300 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	163.5300 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8600 (17)
Infiltration rate	0.1930 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1641 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2092	0.2051	0.2010	0.1805	0.1764	0.1558	0.1558	0.1517	0.1641	0.1764	0.1846	0.1928 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3492	0.3451	0.3410	0.3205	0.3164	0.2958	0.2958	0.2917	0.3041	0.3164	0.3246	0.3328 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
Heatloss Floor 1			69.0000	0.1100	7.5900	75.0000	5175.0000 (28a)
External Wall	39.0800	8.6000	30.4800	0.1900	5.7912	150.0000	4572.0003 (29a)
Total net area of external elements A _{um} (A, m ²)			108.0800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.0479		(33)
Main dwelling							
Corridor			18.2700	0.0000	0.0000	180.0000	3288.6001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Ceiling 1			69.0000			40.0000	2760.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 20371.3805 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							295.2374 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622	
E3 Sill	4.7700	0.0260	0.1240	
E4 Jamb	10.8200	0.0300	0.3246	
E5 Ground floor (normal)	16.4900	0.0810	1.3357	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	16.4900	-0.0180	-0.2968	
P1 Party wall - Ground floor	16.4100	0.1600	2.6256	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.4100	0.0000	0.0000	
E16 Corner (normal)	2.3700	0.0490	0.1161	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.5289	(36)
Point Thermal Bridges			0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	24.5767	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	18.8426	18.6213	18.3999	17.2933	17.0720	15.9654	15.9654	15.7441	16.4080	17.0720	17.5146	17.9573 (38)
Average = Sum(39)m / 12 =	43.4193	43.1980	42.9767	41.8700	41.6487	40.5421	40.5421	40.3208	40.9848	41.6487	42.0914	42.5340 (39)
												41.8147
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6293	0.6261	0.6229	0.6068	0.6036	0.5876	0.5876	0.5844	0.5940	0.6036	0.6100	0.6164 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2216	(42)
Hot water usage for mixer showers														
	84.5194	83.2492	81.3983	77.8570	75.2436	72.3292	70.6726	72.5095	74.5230	77.6522	81.2696	84.1955	(42a)	
Hot water usage for baths														
	26.5567	26.1623	25.6069	24.5829	23.8161	22.9658	22.5065	23.0580	23.6585	24.5684	25.6135	26.4670	(42b)	
Hot water usage for other uses														
	37.3814	36.0221	34.6628	33.3035	31.9441	30.5848	30.5848	31.9441	33.3035	34.6628	36.0221	37.3814	(42c)	
Average daily hot water use (litres/day)													136.5295	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	148.4576	145.4337	141.6681	135.7434	131.0038	125.8798	123.7639	127.5117	131.4850	136.8834	142.9053	148.0440	(44)	
Energy conte	235.1205	207.0956	217.7385	185.8259	176.3563	154.7839	149.6818	157.8861	162.1342	185.7495	203.5948	231.8011	(45)	
Energy content (annual)										Total = Sum(45)m =		2267.7681		
Distribution loss (46)m = 0.15 x (45)m														
	35.2681	31.0643	32.6608	27.8739	26.4534	23.2176	22.4523	23.6829	24.3201	27.8624	30.5392	34.7702	(46)	
Water storage loss:														
Store volume													201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage														
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h														
	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(64)	
Electric shower(s)														
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month														
	78.1776	68.8593	72.3981	61.7871	58.6385	51.4656	49.7692	52.4971	53.9096	61.7617	67.6953	77.0739	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	23.0412	20.4649	16.6432	12.6000	9.4186	7.9516	8.5920	11.1682	14.9899	19.0332	22.2145	23.6815	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	290.9731	293.9925	286.3837	270.1855	249.7383	230.5207	217.6822	214.6628	222.2716	238.4697	258.9170	278.1346	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	(69)	
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	(71)	
Water heating gains (Table 5)														
	105.0774	102.4692	97.3092	85.8154	78.8152	71.4801	66.8941	70.5606	74.8745	83.0130	94.0212	103.5939	(72)	
Total internal gains														
	514.0749	511.9099	495.3194	463.5842	432.9554	404.9357	388.1516	391.3750	407.1193	435.4993	470.1360	500.3933	(73)	

6. Solar gains

[Jan]														
		Area	Solar flux	g	FF	Access	Gains							
		m2	Table 6a	Specific data	Specific data	factor	W							
			W/m2	or Table 6b	or Table 6c	Table 6d								
Southeast		8.6000	36.7938	0.2400	0.0000	0.7700	58.4757	(77)						
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430	(83)	
Total gains	572.5506	611.5156	631.6044	632.4479	622.0967	592.7093	569.1854	557.2807	554.6871	545.5848	540.1764	550.4363	(84)	

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.3272	130.9949	131.6695	135.1495	135.8677	139.5763	139.5763	140.3424	138.0688	135.8677	134.4389	133.0398
alpha	9.6885	9.7330	9.7780	10.0100	10.0578	10.3051	10.3051	10.3562	10.2046	10.0578	9.9626	9.8693
util living area	0.9768	0.9539	0.9010	0.7821	0.6206	0.4377	0.3134	0.3328	0.5096	0.7765	0.9406	0.9814 (86)
MIT	20.7542	20.8337	20.9197	20.9822	20.9981	21.0000	21.0000	21.0000	20.9998	20.9859	20.8855	20.7410 (87)
Th 2	20.4037	20.4066	20.4095	20.4239	20.4268	20.4412	20.4412	20.4441	20.4354	20.4268	20.4210	20.4152 (88)
util rest of house	0.9704	0.9425	0.8803	0.7502	0.5832	0.3995	0.2736	0.2926	0.4680	0.7393	0.9248	0.9761 (89)
MIT 2	20.1306	20.2287	20.3299	20.4085	20.4255	20.4412	20.4412	20.4441	20.4353	20.4154	20.3043	20.1248 (90)
Living area fraction									fLA = Living area / (4) =			0.4014 (91)
MIT	20.3809	20.4716	20.5667	20.6388	20.6554	20.6655	20.6655	20.6673	20.6619	20.6444	20.5376	20.3721 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3809	20.4716	20.5667	20.6388	20.6554	20.6655	20.6655	20.6673	20.6619	20.6444	20.5376	20.3721 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9701	0.9439	0.8861	0.7623	0.5981	0.4149	0.2896	0.3087	0.4847	0.7537	0.9282	0.9757 (94)
Useful gains	555.4277	577.1861	559.6752	482.1420	372.1060	245.8916	164.8249	172.0588	268.8527	411.2100	501.4023	537.0611 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	698.2232	672.6598	604.5408	491.5051	372.9793	245.9082	164.8252	172.0594	268.9385	418.3379	565.6079	687.8663 (97)
Space heating kWh	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990 (98a)
Space heating requirement - total per year (kWh/year)												374.8995
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												374.8995
Space heating per m2										(98c) / (4) =		5.4333 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													(213)
Water heating													
Water heating requirement	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(64)
Efficiency of water heater	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	(216)
(217)m	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	(217)
Fuel for water heating, kWh/month	77.5577	68.4921	72.4137	62.7121	60.1670	53.5256	52.2729	54.7009	55.7008	62.9468	67.9707	76.5754	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	14.2333	12.8559	14.2333	13.7742	14.2333	13.7742	14.2333	14.2333	13.7742	14.2333	13.7742	14.2333	(231)
Lighting	20.1678	16.1793	14.5677	10.6729	8.2441	6.7355	7.5205	9.7755	12.6974	16.6596	18.8170	20.7283	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													374.8995 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													337.9057
Water heating fuel used													765.0357 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													167.5855 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	167.5855	(231)
Electricity for lighting (calculated in Appendix L)	162.7656	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1470.2863	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	374.8995	16.4900	61.8209 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	765.0357	16.4900	126.1544 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	167.5855	16.4900	27.6349 (249)
Energy for lighting	162.7656	16.4900	26.8400 (250)
Additional standing charges			0.0000 (251)
Total energy cost			242.4502 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7656 (257)
SAP value		87.5891
SAP rating (Section 12)		88 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	374.8995	0.1593	59.7294 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	765.0357	0.1412	108.0433 (264)
Space and water heating			167.7728 (265)
Pumps, fans and electric keep-hot	167.5855	0.1387	23.2462 (267)
Energy for lighting	162.7656	0.1443	23.4921 (268)
Total CO2, kg/year			214.5110 (272)
CO2 emissions per m2			3.1100 (273)
EI value			97.4786
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.0000 (1b)	x 2.3700 (2b)	= 163.5300 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	163.5300 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8600 (17)
Infiltration rate	0.1930 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.1641 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1764	0.1723	0.1764	0.1599	0.1641	0.1394	0.1353	0.1353	0.1394	0.1558	0.1558	0.1599	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3164	0.3123	0.3164	0.2999	0.3041	0.2794	0.2753	0.2753	0.2794	0.2958	0.2958	0.2999	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.6000	0.7752	6.6667			(27)
Heatloss Floor 1			69.0000	0.1100	7.5900	75.0000	5175.0000	(28a)
External Wall	39.0800	8.6000	30.4800	0.1900	5.7912	150.0000	4572.0003	(29a)
Total net area of external elements Aum(A, m2)			108.0800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.0479			(33)
Main dwelling								
Corridor			18.2700	0.0000	0.0000	180.0000	3288.6001	(32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002	(32)
Party Ceiling 1			69.0000			40.0000	2760.0000	(32b)
Internal Wall 1			96.0200			9.0000	864.1800	(32c)

Heat capacity Cm = Sum(A x k)

(28)...(30) + (32) + (32a)...(32e) = 20371.3805 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

295.2374 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622	
E3 Sill	4.7700	0.0260	0.1240	
E4 Jamb	10.8200	0.0300	0.3246	
E5 Ground floor (normal)	16.4900	0.0810	1.3357	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	16.4900	-0.0180	-0.2968	
P1 Party wall - Ground floor	16.4100	0.1600	2.6256	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.4100	0.0000	0.0000	
E16 Corner (normal)	2.3700	0.0490	0.1161	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

4.5289 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 24.5767 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	17.0720	16.8507	17.0720	16.1867	16.4080	15.0801	14.8588	14.8588	15.0801	15.9654	15.9654	16.1867	(38)
Average = Sum(39)m / 12 =	41.6487	41.4274	41.6487	40.7634	40.9848	39.6568	39.4355	39.4355	39.6568	40.5421	40.5421	40.7634	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6036	0.6004	0.6036	0.5908	0.5940	0.5747	0.5715	0.5715	0.5747	0.5876	0.5876	0.5908	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2216 (42)
Hot water usage for mixer showers													
Hot water usage for baths	84.5194	83.2492	81.3983	77.8570	75.2436	72.3292	70.6726	72.5095	74.5230	77.6522	81.2696	84.1955	(42a)
Hot water usage for other uses	26.5567	26.1623	25.6069	24.5829	23.8161	22.9658	22.5065	23.0580	23.6585	24.5684	25.6135	26.4670	(42b)
Average daily hot water use (litres/day)	37.3814	36.0221	34.6628	33.3035	31.9441	30.5848	30.5848	31.9441	33.3035	34.6628	36.0221	37.3814	(42c)
													136.5295 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	148.4576	145.4337	141.6681	135.7434	131.0038	125.8798	123.7639	127.5117	131.4850	136.8834	142.9053	148.0440	(44)
Energy content (annual)	235.1205	207.0956	217.7385	185.8259	176.3563	154.7839	149.6818	157.8861	162.1342	185.7495	203.5948	231.8011	(45)
Distribution loss (46)m = 0.15 x (45)m	35.2681	31.0643	32.6608	27.8739	26.4534	23.2176	22.4523	23.6829	24.3201	27.8624	30.5392	34.7702	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(64)
													2585.0991 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month	78.1776	68.8593	72.3981	61.7871	58.6385	51.4656	49.7692	52.4971	53.9096	61.7617	67.6953	77.0739	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0412	20.4649	16.6432	12.6000	9.4186	7.9516	8.5920	11.1682	14.9899	19.0332	22.2145	23.6815 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	290.9731	293.9925	286.3837	270.1855	249.7383	230.5207	217.6822	214.6628	222.2716	238.4697	258.9170	278.1346 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642 (71)
Water heating gains (Table 5)	105.0774	102.4692	97.3092	85.8154	78.8152	71.4801	66.8941	70.5606	74.8745	83.0130	94.0212	103.5939 (72)
Total internal gains	514.0749	511.9099	495.3194	463.5842	432.9554	404.9357	388.1516	391.3750	407.1193	435.4993	470.1360	500.3933 (73)

6. Solar gains

[Jan]	Area		Solar flux		Specific data		FF		Access		Gains	
	m2		Table 6a		or Table 6b		or Table 6c		factor		W	
			W/m2						Table 6d			
Southeast	8.6000		32.4665		0.2400		0.0000		0.7700		51.5984 (77)	
Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405 (83)
Total gains	565.6733	602.0688	624.2178	626.5379	611.0409	585.9559	558.4613	546.4784	550.5425	541.9910	533.6489	547.9338 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	135.8677	136.5936	135.8677	138.8185	138.0688	142.6922	143.4930	143.4930	142.6922	139.5763	139.5763	138.8185
alpha	10.0578	10.1062	10.0578	10.2546	10.2046	10.5128	10.5662	10.5662	10.5128	10.3051	10.3051	10.2546
util living area	0.9638	0.9315	0.8676	0.7208	0.5494	0.3655	0.2683	0.2887	0.4609	0.7248	0.9128	0.9701 (86)
MIT	20.8258	20.8912	20.9506	20.9926	20.9995	21.0000	21.0000	21.0000	20.9999	20.9933	20.9283	20.8139 (87)
Th 2	20.4268	20.4296	20.4268	20.4383	20.4354	20.4528	20.4557	20.4557	20.4528	20.4412	20.4412	20.4383 (88)
util rest of house	0.9542	0.9159	0.8431	0.6872	0.5119	0.3284	0.2299	0.2494	0.4216	0.6864	0.8920	0.9621 (89)
MIT 2	20.2385	20.3173	20.3798	20.4323	20.4351	20.4528	20.4557	20.4557	20.4528	20.4362	20.3713	20.2349 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.4742	20.5477	20.6090	20.6573	20.6617	20.6725	20.6742	20.6742	20.6724	20.6599	20.5949	20.4673 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.4742	20.5477	20.6090	20.6573	20.6617	20.6725	20.6742	20.6742	20.6724	20.6599	20.5949	20.4673 (93)

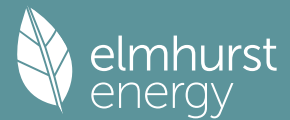
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9551	0.9194	0.8512	0.7004	0.5269	0.3433	0.2453	0.2651	0.4374	0.7016	0.8981	0.9625 (94)
Useful gains	540.2639	553.5331	531.3402	438.8245	321.9866	201.1560	137.0069	144.8939	240.7903	380.2816	479.2514	527.3952 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	640.3169	615.1030	558.4658	442.5789	322.2089	201.1578	137.0069	144.8940	240.8131	383.5227	518.7323	634.5774 (97)
Space heating kWh	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435 (98a)
Space heating requirement - total per year (kWh/year)	249.4456											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	249.4456											
Space heating per m2	(98c) / (4) = 3.6152 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000 (213)											

Full SAP Calculation Printout



Water heating requirement	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (64)
Efficiency of water heater (217)m	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057 (216)
Fuel for water heating, kWh/month	77.5577	68.4921	72.4137	62.7121	60.1670	53.5256	52.2729	54.7009	55.7008	62.9468	67.9707	76.5754 (217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	14.2333	12.8559	14.2333	13.7742	14.2333	13.7742	14.2333	14.2333	13.7742	14.2333	13.7742	14.2333 (231)
Lighting	20.1678	16.1793	14.5677	10.6729	8.2441	6.7355	7.5205	9.7755	12.6974	16.6596	18.8170	20.7283 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												249.4456 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												337.9057
Water heating fuel used												765.0357 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												167.5855 (230a)
Total electricity for the above, kWh/year												167.5855 (231)
Electricity for lighting (calculated in Appendix L)												162.7656 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1344.8325 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	249.4456	28.4300	70.9174 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	765.0357	28.4300	217.4997 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	167.5855	28.4300	47.6446 (249)
Energy for lighting	162.7656	28.4300	46.2743 (250)
Additional standing charges			0.0000 (251)
Total energy cost			382.3359 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	249.4456	0.1598	39.8683 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	765.0357	0.1412	108.0433 (264)
Space and water heating			147.9116 (265)
Pumps, fans and electric keep-hot	167.5855	0.1387	23.2462 (267)
Energy for lighting	162.7656	0.1443	23.4921 (268)
Total CO2, kg/year			194.6499 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	249.4456	1.5916	397.0121 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	765.0357	1.5222	1164.5532 (278)
Space and water heating			1561.5653 (279)
Pumps, fans and electric keep-hot	167.5855	1.5128	253.5234 (281)
Energy for lighting	162.7656	1.5338	249.6553 (282)
Total Primary energy kWh/year			2064.7440 (286)

SAP 10 EPC IMPROVEMENTS

Plot 6

Current energy efficiency rating: B 88
Current environmental impact rating: A 97

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£382	£382	£0
Space heating	£119	£119	£0
Water heating	£217	£217	£0
Lighting	£46	£46	£0
Total cost of fuels	£382	£382	£0
Total cost of uses	£382	£382	£0
Delivered energy	19 kWh/m ²	19 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	30 kWh/m ²	30 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	69.0000 (1b)	2.3700 (2b)	163.5300 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000		163.5300 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 163.5300 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8600 (17)
Infiltration rate	0.1930 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1641 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2092	0.2051	0.2010	0.1805	0.1764	0.1558	0.1558	0.1517	0.1641	0.1764	0.1846	0.1928 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3492	0.3451	0.3410	0.3205	0.3164	0.2958	0.2958	0.2917	0.3041	0.3164	0.3246	0.3328 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							

Full SAP Calculation Printout



Window			8.6000	0.7752	6.6667			(27)
Heatloss Floor 1			69.0000	0.1100	7.5900	75.0000	5175.0000	(28a)
External Wall	39.0800	8.6000	30.4800	0.1900	5.7912	150.0000	4572.0003	(29a)
Total net area of external elements Aum(A, m2)			108.0800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.0479			(33)
Main dwelling								
Corridor			18.2700	0.0000	0.0000	180.0000	3288.6001	(32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002	(32)
Party Ceiling 1			69.0000			40.0000	2760.0000	(32b)
Internal Wall 1			96.0200			9.0000	864.1800	(32c)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =		20371.3805			(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					295.2374			(35)
List of Thermal Bridges								
K1 Element			Length	Psi-value	Total			
E2 Other lintels (including other steel lintels)			4.7700	0.0340	0.1622			
E3 Sill			4.7700	0.0260	0.1240			
E4 Jamb			10.8200	0.0300	0.3246			
E5 Ground floor (normal)			16.4900	0.0810	1.3357			
E18 Party wall between dwellings			4.7400	0.0290	0.1375			
E7 Party floor between dwellings (in blocks of flats)			16.4900	-0.0180	-0.2968			
P1 Party wall - Ground floor			16.4100	0.1600	2.6256			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			16.4100	0.0000	0.0000			
E16 Corner (normal)			2.3700	0.0490	0.1161			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)					4.5289			(36)
Point Thermal bridges					(36a) =	0.0000		
Total fabric heat loss					(33) + (36) + (36a) =	24.5767		(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat transfer coeff	18.8426	18.6213	18.3999	17.2933	17.0720	15.9654	15.9654	15.7441	16.4080	17.0720	17.5146	17.9573	(38)	
Average = Sum(39)m / 12 =	43.4193	43.1980	42.9767	41.8700	41.6487	40.5421	40.5421	40.3208	40.9848	41.6487	42.0914	42.5340	(39)	
												41.8147		
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	0.6293	0.6261	0.6229	0.6068	0.6036	0.5876	0.5876	0.5844	0.5940	0.6036	0.6100	0.6164	(40)	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)

Assumed occupancy														2.2216	(42)
Hot water usage for mixer showers															
Hot water usage for baths	84.5194	83.2492	81.3983	77.8570	75.2436	72.3292	70.6726	72.5095	74.5230	77.6522	81.2696	84.1955	(42a)		
Hot water usage for other uses	26.5567	26.1623	25.6069	24.5829	23.8161	22.9658	22.5065	23.0580	23.6585	24.5684	25.6135	26.4670	(42b)		
Average daily hot water use (litres/day)	37.3814	36.0221	34.6628	33.3035	31.9441	30.5848	30.5848	31.9441	33.3035	34.6628	36.0221	37.3814	(42c)		
												136.5295	(43)		
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Energy conte	148.4576	145.4337	141.6681	135.7434	131.0038	125.8798	123.7639	127.5117	131.4850	136.8834	142.9053	148.0440	(44)		
Energy content (annual)	235.1205	207.0956	217.7385	185.8259	176.3563	154.7839	149.6818	157.8861	162.1342	185.7495	203.5948	231.8011	(45)		
Distribution loss (46)m = 0.15 x (45)m															
Water storage loss:	35.2681	31.0643	32.6608	27.8739	26.4534	23.2176	22.4523	23.6829	24.3201	27.8624	30.5392	34.7702	(46)		
Store volume														201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):														1.6100	(48)
Temperature factor from Table 2b														0.5400	(49)
Enter (49) or (54) in (55)														0.8694	(55)
Total storage loss															
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)		
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)		
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)		
Total heat required for water heating calculated for each month	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(62)		
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)		
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)		
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)		
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)		
Output from w/h	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(64)		
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)		
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)		
Heat gains from water heating, kWh/month	78.1776	68.8593	72.3981	61.7871	58.6385	51.4656	49.7692	52.4971	53.9096	61.7617	67.6953	77.0739	(65)		

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts															
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	(66)		
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	23.0412	20.4649	16.6432	12.6000	9.4186	7.9516	8.5920	11.1682	14.9899	19.0332	22.2145	23.6815	(67)		
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	290.9731	293.9925	286.3837	270.1855	249.7383	230.5207	217.6822	214.6628	222.2716	238.4697	258.9170	278.1346	(68)		
Pumps, fans	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	(69)		
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)		
Water heating gains (Table 5)	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	(71)		
Total internal gains	105.0774	102.4692	97.3092	85.8154	78.8152	71.4801	66.8941	70.5606	74.8745	83.0130	94.0212	103.5939	(72)		
	514.0749	511.9099	495.3194	463.5842	432.9554	404.9357	388.1516	391.3750	407.1193	435.4993	470.1360	500.3933	(73)		

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast	8.6000				36.7938	0.2400		0.0000		0.7700	58.4757 (77)
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	50.0430 (83)
Total gains	572.5506	611.5156	631.6044	632.4479	622.0967	592.7093	569.1854	557.2807	554.6871	545.5848	550.4363 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.3272	130.9949	131.6695	135.1495	135.8677	139.5763	139.5763	140.3424	138.0688	135.8677	134.4389	133.0398
alpha	9.6885	9.7330	9.7780	10.0100	10.0578	10.3051	10.3051	10.3562	10.2046	10.0578	9.9626	9.8693
util living area	0.9768	0.9539	0.9010	0.7821	0.6206	0.4377	0.3134	0.3328	0.5096	0.7765	0.9406	0.9814 (86)
MIT	20.7542	20.8337	20.9197	20.9822	20.9981	21.0000	21.0000	21.0000	20.9998	20.9859	20.8855	20.7410 (87)
Th 2	20.4037	20.4066	20.4095	20.4239	20.4268	20.4412	20.4412	20.4441	20.4354	20.4268	20.4210	20.4152 (88)
util rest of house	0.9704	0.9425	0.8803	0.7502	0.5832	0.3995	0.2736	0.2926	0.4680	0.7393	0.9248	0.9761 (89)
MIT 2	20.1306	20.2287	20.3299	20.4085	20.4255	20.4412	20.4412	20.4441	20.4353	20.4154	20.3043	20.1248 (90)
Living area fraction									fLA = Living area /	(4) =		0.4014 (91)
MIT	20.3809	20.4716	20.5667	20.6388	20.6554	20.6655	20.6655	20.6673	20.6619	20.6444	20.5376	20.3721 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3809	20.4716	20.5667	20.6388	20.6554	20.6655	20.6655	20.6673	20.6619	20.6444	20.5376	20.3721 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9701	0.9439	0.8861	0.7623	0.5981	0.4149	0.2896	0.3087	0.4847	0.7537	0.9282	0.9757 (94)
Useful gains	555.4277	577.1861	559.6752	482.1420	372.1060	245.8916	164.8249	172.0588	268.8527	411.2100	501.4023	537.0611 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	698.2232	672.6598	604.5408	491.5051	372.9793	245.9082	164.8252	172.0594	268.9385	418.3379	565.6079	687.8663 (97)
Space heating kWh	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990 (98a)
Space heating requirement - total per year (kWh/year)												374.8995
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												374.8995
Space heating per m2										(98c) / (4) =		5.4333 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	106.2398	64.1583	33.3800	6.7415	0.6497	0.0000	0.0000	0.0000	0.0000	5.3031	46.2280	112.1990 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (64)
Efficiency of water heater	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057 (216)
Fuel for water heating, kWh/month	77.5577	68.4921	72.4137	62.7121	60.1670	53.5256	52.2729	54.7009	55.7008	62.9468	67.9707	76.5754 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	14.2333	12.8559	14.2333	13.7742	14.2333	13.7742	14.2333	14.2333	13.7742	14.2333	13.7742	14.2333 (221)
Lighting	20.1678	16.1793	14.5677	10.6729	8.2441	6.7355	7.5205	9.7755	12.6974	16.6596	18.8170	20.7283 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													374.8995	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													337.9057	
Water heating fuel used													765.0357	(219)
Space cooling fuel													0.0000	(221)

Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													167.5855	(230a)
Total electricity for the above, kWh/year													167.5855	(231)
Electricity for lighting (calculated in Appendix L)													162.7656	(232)

Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1470.2863	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	374.8995	16.4900	61.8209	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	765.0357	16.4900	126.1544	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	167.5855	16.4900	27.6349	(249)
Energy for lighting	162.7656	16.4900	26.8400	(250)
Additional standing charges			0.0000	(251)
Total energy cost			242.4502	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.7656	(257)
SAP value		87.5891	
SAP rating (Section 12)		88	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	374.8995	0.1593	59.7294	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	765.0357	0.1412	108.0433	(264)
Space and water heating			167.7728	(265)
Pumps, fans and electric keep-hot	167.5855	0.1387	23.2462	(267)
Energy for lighting	162.7656	0.1443	23.4921	(268)
Total CO2, kg/year			214.5110	(272)
CO2 emissions per m2			3.1100	(273)
EI value			97.4786	
EI rating			97	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

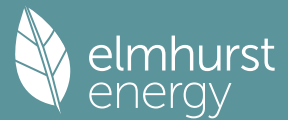
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	69.0000 (1b)	x 2.3700 (2b)	= 163.5300 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	163.5300 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

Full SAP Calculation Printout



Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.8600 (17)
Infiltration rate 0.1930 (18)
Number of sides sheltered 2 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1641 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1764	0.1723	0.1764	0.1599	0.1641	0.1394	0.1353	0.1353	0.1394	0.1558	0.1558	0.1599	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3164	0.3123	0.3164	0.2999	0.3041	0.2794	0.2753	0.2753	0.2794	0.2958	0.2958	0.2999	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.6000	0.7752	6.6667			(27)
Heatloss Floor 1			69.0000	0.1100	7.5900	75.0000	5175.0000	(28a)
External Wall	39.0800	8.6000	30.4800	0.1900	5.7912	150.0000	4572.0003	(29a)
Total net area of external elements Aum(A, m2)			108.0800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.0479			(33)
Main dwelling								
Corridor			18.2700	0.0000	0.0000	180.0000	3288.6001	(32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002	(32)
Party Ceiling 1			69.0000			40.0000	2760.0000	(32b)
Internal Wall 1			96.0200			9.0000	864.1800	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 20371.3805 (34)
List of Thermal Bridges 295.2374 (35)

	Length	Psi-value	Total	
K1 Element	4.7700	0.0340	0.1622	
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240	
E3 Sill	10.8200	0.0300	0.3246	
E4 Jamb	16.4900	0.0810	1.3357	
E5 Ground floor (normal)	4.7400	0.0290	0.1375	
E8 Party wall between dwellings	16.4900	-0.0180	-0.2968	
E7 Party floor between dwellings (in blocks of flats)	16.4100	0.1600	2.6256	
P1 Party wall - Ground floor	16.4100	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.3700	0.0490	0.1161	
E16 Corner (normal)				

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.5289 (36)
Point Thermal Bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 24.5767 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 17.0720 Feb 16.8507 Mar 17.0720 Apr 16.1867 May 16.4080 Jun 15.0801 Jul 14.8588 Aug 14.8588 Sep 15.0801 Oct 15.9654 Nov 15.9654 Dec 16.1867 (38)
Heat transfer coeff 41.6487 41.4274 41.6487 40.7634 40.9848 39.6568 39.4355 39.4355 39.6568 40.5421 40.5421 40.7634 (39)
Average = Sum(39)m / 12 = 40.5421

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6036	0.6004	0.6036	0.5908	0.5940	0.5747	0.5715	0.5715	0.5747	0.5876	0.5876	0.5908	(40)
HLP (average)													0.5876
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2216 (42)
Hot water usage for mixer showers 84.5194 83.2492 81.3983 77.8570 75.2436 72.3292 70.6726 72.5095 74.5230 77.6522 81.2696 84.1955 (42a)
Hot water usage for baths 26.5567 26.1623 25.6069 24.5829 23.8161 22.9658 22.5065 23.0580 23.6585 24.5684 25.6135 26.4670 (42b)
Hot water usage for other uses 37.3814 36.0221 34.6628 33.3035 31.9441 30.5848 30.5848 31.9441 33.3035 34.6628 36.0221 37.3814 (42c)
Average daily hot water use (litres/day) 136.5295 (43)
Daily hot water use Jan 148.4576 Feb 145.4337 Mar 141.6681 Apr 135.7434 May 131.0038 Jun 125.8798 Jul 123.7639 Aug 127.5117 Sep 131.4850 Oct 136.8834 Nov 142.9053 Dec 148.0440 (44)
Energy conte 235.1205 207.0956 217.7385 185.8259 176.3563 154.7839 149.6818 157.8861 162.1342 185.7495 203.5948 231.8011 (45)
Energy content (annual) Total = Sum(45)m = 2267.7681
Distribution loss (46)m = 0.15 x (45)m 35.2681 31.0643 32.6608 27.8739 26.4534 23.2176 22.4523 23.6829 24.3201 27.8624 30.5392 34.7702 (46)
Water storage loss: Store volume 201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.8694 (55)
Total storage loss 26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (56)
If cylinder contains dedicated solar storage 26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month

Full SAP Calculation Printout



WWHRS	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	78.1776	68.8593	72.3981	61.7871	58.6385	51.4656	49.7692	52.4971	53.9096	61.7617	67.6953	77.0739 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	133.2962	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0412	20.4649	16.6432	12.6000	9.4186	7.9516	8.5920	11.1682	14.9899	19.0332	22.2145	23.6815	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	290.9731	293.9925	286.3837	270.1855	249.7383	230.5207	217.6822	214.6628	222.2716	238.4697	258.9170	278.1346	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	50.5512	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	-88.8642	(71)
Water heating gains (Table 5)	105.0774	102.4692	97.3092	85.8154	78.8152	71.4801	66.8941	70.5606	74.8745	83.0130	94.0212	103.5939	(72)
Total internal gains	514.0749	511.9099	495.3194	463.5842	432.9554	404.9357	388.1516	391.3750	407.1193	435.4993	470.1360	500.3933	(73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W
Southeast				8.6000	32.4665		0.2400		0.0000		0.7700	51.5984 (77)
Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405 (83)
Total gains	565.6733	602.0688	624.2178	626.5379	611.0409	585.9559	558.4613	546.4784	550.5425	541.9910	533.6489	547.9338 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	135.8677	136.5936	135.8677	138.8185	138.0688	142.6922	143.4930	143.4930	142.6922	139.5763	139.5763	138.8185
alpha	10.0578	10.1062	10.0578	10.2546	10.2046	10.5128	10.5662	10.5662	10.5128	10.3051	10.3051	10.2546
util living area	0.9638	0.9315	0.8676	0.7208	0.5494	0.3655	0.2683	0.2887	0.4609	0.7248	0.9128	0.9701 (86)
MIT	20.8258	20.8912	20.9506	20.9926	20.9995	21.0000	21.0000	21.0000	20.9999	20.9933	20.9283	20.8139 (87)
Th 2	20.4268	20.4296	20.4268	20.4383	20.4354	20.4528	20.4557	20.4557	20.4528	20.4412	20.4412	20.4383 (88)
util rest of house	0.9542	0.9159	0.8431	0.6872	0.5119	0.3284	0.2299	0.2494	0.4216	0.6864	0.8920	0.9621 (89)
MIT 2	20.2385	20.3173	20.3798	20.4323	20.4351	20.4528	20.4557	20.4557	20.4528	20.4362	20.3713	20.2349 (90)
Living area fraction	20.4742	20.5477	20.6090	20.6573	20.6617	20.6725	20.6742	20.6742	20.6724	FLA = Living area / (4) =		0.4014 (91)
MIT	20.4742	20.5477	20.6090	20.6573	20.6617	20.6725	20.6742	20.6742	20.6724	20.6599	20.5949	20.4673 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4742	20.5477	20.6090	20.6573	20.6617	20.6725	20.6742	20.6742	20.6724	20.6599	20.5949	20.4673 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9551	0.9194	0.8512	0.7004	0.5269	0.3433	0.2453	0.2651	0.4374	0.7016	0.8981	0.9625 (94)
Useful gains	540.2639	553.5331	531.3402	438.8245	321.9866	201.1560	137.0069	144.8939	240.7903	380.2816	479.2514	527.3952 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	640.3169	615.1030	558.4658	442.5789	322.2089	201.1578	137.0069	144.8940	240.8131	383.5227	518.7323	634.5774 (97)
Space heating kWh	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435 (98a)
Space heating requirement - total per year (kWh/year)												249.4456
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												249.4456
Space heating per m2										(98c) / (4) =		3.6152 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Fraction of main heating from main system 2	0.0000 (203)
Fraction of total heating from main system 1	1.0000 (204)
Fraction of total heating from main system 2	0.0000 (205)
Efficiency of main space heating system 1 (in %)	100.0000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	74.4394	41.3750	20.1814	2.7032	0.1654	0.0000	0.0000	0.0000	0.0000	2.4114	28.4262	79.7435	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	262.0719	231.4388	244.6899	211.9079	203.3077	180.8659	176.6332	184.8375	188.2162	212.7009	229.6768	258.7525	(64)
Efficiency of water heater (217)m	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	337.9057	(216)
Fuel for water heating, kWh/month	77.5577	68.4921	72.4137	62.7121	60.1670	53.5256	52.2729	54.7009	55.7008	62.9468	67.9707	76.5754	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	14.2333	12.8559	14.2333	13.7742	14.2333	13.7742	14.2333	14.2333	13.7742	14.2333	13.7742	14.2333	(231)
Lighting	20.1678	16.1793	14.5677	10.6729	8.2441	6.7355	7.5205	9.7755	12.6974	16.6596	18.8170	20.7283	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												249.4456	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												337.9057	
Water heating fuel used												765.0357	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400) mechanical ventilation fans (SFP = 0.8400)												167.5855	(230a)
Total electricity for the above, kWh/year												167.5855	(231)
Electricity for lighting (calculated in Appendix L)												162.7656	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1344.8325	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	249.4456	28.4300	70.9174	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	765.0357	28.4300	217.4997	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	167.5855	28.4300	47.6446	(249)
Energy for lighting	162.7656	28.4300	46.2743	(250)
Additional standing charges			0.0000	(251)
Total energy cost			382.3359	(255)

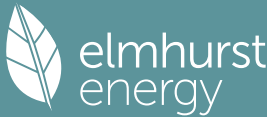
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	249.4456	0.1598	39.8683	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	765.0357	0.1412	108.0433	(264)
Space and water heating			147.9116	(265)
Pumps, fans and electric keep-hot	167.5855	0.1387	23.2462	(267)
Energy for lighting	162.7656	0.1443	23.4921	(268)
Total CO2, kg/year			194.6499	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	249.4456	1.5916	397.0121	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	765.0357	1.5222	1164.5532	(278)
Space and water heating			1561.5653	(279)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	167.5855	1.5128	253.5234 (281)
Energy for lighting	162.7656	1.5338	249.6553 (282)
Total Primary energy kWh/year			2064.7440 (286)

Full SAP Calculation Printout



Property Reference	Plot 7			Issued on Date	27/08/2025
Assessment Reference	Plot 7	Prop Type Ref			
Property	Flat 7, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.85	TER	13.99
Environmental	97 A	% DER < TER			72.48
CO ₂ Emissions (t/year)	0.16	DFEE	23.70	TFEE	32.66
Compliance Check	See BREL	% DFEE < TFEE			27.44
% DPER < TPER	45.41	DPER	40.48	TPER	74.16
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7600	(17)
Infiltration rate	0.1880	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1457 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Cycle Store			8.0000	0.1275	1.0200	20.0000	160.0000 (28b)
Plant Room			28.0000	0.1275	3.5701	20.0000	560.0000 (28b)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003 (29a)
Total net area of external elements Aum(A, m ²)			69.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.4469		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999 (32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000 (32)
Party Floor 1			14.0000			40.0000	560.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	13572.6802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		271.4536 (35)

Full SAP Calculation Printout



List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543
E16 Corner (normal)	2.3700	0.0490	0.1161
E20 Exposed floor (normal)	14.1300	0.1690	2.3880
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000
E21 Exposed floor (inverted)	7.0600	0.0750	0.5295
P8 Party Wall - Exposed floor (inverted)	7.0600	0.2400	1.6944
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0275 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	19.4744 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694 (38)
Average = Sum(39)m / 12 =	32.2135	32.0711	31.9286	31.2164	31.0740	30.3618	30.3618	30.2194	30.6467	31.0740	31.3589	31.6438 (39)
												31.1808
HLP	0.6443	0.6414	0.6386	0.6243	0.6215	0.6072	0.6072	0.6044	0.6129	0.6215	0.6272	0.6329 (40)
HLP (average)												0.6236
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
12Total per year (kWh/year)													2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)

Full SAP Calculation Printout



Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	117.0374	117.5572	118.0817	120.7757	121.3293	124.1754	124.1754	124.7607	123.0211	121.3293	120.2271	119.1447
alpha	8.8025	8.8371	8.8721	9.0517	9.0886	9.2784	9.2784	9.3174	9.2014	9.0886	9.0151	8.9430
util living area	0.9850	0.9726	0.9464	0.8449	0.6691	0.4610	0.3330	0.3635	0.5727	0.8522	0.9616	0.9871 (86)
MIT	20.6465	20.7290	20.8291	20.9518	20.9940	20.9998	21.0000	21.0000	20.9988	20.9561	20.8091	20.6397 (87)
Th 2	20.3903	20.3929	20.3954	20.4082	20.4107	20.4235	20.4235	20.4261	20.4184	20.4107	20.4056	20.4005 (88)
util rest of house	0.9809	0.9654	0.9329	0.8157	0.6290	0.4196	0.2894	0.3182	0.5251	0.8185	0.9506	0.9835 (89)
MIT 2	19.9876	20.0918	20.2150	20.3638	20.4063	20.4234	20.4235	20.4260	20.4177	20.3724	20.2020	19.9880 (90)
Living area fraction									fLA = Living area / (4) =			0.4692 (91)
MIT	20.2968	20.3907	20.5031	20.6397	20.6821	20.6939	20.6940	20.6953	20.6903	20.6463	20.4868	20.2938 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2968	20.3907	20.5031	20.6397	20.6821	20.6939	20.6940	20.6953	20.6903	20.6463	20.4868	20.2938 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9801	0.9654	0.9355	0.8275	0.6476	0.4390	0.3098	0.3394	0.5475	0.8325	0.9523	0.9828 (94)
Useful gains	375.2247	390.1296	380.8112	348.5363	277.0820	184.9704	124.2992	129.7988	201.6082	296.2971	345.8678	366.3600 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	515.3132	496.8049	447.1007	366.4709	279.1084	185.0205	124.3008	129.8024	201.9718	312.1779	419.7960	509.2669 (97)
Space heating kWh	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (98a)
Space heating requirement - total per year (kWh/year)												411.0179
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												411.0179
Space heating per m2										(98c) / (4) =		8.2204 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												411.0179 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1312.5530 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	411.0179	0.1582	65.0249 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			157.5722 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			192.3933 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	411.0179	1.5857	651.7382 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1649.5024 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			2024.2499 (286)
Dwelling Primary energy Rate (DPER)			40.4800 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359		(27)						
Cycle Store			8.0000	0.1300	1.0400		(28b)						
Plant Room			28.0000	0.1300	3.6400		(28b)						
External Wall	33.4900	5.9700	27.5200	0.1800	4.9536		(29a)						
Total net area of external elements Aum(A, m2)			69.4900				(31)						
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.4695		(33)						
Main dwelling													
Corridor			16.6400	0.0000	0.0000		(32)						
Party Wall			16.8300	0.0000	0.0000		(32)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							281.4536 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590							
E3 Sill				3.1800	0.0500	0.1590							
E4 Jamb				7.5200	0.0500	0.3760							
E18 Party wall between dwellings				4.7400	0.0600	0.2844							
E7 Party floor between dwellings (in blocks of flats)				14.1300	0.0700	0.9891							
E16 Corner (normal)				2.3700	0.0900	0.2133							
E20 Exposed floor (normal)				14.1300	0.3200	4.5216							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1200	0.0000	0.0000							
E21 Exposed floor (inverted)				7.0600	0.3200	2.2592							
P8 Party Wall - Exposed floor (inverted)				7.0600	0.2400	1.6944							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.6560 (36)						
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	27.1255 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	50.0260	49.8960	49.7686	49.1700	49.0580	48.5367	48.5367	48.4402	48.7375	49.0580	49.2846	49.5214	(39)
Average = Sum(39)m / 12 =												49.1695	
HLP	Jan 1.0005	Feb 0.9979	Mar 0.9954	Apr 0.9834	May 0.9812	Jun 0.9707	Jul 0.9707	Aug 0.9688	Sep 0.9748	Oct 0.9812	Nov 0.9857	Dec 0.9904	(40)
HLP (average)												0.9834	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													98.5597 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)
Energy content (annual)	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
WWHRS	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)
PV diverter	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h													
	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)
Electric shower(s)												1962	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)

Full SAP Calculation Printout



Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344 (72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
-----				5.9700	11.2829	0.6300	0.7000			0.7700			20.5858 (81)
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114	(83)
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	473.0747	442.3087	415.8430	411.5583	416.3553	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	78.1409	78.3445	78.5451	79.5012	79.6827	80.5386	80.5386	80.6991	80.2068	79.6827	79.3164	78.9371
alpha	6.2094	6.2230	6.2363	6.3001	6.3122	6.3692	6.3692	6.3799	6.3471	6.3122	6.2878	6.2625
util living area	0.9923	0.9868	0.9737	0.9203	0.7871	0.5783	0.4214	0.4690	0.7234	0.9344	0.9834	0.9934 (86)
MIT	20.1781	20.2960	20.4805	20.7469	20.9277	20.9912	20.9990	20.9980	20.9672	20.7560	20.4381	20.1621 (87)
Th 2	20.0829	20.0851	20.0872	20.0972	20.0991	20.1078	20.1078	20.1094	20.1044	20.0991	20.0953	20.0913 (88)
util rest of house	0.9897	0.9824	0.9645	0.8942	0.7314	0.5016	0.3365	0.3793	0.6445	0.9072	0.9769	0.9912 (89)
MIT 2	19.1431	19.2937	19.5260	19.8524	20.0435	20.1034	20.1075	20.1088	20.0849	19.8706	19.4820	19.1294 (90)
Living area fraction									fLA = Living area /	(4) =		0.4692 (91)
MIT	19.6287	19.7640	19.9739	20.2721	20.4584	20.5199	20.5258	20.5260	20.4989	20.2860	19.9306	19.6139 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6287	19.7640	19.9739	20.2721	20.4584	20.5199	20.5258	20.5260	20.4989	20.2860	19.9306	19.6139 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9880	0.9805	0.9631	0.8998	0.7547	0.5375	0.3764	0.4215	0.6806	0.9136	0.9755	0.9897 (94)
Useful gains	422.5694	448.4774	457.0540	458.3031	402.8933	284.6293	190.3073	199.3923	301.0239	379.9256	401.4650	412.0515 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	766.8358	741.6520	670.5747	559.1659	429.6687	287.3344	190.5447	199.8662	311.8661	475.1773	632.3509	763.3189 (97)
Space heating kWh	256.1342	197.0133	158.8594	72.6212	19.9209	0.0000	0.0000	0.0000	0.0000	70.8673	166.2378	261.3429 (98a)
Space heating requirement - total per year (kWh/year)												1202.9970
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	256.1342	197.0133	158.8594	72.6212	19.9209	0.0000	0.0000	0.0000	0.0000	70.8673	166.2378	261.3429 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1202.9970
Space heating per m ²										(98c) / (4) =		24.0599 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	256.1342	197.0133	158.8594	72.6212	19.9209	0.0000	0.0000	0.0000	0.0000	70.8673	166.2378	261.3429 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	277.5018	213.4489	172.1120	78.6796	21.5827	0.0000	0.0000	0.0000	0.0000	76.7793	180.1060	283.1451 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater	84.7025	84.3880	83.7644	82.3994	80.7234	79.8000	79.8000	79.8000	79.8000	82.3294	83.9853	79.8000 (216)
Fuel for water heating, kWh/month	227.1217	201.7544	216.4813	195.0159	193.9787	177.9421	176.5248	182.9609	184.3137	197.8798	204.6296	224.6763 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1303.3554	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2383.2792	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												138.3788	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-823.7918	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3087.2216	(238)

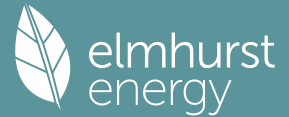
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1303.3554	0.2100	273.7046	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2383.2792	0.2100	500.4886	(264)
Space and water heating			774.1933	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.3788	0.1443	19.9723	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705	
PV Unit electricity exported	-416.6872	0.1255	-52.2993	
Total			-106.7697	(269)
Total CO2, kg/year			699.3251	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.9900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1303.3554	1.1300	1472.7916	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2383.2792	1.1300	2693.1055	(278)
Space and water heating			4165.8971	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.3788	1.5338	212.2501	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000	
PV Unit electricity exported	-416.6872	0.4607	-191.9673	
Total			-800.3673	(283)
Total Primary energy kWh/year			3707.8806	(286)
Target Primary Energy Rate (TPER)			74.1600	(287)

Full SAP Calculation Printout



Property Reference	Plot 7			Issued on Date	27/08/2025
Assessment Reference	Plot 7	Prop Type Ref			
Property	Flat 7, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.85	TER	13.99
Environmental	97 A	% DER < TER			72.48
CO ₂ Emissions (t/year)	0.16	DFEE	23.70	TFEE	32.66
Compliance Check	See BREL	% DFEE < TFEE			27.44
% DPER < TPER	45.41	DPER	40.48	TPER	74.16
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7600 (17)
Infiltration rate	0.3568 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2765 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3525	0.3456	0.3387	0.3042	0.2972	0.2627	0.2627	0.2558	0.2765	0.2972	0.3111	0.3249 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5621	0.5597	0.5574	0.5463	0.5442	0.5345	0.5345	0.5327	0.5382	0.5442	0.5484	0.5528 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Cycle Store			8.0000	0.1275	1.0200	20.0000	160.0000 (28b)
Plant Room			28.0000	0.1275	3.5701	20.0000	560.0000 (28b)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003 (29a)
Total net area of external elements Aum(A, m ²)			69.4900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.4469		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999 (32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000 (32)
Party Floor 1			14.0000			40.0000	560.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14072.6802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							281.4536 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	

Full SAP Calculation Printout



E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543	
E16 Corner (normal)	2.3700	0.0490	0.1161	
E20 Exposed floor (normal)	14.1300	0.1690	2.3880	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000	
E21 Exposed floor (inverted)	7.0600	0.0750	0.5295	
P8 Party Wall - Exposed floor (inverted)	7.0600	0.2400	1.6944	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.0275 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		19.4744 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	21.9826	21.8882	21.7957	21.3613	21.2800	20.9016	20.9016	20.8315	21.0473	21.2800	21.4444	21.6163 (38)
Average = Sum(39)m / 12 =	41.4570	41.3626	41.2701	40.8357	40.7544	40.3760	40.3760	40.3059	40.5217	40.7544	40.9188	41.0907 (39)
												40.8353
HLP (average)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in month	0.8291	0.8273	0.8254	0.8167	0.8151	0.8075	0.8075	0.8061	0.8104	0.8151	0.8184	0.8218 (40)
	31	28	31	30	31	30	31	31	30	31	30	0.8167 (40)
												31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												
WWHRS	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (64)
12Total per year (kWh/year)												707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)
												478.7637 (64a)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700											12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	331.8630	354.4053	360.2546	381.3959	392.1659	390.0297	372.8334	352.0659	335.5333	318.3307	318.9282	322.7690 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	94.2924	94.5076	94.7194	95.7271	95.9180	96.8169	96.8169	96.9852	96.4687	95.9180	95.5325	95.1329
alpha	7.2862	7.3005	7.3146	7.3818	7.3945	7.4545	7.4545	7.4657	7.4312	7.3945	7.3688	7.3422
util living area	0.9975	0.9953	0.9901	0.9619	0.8653	0.6518	0.4755	0.5245	0.7877	0.9670	0.9938	0.9980 (86)
MIT	20.2559	20.3548	20.5019	20.7374	20.9181	20.9914	20.9992	20.9985	20.9684	20.7605	20.4804	20.2407 (87)
Th 2	20.2282	20.2298	20.2314	20.2389	20.2403	20.2468	20.2468	20.2480	20.2443	20.2403	20.2374	20.2345 (88)
util rest of house	0.9967	0.9936	0.9864	0.9476	0.8222	0.5801	0.3947	0.4400	0.7194	0.9517	0.9912	0.9973 (89)
MIT 2	19.5494	19.6490	19.7959	20.0291	20.1874	20.2432	20.2466	20.2476	20.2286	20.0546	19.7805	19.5396 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.8809	19.9801	20.1271	20.3614	20.5303	20.5942	20.5998	20.5999	20.5757	20.3858	20.1089	19.8686 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.8809	19.9801	20.1271	20.3614	20.5303	20.5942	20.5998	20.5999	20.5757	20.3858	20.1089	19.8686 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9962	0.9930	0.9858	0.9502	0.8398	0.6137	0.4327	0.4798	0.7507	0.9551	0.9907	0.9969 (94)
Useful gains	330.5978	351.9140	355.1474	362.4007	329.3282	239.3569	161.3149	168.9101	251.8776	304.0448	315.9541	321.7544 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	645.9375	623.7531	562.3927	468.0350	359.8716	242.0233	161.4941	169.2822	262.4060	398.8151	532.3086	643.8325 (97)
Space heating kWh	234.6127	182.6759	154.1905	76.0567	22.7243	0.0000	0.0000	0.0000	0.0000	70.5090	155.7752	239.6261 (98a)
Space heating requirement - total per year (kWh/year)	1136.1704											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	234.6127	182.6759	154.1905	76.0567	22.7243	0.0000	0.0000	0.0000	0.0000	70.5090	155.7752	239.6261 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1136.1704											
Space heating per m2	(98c) / (4) = 22.7234 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	379.5343	298.7823	306.3250	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9193	0.9683	0.9518	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	348.9067	289.3210	291.5663	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	417.5437	399.4079	376.8553	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	49.4186	81.9047	63.4550	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) = 1.0000 (105)											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	12.3547	20.4762	15.8638	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	48.6946 (107)											
Energy for space heating	22.7234 (99)											
Energy for space cooling	0.9739 (108)											
Total	23.6973 (109)											
Fabric Energy Efficiency (DFEE)	23.7 (109)											

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1688 (8)
Pressure test	Yes

Full SAP Calculation Printout



Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
5.0000 (17)
0.4188 (18)
3 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = $1 - [0.075 \times (19)] = 0.7750$ (20)
(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
Cycle Store			8.0000	0.1300	1.0400			(28b)
Plant Room			28.0000	0.1300	3.6400			(28b)
External Wall	33.4900	5.9700	27.5200	0.1800	4.9536			(29a)
Total net area of external elements Aum(A, m2)			69.4900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	16.4695			(33)
Main dwelling								
Corridor			16.6400	0.0000	0.0000			(32)
Party Wall			16.8300	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 281.4536 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	3.1800	0.0500	0.1590	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	7.5200	0.0500	0.3760	
E4 Jamb	4.7400	0.0600	0.2844	
E18 Party wall between dwellings	14.1300	0.0700	0.9891	
E7 Party floor between dwellings (in blocks of flats)	2.3700	0.0900	0.2133	
E16 Corner (normal)	14.1300	0.3200	4.5216	
E20 Exposed floor (normal)	14.1200	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0600	0.3200	2.2592	
E21 Exposed floor (inverted)	7.0600	0.2400	1.6944	
P8 Party Wall - Exposed floor (inverted)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.6560	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			27.1255	(33) + (36) + (36a) = (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Average = Sum(39)m / 12 =	50.0260	49.8960	49.7686	49.1700	49.0580	48.5367	48.5367	48.4402	48.7375	49.0580	49.2846	49.5214	(39)
												49.1695	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0005	0.9979	0.9954	0.9834	0.9812	0.9707	0.9707	0.9688	0.9748	0.9812	0.9857	0.9904	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.9834	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)												50.1040	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(64)
12Total per year (kWh/year)												707.3017	(64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893	(64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844	(65)
												478.7637	(64a)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.9700		11.2829		0.6300		0.7000		0.7700		20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	337.5612	368.2691	387.6595	427.8883	455.6099	457.7476	436.1007	402.0087	369.3784	336.1345	326.6467	326.9751 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	78.1409	78.3445	78.5451	79.5012	79.6827	80.5386	80.5386	80.6991	80.2068	79.6827	79.3164	78.9371
alpha	6.2094	6.2230	6.2363	6.3001	6.3122	6.3692	6.3692	6.3799	6.3471	6.3122	6.2878	6.2625
util living area	0.9979	0.9958	0.9903	0.9613	0.8638	0.6590	0.4870	0.5485	0.8202	0.9743	0.9950	0.9982 (86)
MIT	20.0030	20.1266	20.3241	20.6318	20.8743	20.9820	20.9977	20.9953	20.9331	20.6335	20.2783	19.9874 (87)
Th 2	20.0829	20.0851	20.0872	20.0972	20.0991	20.1078	20.1078	20.1094	20.1044	20.0991	20.0953	20.0913 (88)
util rest of house	0.9971	0.9942	0.9865	0.9459	0.8163	0.5760	0.3898	0.4455	0.7464	0.9610	0.9928	0.9976 (89)
MIT 2	19.1772	19.3018	19.4992	19.8047	20.0185	20.1004	20.1073	20.1082	20.0704	19.8122	19.4615	19.1684 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5647	19.6888	19.8862	20.1928	20.4201	20.5140	20.5250	20.5245	20.4752	20.1975	19.8447	19.5527 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5647	19.6888	19.8862	20.1928	20.4201	20.5140	20.5250	20.5245	20.4752	20.1975	19.8447	19.5527 (93)

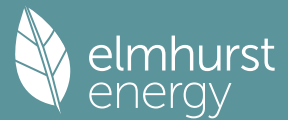
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9965	0.9933	0.9854	0.9478	0.8346	0.6147	0.4356	0.4941	0.7792	0.9627	0.9921	0.9971 (94)
Useful gains	336.3734	365.8115	382.0114	405.5463	380.2489	281.3870	189.9584	198.6215	287.8251	323.6089	324.0555	326.0282 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	763.6303	737.9025	666.2144	555.2666	427.7887	287.0475	190.5088	199.7892	310.7106	470.8366	628.1193	760.2870 (97)
Space heating kWh	317.8791	250.0452	211.4471	107.7986	35.3696	0.0000	0.0000	0.0000	0.0000	109.5374	218.9260	323.0886 (98a)
Space heating requirement - total per year (kWh/year)	1574.0915											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	317.8791	250.0452	211.4471	107.7986	35.3696	0.0000	0.0000	0.0000	0.0000	109.5374	218.9260	323.0886 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1574.0915											
Space heating per m ²	(98c) / (4) = 31.4818 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	456.2451	359.1717	368.1453	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9001	0.9533	0.9270	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	410.6579	342.3994	341.2724	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	499.4277	475.9778	437.7817	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	63.9142	99.3823	71.8030	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	15.9786	24.8456	17.9507	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	58.7749 (107)											
Energy for space heating	31.4818 (99)											
Energy for space cooling	1.1755 (108)											
Total	32.6573 (109)											
Fabric Energy Efficiency (TFEE)	32.7 (109)											

Full SAP Calculation Printout



Property Reference	Plot 7				Issued on Date	27/08/2025	
Assessment Reference	Plot 7			Prop Type Ref			
Property	Flat 7, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD						
SAP Rating	88 B	DER	3.85	TER	13.99		
Environmental	97 A	% DER < TER				72.48	
CO ₂ Emissions (t/year)	0.16	DFEE	23.70	TFEE	32.66		
Compliance Check	See BREL	% DFEE < TFEE				27.44	
% DPER < TPER	45.41	DPER	40.48	TPER	74.16		
Assessor Details	Daniel Smith				Assessor ID	CJ06-0001	
Client							

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7600 (17)
Infiltration rate	0.1880 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1457 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Cycle Store			8.0000	0.1275	1.0200	20.0000	160.0000 (28b)
Plant Room			28.0000	0.1275	3.5701	20.0000	560.0000 (28b)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003 (29a)
Total net area of external elements Aum(A, m ²)			69.4900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 14.4469		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999 (32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000 (32)
Party Floor 1			14.0000			40.0000	560.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13572.6802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							271.4536 (35)

Full SAP Calculation Printout



List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543
E16 Corner (normal)	2.3700	0.0490	0.1161
E20 Exposed floor (normal)	14.1300	0.1690	2.3880
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000
E21 Exposed floor (inverted)	7.0600	0.0750	0.5295
P8 Party Wall - Exposed floor (inverted)	7.0600	0.2400	1.6944
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0275 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	19.4744 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694 (38)
Average = Sum(39)m / 12 =	32.2135	32.0711	31.9286	31.2164	31.0740	30.3618	30.3618	30.2194	30.6467	31.0740	31.3589	31.6438 (39)
												31.1808
HLP	0.6443	0.6414	0.6386	0.6243	0.6215	0.6072	0.6072	0.6044	0.6129	0.6215	0.6272	0.6329 (40)
HLP (average)												0.6236
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)

Full SAP Calculation Printout



Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	117.0374	117.5572	118.0817	120.7757	121.3293	124.1754	124.1754	124.7607	123.0211	121.3293	120.2271	119.1447
alpha	8.8025	8.8371	8.8721	9.0517	9.0886	9.2784	9.2784	9.3174	9.2014	9.0886	9.0151	8.9430
util living area	0.9850	0.9726	0.9464	0.8449	0.6691	0.4610	0.3330	0.3635	0.5727	0.8522	0.9616	0.9871 (86)
MIT	20.6465	20.7290	20.8291	20.9518	20.9940	20.9998	21.0000	21.0000	20.9988	20.9561	20.8091	20.6397 (87)
Th 2	20.3903	20.3929	20.3954	20.4082	20.4107	20.4235	20.4235	20.4261	20.4184	20.4107	20.4056	20.4005 (88)
util rest of house	0.9809	0.9654	0.9329	0.8157	0.6290	0.4196	0.2894	0.3182	0.5251	0.8185	0.9506	0.9835 (89)
MIT 2	19.9876	20.0918	20.2150	20.3638	20.4063	20.4234	20.4235	20.4260	20.4177	20.3724	20.2020	19.9880 (90)
Living area fraction									fLA = Living area / (4) =			0.4692 (91)
MIT	20.2968	20.3907	20.5031	20.6397	20.6821	20.6939	20.6940	20.6953	20.6903	20.6463	20.4868	20.2938 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2968	20.3907	20.5031	20.6397	20.6821	20.6939	20.6940	20.6953	20.6903	20.6463	20.4868	20.2938 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9801	0.9654	0.9355	0.8275	0.6476	0.4390	0.3098	0.3394	0.5475	0.8325	0.9523	0.9828 (94)
Useful gains	375.2247	390.1296	380.8112	348.5363	277.0820	184.9704	124.2992	129.7988	201.6082	296.2971	345.8678	366.3600 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	515.3132	496.8049	447.1007	366.4709	279.1084	185.0205	124.3008	129.8024	201.9718	312.1779	419.7960	509.2669 (97)
Space heating kWh	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (98a)
Space heating requirement - total per year (kWh/year)												411.0179
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												411.0179
Space heating per m2										(98c) / (4) =		8.2204 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	104.2259	71.6858	49.3194	12.9129	1.5076	0.0000	0.0000	0.0000	0.0000	11.8153	53.2283	106.3228 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												411.0179 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1312.5530 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	411.0179	0.1582	65.0249 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			157.5722 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			192.3933 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	411.0179	1.5857	651.7382 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1649.5024 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			2024.2499 (286)
Dwelling Primary energy Rate (DPER)			40.4800 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			5.9700	1.1450	6.8359		(27)
Cycle Store			8.0000	0.1300	1.0400		(28b)
Plant Room			28.0000	0.1300	3.6400		(28b)
External Wall	33.4900	5.9700	27.5200	0.1800	4.9536		(29a)
Total net area of external elements Aum(A, m2)			69.4900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.4695		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000		(32)
Party Wall			16.8300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

281.4536 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	3.1800	0.0500	0.1590
E4 Jamb	7.5200	0.0500	0.3760
E18 Party wall between dwellings	4.7400	0.0600	0.2844
E7 Party floor between dwellings (in blocks of flats)	14.1300	0.0700	0.9891
E16 Corner (normal)	2.3700	0.0900	0.2133
E20 Exposed floor (normal)	14.1300	0.3200	4.5216
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000
E21 Exposed floor (inverted)	7.0600	0.3200	2.2592
P8 Party Wall - Exposed floor (inverted)	7.0600	0.2400	1.6944
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.6560 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	27.1255 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960 (38)
Heat transfer coeff	50.0260	49.8960	49.7686	49.1700	49.0580	48.5367	48.5367	48.4402	48.7375	49.0580	49.2846	49.5214 (39)
Average = Sum(39)m / 12 =												49.1695

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0005	0.9979	0.9954	0.9834	0.9812	0.9707	0.9707	0.9688	0.9748	0.9812	0.9857	0.9904 (40)
HLP (average)												0.9834
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												98.5597 (43)
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415 (44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445 (45)
Energy content (annual)										Total = Sum(45)m =		1637.0557
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394 (62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)

Full SAP Calculation Printout



Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344 (72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W		
-----				5.9700	11.2829	0.6300		0.7000		0.7700	20.5858 (81)		

Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)	
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	473.0747	442.3087	415.8430	411.5583	416.3553 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	78.1409	78.3445	78.5451	79.5012	79.6827	80.5386	80.5386	80.6991	80.2068	79.6827	79.3164	78.9371
alpha	6.2094	6.2230	6.2363	6.3001	6.3122	6.3692	6.3692	6.3799	6.3471	6.3122	6.2878	6.2625
util living area	0.9923	0.9868	0.9737	0.9203	0.7871	0.5783	0.4214	0.4690	0.7234	0.9344	0.9834	0.9934 (86)
MIT	20.1781	20.2960	20.4805	20.7469	20.9277	20.9912	20.9990	20.9980	20.9672	20.7560	20.4381	20.1621 (87)
Th 2	20.0829	20.0851	20.0872	20.0972	20.0991	20.1078	20.1078	20.1094	20.1044	20.0991	20.0953	20.0913 (88)
util rest of house	0.9897	0.9824	0.9645	0.8942	0.7314	0.5016	0.3365	0.3793	0.6445	0.9072	0.9769	0.9912 (89)
MIT 2	19.1431	19.2937	19.5260	19.8524	20.0435	20.1034	20.1075	20.1088	20.0849	19.8706	19.4820	19.1294 (90)
Living area fraction									fLA = Living area /	(4) =		0.4692 (91)
MIT	19.6287	19.7640	19.9739	20.2721	20.4584	20.5199	20.5258	20.5260	20.4989	20.2860	19.9306	19.6139 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6287	19.7640	19.9739	20.2721	20.4584	20.5199	20.5258	20.5260	20.4989	20.2860	19.9306	19.6139 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9880	0.9805	0.9631	0.8998	0.7547	0.5375	0.3764	0.4215	0.6806	0.9136	0.9755	0.9897 (94)
Useful gains	422.5694	448.4774	457.0540	458.3031	402.8933	284.6293	190.3073	199.3922	301.0239	379.9256	401.4650	412.0515 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	766.8358	741.6520	670.5747	559.1659	429.6687	287.3344	190.5447	199.8662	311.8661	475.1773	632.3509	763.3189 (97)
Space heating kWh	256.1342	197.0133	158.8594	72.6212	19.9209	0.0000	0.0000	0.0000	0.0000	70.8673	166.2378	261.3429 (98a)
Space heating requirement - total per year (kWh/year)												1202.9970
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	256.1342	197.0133	158.8594	72.6212	19.9209	0.0000	0.0000	0.0000	0.0000	70.8673	166.2378	261.3429 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1202.9970
Space heating per m ²										(98c) / (4) =		24.0599 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	256.1342	197.0133	158.8594	72.6212	19.9209	0.0000	0.0000	0.0000	0.0000	70.8673	166.2378	261.3429 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	277.5018	213.4489	172.1120	78.6796	21.5827	0.0000	0.0000	0.0000	0.0000	76.7793	180.1060	283.1451 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater												79.8000 (216)
(217)m	84.7025	84.3880	83.7644	82.3994	80.7234	79.8000	79.8000	79.8000	79.8000	82.3294	83.9853	84.7698 (217)
Fuel for water heating, kWh/month	227.1217	201.7544	216.4813	195.0159	193.9787	177.9421	176.5248	182.9609	184.3137	197.8798	204.6296	224.6763 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1303.3554	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2383.2792	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												138.3788	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-823.7918	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3087.2216	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1303.3554	0.2100	273.7046	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2383.2792	0.2100	500.4886	(264)
Space and water heating			774.1933	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.3788	0.1443	19.9723	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705	
PV Unit electricity exported	-416.6872	0.1255	-52.2993	
Total			-106.7697	(269)
Total CO2, kg/year			699.3251	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.9900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1303.3554	1.1300	1472.7916	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2383.2792	1.1300	2693.1055	(278)
Space and water heating			4165.8971	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.3788	1.5338	212.2501	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000	
PV Unit electricity exported	-416.6872	0.4607	-191.9673	
Total			-800.3673	(283)
Total Primary energy kWh/year			3707.8806	(286)
Target Primary Energy Rate (TPER)			74.1600	(287)

Full SAP Calculation Printout



Property Reference	Plot 7			Issued on Date	27/08/2025
Assessment Reference	Plot 7	Prop Type Ref			
Property	Flat 7, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.85	TER	13.99
Environmental	97 A	% DER < TER			72.48
CO ₂ Emissions (t/year)	0.16	DFEE	23.70	TFEE	32.66
Compliance Check	See BREL	% DFEE < TFEE			27.44
% DPER < TPER	45.41	DPER	40.48	TPER	74.16
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7600	(17)
Infiltration rate	0.1880	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1457 (21)

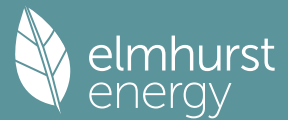
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Cycle Store			8.0000	0.1275	1.0200	20.0000	160.0000 (28b)
Plant Room			28.0000	0.1275	3.5701	20.0000	560.0000 (28b)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003 (29a)
Total net area of external elements Aum(A, m ²)			69.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.4469		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999 (32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000 (32)
Party Floor 1			14.0000			40.0000	560.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	14072.6802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		281.4536 (35)

Full SAP Calculation Printout



List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543
E16 Corner (normal)	2.3700	0.0490	0.1161
E20 Exposed floor (normal)	14.1300	0.1690	2.3880
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000
E21 Exposed floor (inverted)	7.0600	0.0750	0.5295
P8 Party Wall - Exposed floor (inverted)	7.0600	0.2400	1.6944
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0275 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	19.4744 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694 (38)
Average = Sum(39)m / 12 =	32.2135	32.0711	31.9286	31.2164	31.0740	30.3618	30.3618	30.2194	30.6467	31.0740	31.3589	31.6438 (39)
												31.1808
HLP	0.6443	0.6414	0.6386	0.6243	0.6215	0.6072	0.6072	0.6044	0.6129	0.6215	0.6272	0.6329 (40)
HLP (average)												0.6236
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
													Total per year (kWh/year) = Sum(64)m = 2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northwest					5.9700	11.2829	0.2400	0.0000		0.7700		12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)

Full SAP Calculation Printout



Total gains 420.3031 431.2727 438.5037 442.6707 444.6142 429.3686 409.3093 391.7531 379.6128 377.2367 389.2227 407.5463 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	121.3489	121.8879	122.4317	125.2249	125.7990	128.7498	128.7498	129.3567	127.5530	125.7990	124.6561	123.5339
alpha	9.0899	9.1259	9.1621	9.3483	9.3866	9.5833	9.5833	9.6238	9.5035	9.3866	9.3104	9.2356
util living area	0.9747	0.9620	0.9242	0.8180	0.6459	0.4524	0.3264	0.3548	0.5561	0.8207	0.9458	0.9785 (86)
MIT	20.7269	20.7839	20.8771	20.9667	20.9962	20.9999	21.0000	21.0000	20.9992	20.9710	20.8554	20.7167 (87)
Th 2	20.3903	20.3929	20.3954	20.4082	20.4107	20.4235	20.4235	20.4261	20.4184	20.4107	20.4056	20.4005 (88)
util rest of house	0.9680	0.9524	0.9068	0.7870	0.6065	0.4117	0.2836	0.3106	0.5097	0.7846	0.9313	0.9728 (89)
MIT 2	20.0859	20.1575	20.2696	20.3784	20.4079	20.4234	20.4235	20.4260	20.4179	20.3863	20.2556	20.0825 (90)
Living area fraction	fLA = Living area / (4) = 0.4692 (91)											
MIT	20.3867	20.4514	20.5546	20.6544	20.6839	20.6939	20.6940	20.6953	20.6907	20.6607	20.5370	20.3801 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.3867	20.4514	20.5546	20.6544	20.6839	20.6939	20.6940	20.6953	20.6907	20.6607	20.5370	20.3801 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9680	0.9534	0.9117	0.8003	0.6249	0.4308	0.3037	0.3313	0.5315	0.8004	0.9348	0.9725 (94)
Useful gains	406.8393	411.1766	399.7714	354.2484	277.8401	184.9890	124.2999	129.8005	201.7471	301.9241	363.8394	396.3557 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	518.2087	498.7513	448.7447	366.9311	279.1669	185.0220	124.3008	129.8026	201.9825	312.6250	421.3693	511.9991 (97)
Space heating kWh	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (98a)
Space heating requirement - total per year (kWh/year)	323.6856											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	323.6856											
Space heating per m2	(98c) / (4) = 6.4737 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

0.0000 (201)

Fraction of space heat from main system(s)

1.0000 (202)

Fraction of main heating from main system 2

0.0000 (203)

Fraction of total heating from main system 1

1.0000 (204)

Fraction of total heating from main system 2

0.0000 (205)

Efficiency of main space heating system 1 (in %)

100.0000 (206)

Efficiency of main space heating system 2 (in %)

0.0000 (207)

Efficiency of secondary/supplementary heating system, %

0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	323.6856 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	344.1753											
Water heating fuel used	655.5490 (219)											
Space cooling fuel	0.0000 (221)											

Full SAP Calculation Printout



Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)

Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1225.2207 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	323.6856	16.4900	53.3758 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			202.0389 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7656 (257)
SAP value		87.5893
SAP rating (Section 12)		88 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	323.6856	0.1585	51.2946 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			143.8418 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			178.6629 (272)
CO2 emissions per m2			3.5700 (273)
EI value			97.4799
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	$= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =$
Pressure test	0.0000 / (5) = 0.0000 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	3.7600 (17)
	0.1880 (18)

Full SAP Calculation Printout



Number of sides sheltered

3 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.7750 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.1457 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1566	0.1530	0.1566	0.1421	0.1457	0.1238	0.1202	0.1202	0.1238	0.1384	0.1384	0.1421	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.2966	0.2930	0.2966	0.2821	0.2857	0.2638	0.2602	0.2602	0.2638	0.2784	0.2784	0.2821	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
Cycle Store			8.0000	0.1275	1.0200	20.0000	160.0000	(28b)
Plant Room			28.0000	0.1275	3.5701	20.0000	560.0000	(28b)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003	(29a)
Total net area of external elements Aum(A, m2)			69.4900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	14.4469			(33)
Main dwelling								
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999	(32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000	(32)
Party Floor 1			14.0000			40.0000	560.0000	(32d)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k)

$$(28) \dots (30) + (32) + (32a) \dots (32e) = 14072.6802 \quad (34)$$

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

$$281.4536 \quad (35)$$

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543	
E16 Corner (normal)	2.3700	0.0490	0.1161	
E20 Exposed floor (normal)	14.1300	0.1690	2.3880	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000	
E21 Exposed floor (inverted)	7.0600	0.0750	0.5295	
P8 Party Wall - Exposed floor (inverted)	7.0600	0.2400	1.6944	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

$$5.0275 \quad (36)$$

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 19.4744 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	11.5996	11.4572	11.5996	11.0299	11.1723	10.3177	10.1752	10.1752	10.3177	10.8874	10.8874	11.0299	(38)
Heat transfer coeff	31.0740	30.9316	31.0740	30.5042	30.6467	29.7920	29.6496	29.6496	29.7920	30.3618	30.3618	30.5042	(39)
Average = Sum(39)m / 12 =												30.3618	
HLP	0.6215	0.6186	0.6215	0.6101	0.6129	0.5958	0.5930	0.5930	0.5958	0.6072	0.6072	0.6101	(40)
HLP (average)												0.6072	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889		(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476		(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383		(42c)
Average daily hot water use (litres/day)												116.7306	(43)
Daily hot water use													
126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748		(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278		(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370		(64)
Electric shower(s)												2256.2377	(64)
Total per year (kWh/year) = Sum(64)m =													

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700				9.9768		0.2400		0.0000		0.7700	11.0070 (81)
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	125.7990	126.3783	125.7990	128.1486	127.5530	131.2121	131.8425	131.8425	131.2121	128.7498	128.7498	128.1486
alpha	9.3866	9.4252	9.3866	9.5432	9.5035	9.7475	9.7895	9.7895	9.7475	9.5833	9.5833	9.5432
util living area	0.9606	0.9422	0.8959	0.7595	0.5714	0.3779	0.2792	0.3067	0.5039	0.7717	0.9197	0.9669 (86)
MIT	20.8040	20.8522	20.9186	20.9843	20.9988	21.0000	21.0000	21.0000	20.9997	20.9847	20.9055	20.7911 (87)
Th 2	20.4107	20.4133	20.4107	20.4209	20.4184	20.4337	20.4363	20.4363	20.4337	20.4235	20.4235	20.4209 (88)
util rest of house	0.9507	0.9286	0.8741	0.7251	0.5314	0.3383	0.2378	0.2635	0.4594	0.7325	0.9001	0.9584 (89)
MIT 2	20.1980	20.2574	20.3305	20.4078	20.4176	20.4337	20.4363	20.4363	20.4336	20.4114	20.3294	20.1919 (90)
Living area fraction									fLA = Living area / (4) =			0.4692 (91)
MIT	20.4823	20.5365	20.6064	20.6783	20.6903	20.6994	20.7008	20.7008	20.6992	20.6804	20.5997	20.4731 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4823	20.5365	20.6064	20.6783	20.6903	20.6994	20.7008	20.7008	20.6992	20.6804	20.5997	20.4731 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9520	0.9317	0.8817	0.7406	0.5501	0.3569	0.2572	0.2838	0.4803	0.7503	0.9065	0.9592 (94)
Useful gains	398.7602	399.6083	384.5498	326.0335	241.4357	151.9179	103.7970	109.7267	181.6344	282.3290	351.5255	390.4586 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	477.9911	458.9153	416.5911	331.8348	241.8127	151.9222	103.7972	109.7271	181.7089	287.8406	388.6222	475.0446 (97)
Space heating kWh	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319 (98a)
Space heating requirement - total per year (kWh/year)												220.8403
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												220.8403
Space heating per m2										(98c) / (4) =		4.4168 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)

Full SAP Calculation Printout



Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater												344.1753	(216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												220.8403	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1122.3754	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	220.8403	28.4300	62.7849 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	124.5474	28.4300	35.4088 (250)
Additional standing charges			0.0000 (251)
Total energy cost			319.0913 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	220.8403	0.1590	35.1156 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			127.6628 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			162.4839 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	220.8403	1.5886	350.8327 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1348.5969 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1723.3444 (286)

SAP 10 EPC IMPROVEMENTS

Full SAP Calculation Printout



Plot 7

Current energy efficiency rating: B 88
Current environmental impact rating: A 97

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures
(none)

Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current £319	Potential £319	Saving £0
Electricity			
Space heating	£97	£97	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£319	£319	£0
Total cost of uses	£318	£318	£0
Delivered energy	22 kWh/m²	22 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	34 kWh/m²	34 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

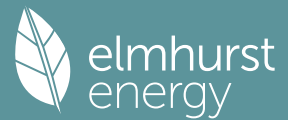
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7600	(17)
Infiltration rate	0.1880	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1457 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
Window			5.9700	0.7752	4.6279			(27)					
Cycle Store			8.0000	0.1275	1.0200	20.0000	160.0000	(28b)					
Plant Room			28.0000	0.1275	3.5701	20.0000	560.0000	(28b)					
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003	(29a)					
Total net area of external elements Aum(A, m2)			69.4900					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.4469			(33)					
Main dwelling													
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999	(32)					
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000	(32)					
Party Floor 1			14.0000			40.0000	560.0000	(32d)					
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)					
Internal Wall 1			71.1200			9.0000	640.0800	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14072.6802	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							281.4536	(35)					
List of Thermal Bridges													
K1 Element					Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081						
E3 Sill					3.1800	0.0260	0.0827						
E4 Jamb					7.5200	0.0300	0.2256						
E18 Party wall between dwellings					4.7400	0.0290	0.1375						
E7 Party floor between dwellings (in blocks of flats)					14.1300	-0.0180	-0.2543						
E16 Corner (normal)					2.3700	0.0490	0.1161						
E20 Exposed floor (normal)					14.1300	0.1690	2.3880						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					14.1200	0.0000	0.0000						
E21 Exposed floor (inverted)					7.0600	0.0750	0.5295						
P8 Party Wall - Exposed floor (inverted)					7.0600	0.2400	1.6944						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								5.0275 (36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =		19.4744 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694	(38)
Average = Sum(39)m / 12 =	32.2135	32.0711	31.9286	31.2164	31.0740	30.3618	30.3618	30.2194	30.6467	31.0740	31.3589	31.6438	(39)
												31.1808	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6443	0.6414	0.6386	0.6243	0.6215	0.6072	0.6072	0.6044	0.6129	0.6215	0.6272	0.6329	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

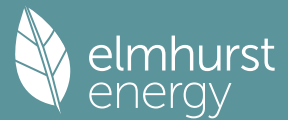
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	71.9889	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	225.1370	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month													
66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Pumps, fans	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.9700		11.2829		0.2400		0.0000		0.7700		12.4480 (81)	
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	420.3031	431.2727	438.5037	442.6707	444.6142	429.3686	409.3093	391.7531	379.6128	377.2367	389.2227	407.5463 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	121.3489	121.8879	122.4317	125.2249	125.7990	128.7498	128.7498	129.3567	127.5530	125.7990	124.6561	123.5339
alpha	9.0899	9.1259	9.1621	9.3483	9.3866	9.5833	9.5833	9.6238	9.5035	9.3866	9.3104	9.2356
util living area	0.9747	0.9620	0.9242	0.8180	0.6459	0.4524	0.3264	0.3548	0.5561	0.8207	0.9458	0.9785 (86)
MIT	20.7269	20.7839	20.8771	20.9667	20.9962	20.9999	21.0000	21.0000	20.9992	20.9710	20.8554	20.7167 (87)
Th 2	20.3903	20.3929	20.3954	20.4082	20.4107	20.4235	20.4235	20.4261	20.4184	20.4107	20.4056	20.4005 (88)
util rest of house	0.9680	0.9524	0.9068	0.7870	0.6065	0.4117	0.2836	0.3106	0.5097	0.7846	0.9313	0.9728 (89)
MIT 2	20.0859	20.1575	20.2696	20.3784	20.4079	20.4234	20.4235	20.4260	20.4179	20.3863	20.2556	20.0825 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.3867	20.4514	20.5546	20.6544	20.6839	20.6939	20.6940	20.6953	20.6907	20.6607	20.5370	20.3801 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.3867	20.4514	20.5546	20.6544	20.6839	20.6939	20.6940	20.6953	20.6907	20.6607	20.5370	20.3801 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9680	0.9534	0.9117	0.8003	0.6249	0.4308	0.3037	0.3313	0.5315	0.8004	0.9348	0.9725 (94)
Useful gains	406.8393	411.1766	399.7714	354.2484	277.8401	184.9890	124.2999	129.8005	201.7471	301.9241	363.8394	396.3557 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	518.2087	498.7513	448.7447	366.9311	279.1669	185.0220	124.3008	129.8026	201.9825	312.6250	421.3693	511.9991 (97)
Space heating kWh	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (98a)
Space heating requirement - total per year (kWh/year)												323.6856
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												323.6856
Space heating per m ²												(98c) / (4) = 6.4737 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	82.8588	58.8502	36.4362	9.1315	0.9871	0.0000	0.0000	0.0000	0.0000	7.9615	41.4215	86.0387 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)	
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)	
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													

Full SAP Calculation Printout



(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												323.6856	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1225.2207	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	323.6856	16.4900	53.3758 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			202.0389 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 0.7656 (257)
SAP value	87.5893
SAP rating (Section 12)	88 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	323.6856	0.1585	51.2946 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			143.8418 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			178.6629 (272)
CO2 emissions per m2			3.5700 (273)
EI value			97.4799
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

Full SAP Calculation Printout



2. Ventilation rate

												m3 per hour
Number of open chimneys												0 * 80 = 0.0000 (6a)
Number of open flues												0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire												0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler												0 * 20 = 0.0000 (6d)
Number of flues attached to other heater												0 * 35 = 0.0000 (6e)
Number of blocked chimneys												0 * 20 = 0.0000 (6f)
Number of intermittent extract fans												0 * 10 = 0.0000 (7a)
Number of passive vents												0 * 10 = 0.0000 (7b)
Number of flueless gas fires												0 * 40 = 0.0000 (7c)
												Air changes per hour
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) = 0.0000 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												3.7600 (17)
Infiltration rate												0.1880 (18)
Number of sides sheltered												3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.1457 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
	0.1566	0.1530	0.1566	0.1421	0.1457	0.1238	0.1202	0.1202	0.1238	0.1384	0.1384	0.1421 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2966	0.2930	0.2966	0.2821	0.2857	0.2638	0.2602	0.2602	0.2638	0.2784	0.2784	0.2821 (25)

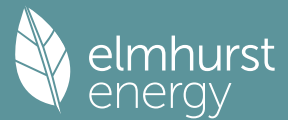
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Window			5.9700	0.7752	4.6279			(27)				
Cycle Store			8.0000	0.1275	1.0200	20.0000	160.0000	(28b)				
Plant Room			28.0000	0.1275	3.5701	20.0000	560.0000	(28b)				
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003	(29a)				
Total net area of external elements Aum(A, m2)			69.4900					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.4469			(33)				
Main dwelling												
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999	(32)				
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000	(32)				
Party Floor 1			14.0000			40.0000	560.0000	(32d)				
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)				
Internal Wall 1			71.1200			9.0000	640.0800	(32c)				
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 14072.6802 (34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								281.4536 (35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081						
E3 Sill				3.1800	0.0260	0.0827						
E4 Jamb				7.5200	0.0300	0.2256						
E18 Party wall between dwellings				4.7400	0.0290	0.1375						
E7 Party floor between dwellings (in blocks of flats)				14.1300	-0.0180	-0.2543						
E16 Corner (normal)				2.3700	0.0490	0.1161						
E20 Exposed floor (normal)				14.1300	0.1690	2.3880						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1200	0.0000	0.0000						
E21 Exposed floor (inverted)				7.0600	0.0750	0.5295						
P8 Party Wall - Exposed floor (inverted)				7.0600	0.2400	1.6944						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.0275	(36)				
Point Thermal bridges							(36a) =	0.0000				
Total fabric heat loss							(33) + (36) + (36a) =	19.4744 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	11.5996	11.4572	11.5996	11.0299	11.1723	10.3177	10.1752	10.1752	10.3177	10.8874	10.8874	11.0299 (38)
Average = Sum(39)m / 12 =	31.0740	30.9316	31.0740	30.5042	30.6467	29.7920	29.6496	29.6496	29.7920	30.3618	30.3618	30.5042 (39)
												30.3618
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6215	0.6186	0.6215	0.6101	0.6129	0.5958	0.5930	0.5930	0.5958	0.6072	0.6072	0.6101 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)	
Hot water usage for mixer showers													
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)		
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)		
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)		
Average daily hot water use (litres/day)												116.7306 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)	
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)	
											Total = Sum(45)m =	1938.9067	
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)	

Full SAP Calculation Printout



Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370		(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000		(64a)
Heat gains from water heating, kWh/month													
66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967		(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210		(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561		(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708		(72)
Total internal gains													
407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807		(73)

6. Solar gains

[Jan]													
	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
Northwest	5.9700	9.9768	0.2400	0.0000	0.7700	11.0070							(81)
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765	(83)
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	125.7990	126.3783	125.7990	128.1486	127.5530	131.2121	131.8425	131.8425	131.2121	128.7498	128.7498	128.1486
alpha	9.3866	9.4252	9.3866	9.5432	9.5035	9.7475	9.7895	9.7895	9.7475	9.5833	9.5833	9.5432
util living area	0.9606	0.9422	0.8959	0.7595	0.5714	0.3779	0.2792	0.3067	0.5039	0.7717	0.9197	0.9669 (86)
MIT	20.8040	20.8522	20.9186	20.9843	20.9988	21.0000	21.0000	21.0000	20.9997	20.9847	20.9055	20.7911 (87)
Th 2	20.4107	20.4133	20.4107	20.4209	20.4184	20.4337	20.4363	20.4363	20.4337	20.4235	20.4235	20.4209 (88)
util rest of house	0.9507	0.9286	0.8741	0.7251	0.5314	0.3383	0.2378	0.2635	0.4594	0.7325	0.9001	0.9584 (89)
MIT 2	20.1980	20.2574	20.3305	20.4078	20.4176	20.4337	20.4363	20.4363	20.4336	20.4114	20.3294	20.1919 (90)
Living area fraction									fLA = Living area / (4) =			0.4692 (91)
MIT	20.4823	20.5365	20.6064	20.6783	20.6903	20.6994	20.7008	20.7008	20.6992	20.6804	20.5997	20.4731 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4823	20.5365	20.6064	20.6783	20.6903	20.6994	20.7008	20.7008	20.6992	20.6804	20.5997	20.4731 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9520	0.9317	0.8817	0.7406	0.5501	0.3569	0.2572	0.2838	0.4803	0.7503	0.9065	0.9592	(94)
Useful gains	398.7602	399.6083	384.5498	326.0335	241.4357	151.9179	103.7970	109.7267	181.6344	282.3290	351.5255	390.4586	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W													
	477.9911	458.9153	416.5911	331.8348	241.8127	151.9222	103.7972	109.7271	181.7089	287.8406	388.6222	475.0446	(97)
Space heating kWh													
	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319	(98a)
Space heating requirement - total per year (kWh/year)												220.8403	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												220.8403	
Space heating per m2												(98c) / (4) =	4.4168 (99)

Full SAP Calculation Printout

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	58.9478	39.8543	23.8387	4.1769	0.2805	0.0000	0.0000	0.0000	0.0000	4.1006	26.7096	62.9319	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2													0.0000	(213)
Water heating														
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(232)	
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(231)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													220.8403	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													344.1753	
Water heating fuel used													655.5490	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													121.4388	(230a)
Total electricity for the above, kWh/year													121.4388	(231)
Electricity for lighting (calculated in Appendix L)													124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1122.3754	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	220.8403	28.4300	62.7849	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	124.5474	28.4300	35.4088	(250)
Additional standing charges			0.0000	(251)
Total energy cost			319.0913	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	220.8403	0.1590	35.1156	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			127.6628	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			162.4839	(272)

Full SAP Calculation Printout



----- 13a. Primary energy - Individual heating systems including micro-CHP -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	220.8403	1.5886	350.8327 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1348.5969 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1723.3444 (286)

Full SAP Calculation Printout



Property Reference	Plot 8	Issued on Date	27/08/2025
Assessment Reference	Plot 8	Prop Type Ref	
Property	Flat 8, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	91 B	DER	2.42
Environmental	98 A	% DER < TER	73.81
CO ₂ Emissions (t/year)	0.15	DFEE	11.07
Compliance Check	See BREL	% DFEE < TFEE	30.18
% DPER < TPER	46.26	DPER	26.01
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

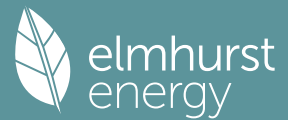
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
Total net area of external elements A _{um} (A, m ²)			22.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.2526		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			30.0000	1860.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17302.2800 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							279.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



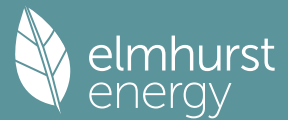
E2 Other lintels (including other steel lintels)						4.7700	0.0340	0.1622				
E3 Sill						4.7700	0.0260	0.1240				
E4 Jamb						10.8200	0.0300	0.3246				
E18 Party wall between dwellings						4.7400	0.0290	0.1375				
E7 Party floor between dwellings (in blocks of flats)						18.7400	-0.0180	-0.3373				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						47.1400	0.0000	0.0000				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												0.4109 (36)
Point Thermal bridges												0.0000
Total fabric heat loss									(33) + (36) + (36a) =			9.6635 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.0121	15.8313	15.6504	14.7462	14.5653	13.6611	13.6611	13.4802	14.0228	14.5653	14.9270	15.2887 (38)
Average = Sum(39)m / 12 =	25.6757	25.4948	25.3139	24.4097	24.2288	23.3246	23.3246	23.1437	23.6863	24.2288	24.5905	24.9522 (39)
												24.3645
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.4141	0.4112	0.4083	0.3937	0.3908	0.3762	0.3762	0.3733	0.3820	0.3908	0.3966	0.4025 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)	
Hot water usage for baths												
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)	
Hot water usage for other uses												
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)	
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)	
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)												
Distribution loss	(46)m = 0.15 x (45)m											
33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)	
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)	
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)												
99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)	
Total internal gains	430.7076	440.7252	420.5228	403.0119	380.5447	365.1370	349.6164	351.2521	363.3156	377.6397	403.9136	421.4465 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	8.6000											
Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	448.6394	477.2258	486.2853	511.0128	525.7191	519.9083	494.4017	466.6767	443.4482	422.2464	426.4764	436.0905 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	187.1886	188.5165	189.8633	196.8969	198.3666	206.0570	206.0570	207.6672	202.9104	198.3666	195.4488	192.6155	
alpha	13.4792	13.5678	13.6576	14.1265	14.2244	14.7371	14.7371	14.8445	14.5274	14.2244	14.0299	13.8410	
util living area													
	0.9079	0.8426	0.7508	0.5779	0.4286	0.2871	0.2076	0.2281	0.3686	0.5966	0.7941	0.9127 (86)	
MIT	20.9613	20.9849	20.9965	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9943	20.9617 (87)	
Th 2	20.6002	20.6029	20.6056	20.6192	20.6219	20.6356	20.6356	20.6383	20.6301	20.6219	20.6165	20.6110 (88)	
util rest of house													
	0.8942	0.8254	0.7314	0.5597	0.4112	0.2708	0.1904	0.2102	0.3488	0.5750	0.7740	0.8995 (89)	
MIT 2	20.5600	20.5879	20.6023	20.6191	20.6219	20.6356	20.6356	20.6383	20.6301	20.6218	20.6112	20.5711 (90)	
Living area fraction									fLA = Living area / (4) =				0.3702 (91)
MIT	20.7085	20.7349	20.7482	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7530	20.7157 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.7085	20.7349	20.7482	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7530	20.7157 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8980	0.8312	0.7384	0.5664	0.4176	0.2768	0.1968	0.2168	0.3561	0.5830	0.7812	0.9032 (94)	
Useful gains	402.8924	396.6656	359.0851	289.4597	219.5582	143.9238	97.2746	101.1890	157.9172	246.1602	333.1743	393.8691 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	421.2996	403.7071	360.6786	289.5007	219.5587	143.9238	97.2746	101.1890	157.9173	246.2080	335.7347	412.1026 (97)	
Space heating kWh	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (98a)	
Space heating requirement - total per year (kWh/year)												35.0870	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												35.0870	
Space heating per m2										(98c) / (4) =		0.5659 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)	
Efficiency of water heater												340.0764 (216)	
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (217)	
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)	
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												35.0870 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710 (219)	
Space cooling fuel												0.0000 (221)	
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)
Total electricity for the above, kWh/year													150.5841 (231)
Electricity for lighting (calculated in Appendix L)													145.1281 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1057.4702 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	35.0870	0.1616	5.6694 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			108.2829 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			150.1172 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.4200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	35.0870	1.5979	56.0668 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1162.1763 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			1612.5823 (286)
Dwelling Primary energy Rate (DPER)			26.0100 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3861 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2992 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type			8.6000	1.1450	9.8473		(27)					
External Wall	22.2100	8.6000	13.6100	0.1800	2.4498		(29a)					
Total net area of external elements Aum(A, m2)			22.2100				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.2971		(33)					
Main dwelling												
Corridor			32.4500	0.0000	0.0000		(32)					
Party Wall			23.4200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						289.0690	(35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				4.7700	0.0500	0.2385						
E3 Sill				4.7700	0.0500	0.2385						
E4 Jamb				10.8200	0.0500	0.5410						
E18 Party wall between dwellings				4.7400	0.0600	0.2844						
E7 Party floor between dwellings (in blocks of flats)				18.7400	0.0700	1.3118						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				47.1400	0.0000	0.0000						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						2.6142	(36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	14.9113 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	27.7742	27.6372	27.5029	26.8719	26.7539	26.2044	26.2044	26.1026	26.4160	26.7539	26.9927	27.2424
Average = Sum(39)m / 12 =	42.6856	42.5485	42.4142	41.7833	41.6652	41.1157	41.1157	41.0139	41.3274	41.6652	41.9040	42.1537
												41.7827
HLP	0.6885	0.6863	0.6841	0.6739	0.6720	0.6632	0.6632	0.6615	0.6666	0.6720	0.6759	0.6799
HLP (average)												0.6739
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
Hot water usage for baths	58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594	(42a)
Hot water usage for other uses	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Average daily hot water use (litres/day)	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Daily hot water use	119.1099	116.5670	113.4700	108.7601	104.9355	100.8238	99.2431	102.3267	105.5789	109.8956	114.6781	118.8009	(44)
Energy conte	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135	(45)
Energy content (annual)										Total = Sum(45)m =	1818.5931		(45)
Distribution loss (46)m = 0.15 x (45)m	28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084	(62)
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	2119.2152		(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254	(65)

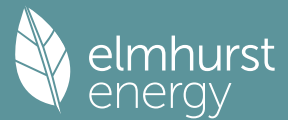
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331 (72)
Total internal gains	465.4239	475.4341	456.2523	440.3782	419.0310	401.6141	386.9341	388.0709	399.4389	415.6535	440.1792	456.3976 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



	m2				Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W
Northwest	8.6000				11.2829	0.6300		0.7000		0.7700		29.6546 (81)
Solar gains	29.6546	60.3629	108.7547	178.6064	240.0821	255.9529	239.4387	190.8833	132.5193	73.7682	37.3132	24.2175 (83)
Total gains	495.0786	535.7970	565.0070	618.9846	659.1131	657.5670	626.3728	578.9542	531.9582	489.4218	477.4924	480.6150 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	116.6298	117.0055	117.3760	119.1484	119.4860	121.0829	121.0829	121.3834	120.4628	119.4860	118.8051	118.1014
alpha	8.7753	8.8004	8.8251	8.9432	8.9657	9.0722	9.0722	9.0922	9.0309	8.9657	8.9203	8.8734
util living area	0.9872	0.9725	0.9320	0.7885	0.5858	0.4001	0.2888	0.3259	0.5352	0.8369	0.9644	0.9895 (86)
MIT	20.6272	20.7271	20.8528	20.9708	20.9977	20.9999	21.0000	21.0000	20.9992	20.9604	20.7967	20.6125 (87)
Th 2	20.3510	20.3530	20.3549	20.3639	20.3656	20.3735	20.3735	20.3750	20.3705	20.3656	20.3622	20.3586 (88)
util rest of house	0.9833	0.9647	0.9149	0.7547	0.5467	0.3610	0.2477	0.2816	0.4868	0.7995	0.9533	0.9862 (89)
MIT 2	19.9277	20.0527	20.2039	20.3385	20.3640	20.3735	20.3735	20.3749	20.3700	20.3323	20.1471	19.9158 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	20.1866	20.3024	20.4441	20.5726	20.5986	20.6054	20.6054	20.6063	20.6029	20.5648	20.3875	20.1737 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.1866	20.3024	20.4441	20.5726	20.5986	20.6054	20.6054	20.6063	20.6029	20.5648	20.3875	20.1737 (93)

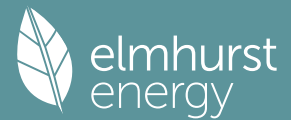
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9821	0.9640	0.9175	0.7661	0.5611	0.3755	0.2629	0.2980	0.5047	0.8118	0.9538	0.9851 (94)
Useful gains	486.2190	516.5106	518.3909	474.1807	369.8260	246.8932	164.6842	172.5156	268.4693	397.3052	455.4144	473.4552 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	678.1295	655.3480	591.4272	487.7186	370.7619	246.9145	164.6848	172.5176	268.7488	415.1855	556.8016	673.3503 (97)
Space heating kWh	142.7814	93.2988	54.3391	9.7473	0.6963	0.0000	0.0000	0.0000	0.0000	13.3029	72.9988	148.7219 (98a)
Space heating requirement - total per year (kWh/year)	535.8866											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	142.7814	93.2988	54.3391	9.7473	0.6963	0.0000	0.0000	0.0000	0.0000	13.3029	72.9988	148.7219 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	535.8866											
Space heating per m2	(98c) / (4) = 8.6433 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	142.7814	93.2988	54.3391	9.7473	0.6963	0.0000	0.0000	0.0000	0.0000	13.3029	72.9988	148.7219 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	154.6928	101.0821	58.8722	10.5605	0.7544	0.0000	0.0000	0.0000	0.0000	14.4127	79.0886	161.1288 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Water heating requirement	83.2282	82.6123	81.5930	80.2325	79.8332	79.8000	79.8000	79.8000	79.8000	80.3730	82.1474	79.8000 (216)
Fuel for water heating, kWh/month	250.5708	223.2964	240.5550	216.2609	211.4200	191.4084	189.6254	196.7757	198.4878	218.7467	226.3218	83.3371 (217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Pumps and Fa	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063 (232)
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)											
(233a)m	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000											
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000											
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000											
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.0502											
(233b)m	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343	-7.1343 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000											
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000											
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000											
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year	Space heating fuel - main system 1											
Space heating fuel - main system 1	580.5922 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	79.8000											

Full SAP Calculation Printout



Water heating fuel used	2611.1525 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	161.8073 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2418.0502 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	580.5922	0.2100	121.9244 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2611.1525	0.2100	548.3420 (264)
Space and water heating			670.2664 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	161.8073	0.1443	23.3538 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	0.1339	-66.4499
PV Unit electricity exported	-525.1326	0.1255	-65.9198
Total			-132.3697 (269)
Total CO2, kg/year			573.1798 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	580.5922	1.1300	656.0692 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2611.1525	1.1300	2950.6023 (278)
Space and water heating			3606.6714 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			3001.0590 (286)
Target Primary Energy Rate (TPER)			48.4000 (287)

Full SAP Calculation Printout



Property Reference	Plot 8			Issued on Date	27/08/2025
Assessment Reference	Plot 8	Prop Type Ref			
Property	Flat 8, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.42	TER	9.24
Environmental	98 A	% DER < TER			73.81
CO ₂ Emissions (t/year)	0.15	DFEE	11.07	TFEE	15.86
Compliance Check	See BREL	% DFEE < TFEE			30.18
% DPER < TPER	46.26	DPER	26.01	TPER	48.40
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.3286 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2547 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3247	0.3183	0.3120	0.2801	0.2738	0.2419	0.2419	0.2356	0.2547	0.2738	0.2865	0.2992 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5527	0.5507	0.5487	0.5392	0.5375	0.5293	0.5293	0.5277	0.5324	0.5375	0.5410	0.5448 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
Total net area of external elements Aum(A, m ²)			22.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.2526		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			40.0000	2480.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17922.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							289.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				10.8200	0.0300	0.3246	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	18.7400	-0.0180	-0.3373
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	47.1400	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.4109 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	9.6635 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
26.8014	26.7021	26.6048	26.1478	26.0623	25.6643	25.6643	25.5906	25.8176	26.0623	26.2353	26.4161	(38)
(38)m												
Heat transfer coeff	36.4649	36.3656	36.2683	35.8113	35.7258	35.3278	35.3278	35.2541	35.4811	35.7258	35.8988	36.0796 (39)
Average = Sum(39)m / 12 =												35.8109
HLP	0.5881	0.5865	0.5850	0.5776	0.5762	0.5698	0.5698	0.5686	0.5723	0.5762	0.5790	0.5819 (40)
HLP (average)												0.5776
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												55.6619 (43)
Daily hot water use	60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414 (44)
Energy conte	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499 (45)
Energy content (annual)												924.4260
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (64)
12Total per year (kWh/year)												785.7621 (64)
Electric shower(s)	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												531.8370 (64a)
Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
Total internal gains	374.0866	385.4940	368.5137	358.7915	340.9103	330.3519	318.1474	317.5698	326.9630	335.8843	354.7262	365.8842 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northwest				8.6000	11.2829	0.2400	0.0000	0.7700	17.9318 (81)			
Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	392.0184	421.9946	434.2762	466.7924	486.0846	485.1231	462.9328	432.9943	407.0956	380.4909	377.2890	380.5282 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	136.5262	136.8988	137.2661	139.0178	139.3505	140.9206	140.9206	141.2152	140.3116	139.3505	138.6791	137.9840
alpha	10.1017	10.1266	10.1511	10.2679	10.2900	10.3947	10.3947	10.4143	10.3541	10.2900	10.2453	10.1989

Full SAP Calculation Printout



util living area	0.9958	0.9896	0.9717	0.8737	0.6792	0.4660	0.3358	0.3745	0.6001	0.9002	0.9855	0.9968 (86)
MIT	20.6299	20.7157	20.8240	20.9567	20.9964	20.9999	21.0000	21.0000	20.9991	20.9507	20.7843	20.6155 (87)
Th 2	20.4407	20.4421	20.4435	20.4502	20.4514	20.4573	20.4573	20.4583	20.4550	20.4514	20.4489	20.4463 (88)
util rest of house	0.9944	0.9863	0.9631	0.8469	0.6407	0.4265	0.2944	0.3304	0.5533	0.8719	0.9803	0.9957 (89)
MIT 2	20.1042	20.1898	20.2954	20.4192	20.4494	20.4572	20.4573	20.4583	20.4546	20.4171	20.2635	20.0950 (90)
Living area fraction	20.2988	20.3845	20.4911	20.6182	20.6519	20.6581	20.6582	20.6588	20.6562	20.6147	20.4563	20.2877 (92)
MIT												0.0000
Temperature adjustment												0.0000
adjusted MIT	20.2988	20.3845	20.4911	20.6182	20.6519	20.6581	20.6582	20.6588	20.6562	20.6147	20.4563	20.2877 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9940	0.9859	0.9640	0.8554	0.6549	0.4411	0.3097	0.3467	0.5707	0.8808	0.9804	0.9953 (94)	
Useful gains	389.6720	416.0585	418.6271	399.3151	318.3275	213.9955	143.3651	150.1396	232.3169	335.1466	369.8892	378.7452 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	583.3947	563.1027	507.4328	419.6428	319.8134	214.0196	143.3656	150.1411	232.6209	357.7819	479.4741	580.4366 (97)	
Space heating kWh	144.1297	98.8137	66.0714	14.6359	1.1055	0.0000	0.0000	0.0000	0.0000	16.8407	78.9011	150.0584 (98a)	
Space heating requirement - total per year (kWh/year)												570.5563	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	144.1297	98.8137	66.0714	14.6359	1.1055	0.0000	0.0000	0.0000	0.0000	16.8407	78.9011	150.0584 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												570.5563	
Space heating per m2											(98c) / (4) =	9.2025 (99)	

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	332.0811	261.4256	267.9309	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9967	0.9994	0.9987	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	330.9983	261.2764	267.5758	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	523.1479	499.4171	466.4293	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	138.3477	177.1766	147.9470	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =				1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	34.5869	44.2942	36.9867	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement													115.8678 (107)
Energy for space heating													9.2025 (99)
Energy for space cooling													1.8688 (108)
Total													11.0714 (109)
Fabric Energy Efficiency (DFEE)													11.1 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1361 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3861	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.2992 (21)

Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			8.6000	1.1450	9.8473		(27)
External Wall	22.2100	8.6000	13.6100	0.1800	2.4498		(29a)
Total net area of external elements Aum(A, m2)							
Fabric heat loss, W/K = Sum (A x U)							
(26)...(30) + (32) = 12.2971							
Main dwelling							(33)
Corridor			32.4500	0.0000	0.0000		(32)
Party Wall			23.4200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

289.0690 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385
E3 Sill	4.7700	0.0500	0.2385
E4 Jamb	10.8200	0.0500	0.5410
E18 Party wall between dwellings	4.7400	0.0600	0.2844
E7 Party floor between dwellings (in blocks of flats)	18.7400	0.0700	1.3118
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	47.1400	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			
Point Thermal bridges			
(33a) = 0.0000			
Total fabric heat loss			
(33) + (36) + (36a) = 14.9113 (37)			

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 27.7742	Feb 27.6372	Mar 27.5029	Apr 26.8719	May 26.7539	Jun 26.2044	Jul 26.2044	Aug 26.1026	Sep 26.4160	Oct 26.7539	Nov 26.9927	Dec 27.2424 (38)
Heat transfer coeff	42.6856	42.5485	42.4142	41.7833	41.6652	41.1157	41.1157	41.0139	41.3274	41.6652	41.9040	42.1537 (39)
Average = Sum(39)m / 12 = 41.7827												

HLP	Jan 0.6885	Feb 0.6863	Mar 0.6841	Apr 0.6739	May 0.6720	Jun 0.6632	Jul 0.6632	Aug 0.6615	Sep 0.6666	Oct 0.6720	Nov 0.6759	Dec 0.6799 (40)
HLP (average)												0.6739
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths												
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses												
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)												
55.6619 (43)												
Daily hot water use	Jan 60.7267	Feb 59.0612	Mar 57.2428	Apr 54.9791	May 52.9598	Jun 50.8612	Jul 50.4249	Aug 52.2397	Sep 54.1010	Oct 56.2561	Nov 58.5398	Dec 60.6414 (44)
Energy conte	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499 (45)
Energy content (annual)												
Total = Sum(45)m = 924.4260												
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (64)
Total per year (kWh/year)												
Electric shower(s)												
46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 531.8370 (64a)												
Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan 101.8790	Feb 101.8790	Mar 101.8790	Apr 101.8790	May 101.8790	Jun 101.8790	Jul 101.8790	Aug 101.8790	Sep 101.8790	Oct 101.8790	Nov 101.8790	Dec 101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)

Full SAP Calculation Printout



Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
Total internal gains	371.1971	382.2948	365.6242	355.8056	338.0207	327.3660	315.2579	314.6802	323.9771	332.9947	351.7403	362.9947 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W		
-----												-----		
Northwest				8.6000		11.2829	0.6300		0.7000			0.7700	29.6546 (81)	
-----												-----		
Solar gains	29.6546	60.3629	108.7547	178.6064	240.0821	255.9529	239.4387	190.8833	132.5193	73.7682	37.3132	24.2175 (83)		
Total gains	400.8517	442.6577	474.3788	534.4121	578.1028	583.3189	554.6966	505.5635	456.4964	406.7629	389.0535	387.2121 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	116.6298	117.0055	117.3760	119.1484	119.4860	121.0829	121.0829	121.3834	120.4628	119.4860	118.8051	118.1014
alpha	8.7753	8.8004	8.8251	8.9432	8.9657	9.0722	9.0722	9.0922	9.0309	8.9657	8.9203	8.8734
util living area	0.9972	0.9923	0.9749	0.8727	0.6640	0.4509	0.3261	0.3731	0.6213	0.9257	0.9908	0.9979 (86)
MIT	20.4792	20.5910	20.7461	20.9347	20.9940	20.9998	21.0000	21.0000	20.9974	20.9053	20.6716	20.4639 (87)
Th 2	20.3510	20.3530	20.3549	20.3639	20.3656	20.3735	20.3735	20.3750	20.3705	20.3656	20.3622	20.3586 (88)
util rest of house	0.9962	0.9897	0.9668	0.8437	0.6211	0.4069	0.2797	0.3225	0.5662	0.8998	0.9872	0.9971 (89)
MIT 2	19.8756	19.9879	20.1402	20.3170	20.3623	20.3734	20.3735	20.3749	20.3693	20.2974	20.0760	19.8671 (90)
Living area fraction	20.0990	20.2112	20.3645	20.5456	20.5961	20.6053	20.6054	20.6063	20.6018	20.5224	20.2965	20.0880 (92)
MIT	20.0990	20.2112	20.3645	20.5456	20.5961	20.6053	20.6054	20.6063	20.6018	20.5224	20.2965	20.0880 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0990	20.2112	20.3645	20.5456	20.5961	20.6053	20.6054	20.6063	20.6018	20.5224	20.2965	20.0880 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9958	0.9891	0.9670	0.8524	0.6368	0.4232	0.2969	0.3412	0.5866	0.9068	0.9867	0.9967 (94)
Useful gains	399.1488	437.8164	458.7048	455.5368	368.1554	246.8535	164.6828	172.5108	267.7764	368.8523	383.8862	385.9428 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	674.3911	651.4681	588.0499	486.5930	370.6581	246.9119	164.6847	172.5172	268.7033	413.4196	552.9852	669.7396 (97)
Space heating kWh	204.7803	143.5739	96.2327	22.3604	1.8620	0.0000	0.0000	0.0000	0.0000	33.1580	121.7512	211.1448 (98a)
Space heating requirement - total per year (kWh/year)												834.8635
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	204.7803	143.5739	96.2327	22.3604	1.8620	0.0000	0.0000	0.0000	0.0000	33.1580	121.7512	211.1448 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												834.8635
Space heating per m2										(98c) / (4) =		13.4655 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	386.4877	304.2562	311.7060	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9960	0.9991	0.9977	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	384.9228	303.9781	310.9760	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	641.1594	609.7777	554.2728	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000											
		0.0000	0.0000	0.0000	0.0000	184.4903	227.5150	181.0128	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	46.1226	56.8787	45.2532	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												148.2545 (107)
Energy for space heating												13.4655 (99)
Energy for space cooling												2.3912 (108)
Total												15.8567 (109)
Fabric Energy Efficiency (TFEE)												15.9 (109)

Full SAP Calculation Printout



Property Reference	Plot 8			Issued on Date	27/08/2025
Assessment Reference	Plot 8	Prop Type Ref			
Property	Flat 8, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.42	TER	9.24
Environmental	98 A	% DER < TER			73.81
CO ₂ Emissions (t/year)	0.15	DFEE	11.07	TFEE	15.86
Compliance Check	See BREL	% DFEE < TFEE			30.18
% DPER < TPER	46.26	DPER	26.01	TPER	48.40
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
Total net area of external elements Aum(A, m ²)			22.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.2526		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			30.0000	1860.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17302.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							279.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

elmhurst
energy

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content (annual)												
	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2153.9058
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
VWHRs												0.0000 (63a)
PV diverter												0.0000 (63b)
Solar input												0.0000 (63c)
FGHRs												0.0000 (63d)
Output from w/h												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2471.2368 (64)
Electric shower(s)												2471 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	430.7076	440.7252	420.5228	403.0119	380.5447	365.1370	349.6164	351.2521	363.3156	377.6397	403.9136	421.4465 (73)

[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
Northwest			8.6000	11.2829	0.2400	0.0000	0.7700	17.9318 (81)				
Solar gains	17.9318	36.5006	65.7625	108.0009	145.1741	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	448.6394	477.2258	486.2853	511.0128	525.7191	519.9083	494.4017	466.6767	443.4482	422.2464	426.4764	436.0905 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	187.1886	188.5165	189.8633	196.8969	198.3666	206.0570	206.0570	207.6672	202.9104	198.3666	195.4488	192.6155	
alpha	13.4792	13.5678	13.6576	14.1265	14.2244	14.7371	14.7371	14.8445	14.5274	14.2244	14.0299	13.8410	
util living area													
	0.9079	0.8426	0.7508	0.5779	0.4286	0.2871	0.2076	0.2281	0.3686	0.5966	0.7941	0.9127 (86)	
MIT	20.9613	20.9849	20.9965	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9943	20.9617 (87)	
Th 2	20.6002	20.6029	20.6056	20.6192	20.6219	20.6356	20.6356	20.6383	20.6301	20.6219	20.6165	20.6110 (88)	
util rest of house													
	0.8942	0.8254	0.7314	0.5597	0.4112	0.2708	0.1904	0.2102	0.3488	0.5750	0.7740	0.8995 (89)	
MIT 2	20.5600	20.5879	20.6023	20.6191	20.6219	20.6356	20.6356	20.6383	20.6301	20.6218	20.6112	20.5711 (90)	
Living area fraction									fLA = Living area / (4) =				0.3702 (91)
MIT	20.7085	20.7349	20.7482	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7530	20.7157 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.7085	20.7349	20.7482	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7530	20.7157 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8980	0.8312	0.7384	0.5664	0.4176	0.2768	0.1968	0.2168	0.3561	0.5830	0.7812	0.9032 (94)	
Useful gains	402.8924	396.6656	359.0851	289.4597	219.5582	143.9238	97.2746	101.1890	157.9172	246.1602	333.1743	393.8691 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	421.2996	403.7071	360.6786	289.5007	219.5587	143.9238	97.2746	101.1890	157.9173	246.2080	335.7347	412.1026 (97)	
Space heating kWh	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (98a)	
Space heating requirement - total per year (kWh/year)												35.0870	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												35.0870	
Space heating per m2										(98c) / (4) =		0.5659 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	13.6949	4.7319	1.1856	0.0295	0.0004	0.0000	0.0000	0.0000	0.0000	0.0355	1.8435	13.5657 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)	
Efficiency of water heater												340.0764 (216)	
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (217)	
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)	
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												35.0870 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710 (219)	
Space cooling fuel												0.0000 (221)	
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)
Total electricity for the above, kWh/year													150.5841 (231)
Electricity for lighting (calculated in Appendix L)													145.1281 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1057.4702 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	35.0870	0.1616	5.6694 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			108.2829 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			150.1172 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.4200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	35.0870	1.5979	56.0668 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1162.1763 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			1612.5823 (286)
Dwelling Primary energy Rate (DPER)			26.0100 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3861 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2992 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type			8.6000	1.1450	9.8473		(27)					
External Wall	22.2100	8.6000	13.6100	0.1800	2.4498		(29a)					
Total net area of external elements Aum(A, m2)			22.2100				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.2971		(33)					
Main dwelling												
Corridor			32.4500	0.0000	0.0000		(32)					
Party Wall			23.4200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						289.0690	(35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				4.7700	0.0500	0.2385						
E3 Sill				4.7700	0.0500	0.2385						
E4 Jamb				10.8200	0.0500	0.5410						
E18 Party wall between dwellings				4.7400	0.0600	0.2844						
E7 Party floor between dwellings (in blocks of flats)				18.7400	0.0700	1.3118						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				47.1400	0.0000	0.0000						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						2.6142	(36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	14.9113 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	27.7742	27.6372	27.5029	26.8719	26.7539	26.2044	26.2044	26.1026	26.4160	26.7539	26.9927	27.2424
Average = Sum(39)m / 12 =	42.6856	42.5485	42.4142	41.7833	41.6652	41.1157	41.1157	41.0139	41.3274	41.6652	41.9040	42.1537
												41.7827
HLP	0.6885	0.6863	0.6841	0.6739	0.6720	0.6632	0.6632	0.6615	0.6666	0.6720	0.6759	0.6799
HLP (average)												0.6739
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
Hot water usage for baths	58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594	(42a)
Hot water usage for other uses	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Average daily hot water use (litres/day)	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Daily hot water use	119.1099	116.5670	113.4700	108.7601	104.9355	100.8238	99.2431	102.3267	105.5789	109.8956	114.6781	118.8009	(44)
Energy conte	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135	(45)
Energy content (annual)										Total = Sum(45)m =		1818.5931	
Distribution loss (46)m = 0.15 x (45)m	28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084	(62)
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2119.2152	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331 (72)
Total internal gains	465.4239	475.4341	456.2523	440.3782	419.0310	401.6141	386.9341	388.0709	399.4389	415.6535	440.1792	456.3976 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



	m2				Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W
Northwest	8.6000				11.2829	0.6300		0.7000		0.7700		29.6546 (81)
Solar gains	29.6546	60.3629	108.7547	178.6064	240.0821	255.9529	239.4387	190.8833	132.5193	73.7682	37.3132	24.2175 (83)
Total gains	495.0786	535.7970	565.0070	618.9846	659.1131	657.5670	626.3728	578.9542	531.9582	489.4218	477.4924	480.6150 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	116.6298	117.0055	117.3760	119.1484	119.4860	121.0829	121.0829	121.3834	120.4628	119.4860	118.8051	118.1014
alpha	8.7753	8.8004	8.8251	8.9432	8.9657	9.0722	9.0722	9.0922	9.0309	8.9657	8.9203	8.8734
util living area	0.9872	0.9725	0.9320	0.7885	0.5858	0.4001	0.2888	0.3259	0.5352	0.8369	0.9644	0.9895 (86)
MIT	20.6272	20.7271	20.8528	20.9708	20.9977	20.9999	21.0000	21.0000	20.9992	20.9604	20.7967	20.6125 (87)
Th 2	20.3510	20.3530	20.3549	20.3639	20.3656	20.3735	20.3735	20.3750	20.3705	20.3656	20.3622	20.3586 (88)
util rest of house	0.9833	0.9647	0.9149	0.7547	0.5467	0.3610	0.2477	0.2816	0.4868	0.7995	0.9533	0.9862 (89)
MIT 2	19.9277	20.0527	20.2039	20.3385	20.3640	20.3735	20.3735	20.3749	20.3700	20.3323	20.1471	19.9158 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	20.1866	20.3024	20.4441	20.5726	20.5986	20.6054	20.6054	20.6063	20.6029	20.5648	20.3875	20.1737 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.1866	20.3024	20.4441	20.5726	20.5986	20.6054	20.6054	20.6063	20.6029	20.5648	20.3875	20.1737 (93)

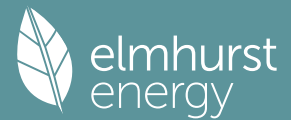
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9821	0.9640	0.9175	0.7661	0.5611	0.3755	0.2629	0.2980	0.5047	0.8118	0.9538	0.9851 (94)
Useful gains	486.2190	516.5106	518.3909	474.1807	369.8260	246.8932	164.6842	172.5156	268.4693	397.3052	455.4144	473.4552 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	678.1295	655.3480	591.4272	487.7186	370.7619	246.9145	164.6848	172.5176	268.7488	415.1855	556.8016	673.3503 (97)
Space heating kWh	142.7814	93.2988	54.3391	9.7473	0.6963	0.0000	0.0000	0.0000	0.0000	13.3029	72.9988	148.7219 (98a)
Space heating requirement - total per year (kWh/year)	535.8866											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	142.7814	93.2988	54.3391	9.7473	0.6963	0.0000	0.0000	0.0000	0.0000	13.3029	72.9988	148.7219 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	535.8866											
Space heating per m2	(98c) / (4) = 8.6433 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	142.7814	93.2988	54.3391	9.7473	0.6963	0.0000	0.0000	0.0000	0.0000	13.3029	72.9988	148.7219 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	154.6928	101.0821	58.8722	10.5605	0.7544	0.0000	0.0000	0.0000	0.0000	14.4127	79.0886	161.1288 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Water heating requirement	83.2282	82.6123	81.5930	80.2325	79.8332	79.8000	79.8000	79.8000	79.8000	80.3730	82.1474	79.8000 (216)
Fuel for water heating, kWh/month	250.5708	223.2964	240.5550	216.2609	211.4200	191.4084	189.6254	196.7757	198.4878	218.7467	226.3218	83.3371 (217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Pumps and Fa	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063 (232)
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)											
(233a)m	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000											
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000											
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000											
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.0502											
(233b)m	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343	-7.1343 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000											
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000											
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000											
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	580.5922 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	79.8000											

Full SAP Calculation Printout



Water heating fuel used	2611.1525 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	161.8073 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2418.0502 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	580.5922	0.2100	121.9244 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2611.1525	0.2100	548.3420 (264)
Space and water heating			670.2664 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	161.8073	0.1443	23.3538 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	0.1339	-66.4499
PV Unit electricity exported	-525.1326	0.1255	-65.9198
Total			-132.3697 (269)
Total CO2, kg/year			573.1798 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	580.5922	1.1300	656.0692 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2611.1525	1.1300	2950.6023 (278)
Space and water heating			3606.6714 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			3001.0590 (286)
Target Primary Energy Rate (TPER)			48.4000 (287)

Full SAP Calculation Printout



Property Reference	Plot 8			Issued on Date	27/08/2025
Assessment Reference	Plot 8	Prop Type Ref			
Property	Flat 8, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.42	TER	9.24
Environmental	98 A	% DER < TER			73.81
CO ₂ Emissions (t/year)	0.15	DFEE	11.07	TFEE	15.86
Compliance Check	See BREL	% DFEE < TFEE			30.18
% DPER < TPER	46.26	DPER	26.01	TPER	48.40
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
Total net area of external elements Aum(A, m ²)			22.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.2526		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			40.0000	2480.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17922.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							289.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622	
E3 Sill	4.7700	0.0260	0.1240	
E4 Jamb	10.8200	0.0300	0.3246	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	18.7400	-0.0180	-0.3373	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	47.1400	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.4109 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		9.6635 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.0121	15.8313	15.6504	14.7462	14.5653	13.6611	13.6611	13.4802	14.0228	14.5653	14.9270	15.2887 (38)
Average = Sum(39)m / 12 =	25.6757	25.4948	25.3139	24.4097	24.2288	23.3246	23.3246	23.1437	23.6863	24.2288	24.5905	24.9522 (39)
												24.3645
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.4141	0.4112	0.4083	0.3937	0.3908	0.3762	0.3762	0.3733	0.3820	0.3908	0.3966	0.4025 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)	
Hot water usage for baths												
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)	
Hot water usage for other uses												
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)	
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)	
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)												
Distribution loss	(46)m = 0.15 x (45)m											
33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)	
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)	
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
												Total per year (kWh/year) = Sum(64)m =
												2471.2368 (64)
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =
												0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)	
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)	
Losses e.g. evaporation (negative values) (Table 5)												
-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)	
Water heating gains (Table 5)												
99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)	
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
Northwest	8.6000											17.9318 (81)
Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	493.9062	510.4571	524.4649	537.3951	546.4180	530.1973	504.7070	478.3694	457.5279	448.1234	458.0368	478.0608 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	193.8962	195.2716	196.6667	203.9523	205.4747	213.4407	213.4407	215.1086	210.1813	205.4747	202.4524	199.5176
alpha	13.9264	14.0181	14.1111	14.5968	14.6983	15.2294	15.2294	15.3406	15.0121	14.6983	14.4968	14.3012
util living area	0.8500	0.7964	0.6985	0.5496	0.4124	0.2816	0.2033	0.2225	0.3572	0.5622	0.7435	0.8578 (86)
MIT	20.9843	20.9931	20.9987	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9978	20.9841 (87)
Th 2	20.6002	20.6029	20.6056	20.6192	20.6219	20.6356	20.6356	20.6383	20.6301	20.6219	20.6165	20.6110 (88)
util rest of house	0.8333	0.7785	0.6799	0.5323	0.3956	0.2655	0.1865	0.2051	0.3381	0.5418	0.7237	0.8418 (89)
MIT 2	20.5846	20.5963	20.6045	20.6192	20.6219	20.6356	20.6356	20.6383	20.6301	20.6219	20.6145	20.5951 (90)
Living area fraction	fLA = Living area / (4) =											0.3702 (91)
MIT	20.7325	20.7432	20.7504	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7564	20.7391 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.7325	20.7432	20.7504	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7564	20.7391 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8389	0.7849	0.6867	0.5387	0.4018	0.2715	0.1927	0.2115	0.3452	0.5494	0.7310	0.8471 (94)
Useful gains	414.3394	400.6544	360.1592	289.4860	219.5586	143.9238	97.2746	101.1890	157.9172	246.1930	334.8137	404.9854 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	421.9164	403.9187	360.7342	289.5020	219.5588	143.9238	97.2746	101.1890	157.9173	246.2096	335.8178	412.6876 (97)
Space heating kWh	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (98a)
Space heating requirement - total per year (kWh/year)												14.7361
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												14.7361
Space heating per m2										(98c) / (4) =		0.2377 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)	
Efficiency of water heater												340.0764 (216)	
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (217)	
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)	
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													14.7361 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													340.0764
Water heating fuel used													726.6710 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													150.5841 (230a)
mechanical ventilation fans (SFP = 0.8400)													150.5841 (231)
Total electricity for the above, kWh/year													145.1281 (232)
Electricity for lighting (calculated in Appendix L)													

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1037.1193 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	14.7361	16.4900	2.4300 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	16.4900	119.8280 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313 (249)
Energy for lighting	145.1281	16.4900	23.9316 (250)
Additional standing charges			0.0000 (251)
Total energy cost			171.0210 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.5754 (257)
SAP value	90.6728
SAP rating (Section 12)	91 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	14.7361	0.1616	2.3819 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			104.9953 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			146.8296 (272)
CO2 emissions per m2			2.3700 (273)
EI value			98.1612
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 146.9400 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

Full SAP Calculation Printout



Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1604	0.1566	0.1604	0.1455	0.1492	0.1268	0.1231	0.1231	0.1268	0.1417	0.1417	0.1455	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3004	0.2966	0.3004	0.2855	0.2892	0.2668	0.2631	0.2631	0.2668	0.2817	0.2817	0.2855	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.6000	0.7752	6.6667			(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999	(29a)
Total net area of external elements Aum(A, m2)			22.2100					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Main dwelling								
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001	(32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000	(32)
Party Floor 1			62.0000			40.0000	2480.0000	(32d)
Party Ceiling 1			62.0000			40.0000	2480.0000	(32b)
Internal Wall 1			96.0200			9.0000	864.1800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 17922.2800 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 289.0690 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	4.7700	0.0340	0.1622	
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240	
E3 Sill	10.8200	0.0300	0.3246	
E4 Jamb	4.7400	0.0290	0.1375	
E18 Party wall between dwellings	18.7400	-0.0180	-0.3373	
E7 Party floor between dwellings (in blocks of flats)	47.1400	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.4109 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 9.6635 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	14.5653	14.3845	14.5653	13.8419	14.0228	12.9376	12.7568	12.7568	12.9376	13.6611	13.6611	13.8419	(38)
Average = Sum(39)m / 12 =	24.2288	24.0480	24.2288	23.5054	23.6863	22.6011	22.4203	22.4203	22.6011	23.3246	23.3246	23.5054	(39)
													23.3246

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.3908	0.3879	0.3908	0.3791	0.3820	0.3645	0.3616	0.3616	0.3645	0.3762	0.3762	0.3791	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	(42a)
Hot water usage for baths													
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses													
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)													129.6745 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Energy content (annual)													Total = Sum(45)m = 2153.9058
Distribution loss (46)m = 0.15 x (45)m													
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	(72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
-----					Northwest	8.6000	9.9768	0.2400	0.0000	0.7700		15.8559 (81)	

Solar gains	15.8559	33.1182	62.3563	104.4552	136.9322	149.4328	136.4321	108.1317	78.0748	43.2583	20.5050	13.9393	(83)
Total gains	491.8304	507.0747	521.0588	533.8494	538.1758	524.8589	496.3538	471.0766	455.4701	446.7751	455.9790	477.3561	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	205.4747	207.0200	205.4747	211.7985	210.1813	220.2725	222.0493	222.0493	220.2725	213.4407	213.4407	211.7985
alpha	14.6983	14.8013	14.6983	15.1199	15.0121	15.6848	15.8033	15.8033	15.6848	15.2294	15.2294	15.1199
util living area	0.7785	0.7239	0.6414	0.4931	0.3609	0.2325	0.1716	0.1904	0.3176	0.5116	0.6747	0.7878 (86)
MIT	20.9959	20.9985	20.9997	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9996	20.9958 (87)
Th 2	20.6219	20.6247	20.6219	20.6329	20.6301	20.6465	20.6493	20.6493	20.6465	20.6356	20.6356	20.6329 (88)
util rest of house	0.7611	0.7066	0.6239	0.4770	0.3446	0.2173	0.1558	0.1737	0.3000	0.4926	0.6562	0.7710 (89)
MIT 2	20.6180	20.6232	20.6217	20.6329	20.6301	20.6465	20.6493	20.6493	20.6465	20.6356	20.6352	20.6288 (90)
Living area fraction									fLA = Living area / (4) =			0.3702 (91)
MIT	20.7579	20.7621	20.7616	20.7688	20.7670	20.7774	20.7791	20.7791	20.7774	20.7705	20.7701	20.7647 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7579	20.7621	20.7616	20.7688	20.7670	20.7774	20.7791	20.7791	20.7774	20.7705	20.7701	20.7647 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	377.4293	361.4985	328.4432	257.8229	188.7094	117.0146	80.2445	84.7286	139.6158	223.2242	302.3242	370.9178 (94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (95)
Heat loss rate W	379.3722	362.2137	328.5816	257.8251	188.7094	117.0146	80.2445	84.7286	139.6158	223.2271	302.5213	372.9054 (97)
Space heating kWh	1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788 (98a)
Space heating requirement - total per year (kWh/year)												3.6535
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3.6535
Space heating per m2										(98c) / (4) =		0.0589 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (217)
Fuel for water heating, kWh/month												

Full SAP Calculation Printout



	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.7893	12.7893	12.3768	12.7893 (231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3.6535 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764
Water heating fuel used												726.6710 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												150.5841 (230a)
Total electricity for the above, kWh/year												150.5841 (231)
Electricity for lighting (calculated in Appendix L)												145.1281 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1026.0368 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3.6535	28.4300	1.0387 (240)	
Space heating - main system 2	0.0000	28.4300	0.0000 (241)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	726.6710	28.4300	206.5926 (247)	
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (241a)	
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111 (249)	
Energy for lighting	145.1281	28.4300	41.2599 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			291.7023 (255)	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3.6535	0.1618	0.5913 (261)	
Space heating - main system 2	0.0000	0.0000	0.0000 (262)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)	
Space and water heating			103.2047 (265)	
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)	
Energy for lighting	145.1281	0.1443	20.9465 (268)	
Total CO2, kg/year			145.0390 (272)	

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3.6535	1.5989	5.8415 (275)	
Space heating - main system 2	0.0000	0.0000	0.0000 (276)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)	
Space and water heating			1111.9510 (279)	
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)	
Energy for lighting	145.1281	1.5338	222.6023 (282)	
Total Primary energy kWh/year			1562.3570 (286)	

SAP 10 EPC IMPROVEMENTS

Plot 8

Current energy efficiency rating: B 91
Current environmental impact rating: A 98

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Full SAP Calculation Printout



Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures
(none)

Typical annual savings	Energy efficiency	Environmental impact
Total Savings £0	0.00 kg/m²	

Potential energy efficiency rating: B 91
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£292	£292	£0
Space heating	£44	£44	£0
Water heating	£207	£207	£0
Lighting	£41	£41	£0
Total cost of fuels	£292	£292	£0
Total cost of uses	£292	£292	£0
Delivered energy	17 kWh/m²	17 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	2 kg/m²	2 kg/m²	0 kg/m²
Primary energy	25 kWh/m²	25 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
Total net area of external elements Aum(A, m2)			22.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.2526		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)

Full SAP Calculation Printout



Party Wall	23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1	62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1	62.0000			40.0000	2480.0000 (32b)
Internal Wall 1	96.0200			9.0000	864.1800 (32c)

Heat capacity Cm = Sum(A x k)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
 List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	18.7400	-0.0180	-0.3373
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	47.1400	0.0000	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges (36a) = 0.4109 (36)
 Total fabric heat loss (33) + (36) + (36a) = 9.6635 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	16.0121	15.8313	15.6504	14.7462	14.5653	13.6611	13.6611	13.4802	14.0228	14.5653	14.9270	15.2887 (38)
Heat transfer coeff	25.6757	25.4948	25.3139	24.4097	24.2288	23.3246	23.3246	23.1437	23.6863	24.2288	24.5905	24.9522 (39)
Average = Sum(39)m / 12 =												24.3645
HLP	0.4141	0.4112	0.4083	0.3937	0.3908	0.3762	0.3762	0.3733	0.3820	0.3908	0.3966	Dec 0.4025 (40)
HLP (average)												0.3930
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)										Total = Sum(45)m =		2153.9058
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest	8.6000	11.2829	0.2400	0.0000	0.7700	17.9318 (81)

Full SAP Calculation Printout



Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	493.9062	510.4571	524.4649	537.3951	546.4180	530.1973	504.7070	478.3694	457.5279	448.1234	458.0368	478.0608 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	193.8962	195.2716	196.6667	203.9523	205.4747	213.4407	213.4407	215.1086	210.1813	205.4747	202.4524	199.5176
alpha	13.9264	14.0181	14.1111	14.5968	14.6983	15.2294	15.2294	15.3406	15.0121	14.6983	14.4968	14.3012
util living area	0.8500	0.7964	0.6985	0.5496	0.4124	0.2816	0.2033	0.2225	0.3572	0.5622	0.7435	0.8578 (86)
MIT	20.9843	20.9931	20.9987	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9978	20.9841 (87)
Th 2	20.6002	20.6029	20.6056	20.6192	20.6219	20.6356	20.6356	20.6383	20.6301	20.6219	20.6165	20.6110 (88)
util rest of house	0.8333	0.7785	0.6799	0.5323	0.3956	0.2655	0.1865	0.2051	0.3381	0.5418	0.7237	0.8418 (89)
MIT 2	20.5846	20.5963	20.6045	20.6192	20.6219	20.6356	20.6356	20.6383	20.6301	20.6219	20.6145	20.5951 (90)
Living area fraction									fLA = Living area / (4) =			0.3702 (91)
MIT	20.7325	20.7432	20.7504	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7564	20.7391 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7325	20.7432	20.7504	20.7601	20.7619	20.7705	20.7705	20.7722	20.7670	20.7618	20.7564	20.7391 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8389	0.7849	0.6867	0.5387	0.4018	0.2715	0.1927	0.2115	0.3452	0.5494	0.7310	0.8471 (94)
Useful gains	414.3394	400.6544	360.1592	289.4860	219.5586	143.9238	97.2746	101.1890	157.9172	246.1930	334.8137	404.9854 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.0000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	421.9164	403.9187	360.7342	289.5020	219.5588	143.9238	97.2746	101.1890	157.9173	246.2096	335.8178	412.6876 (97)
Space heating kWh	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (98a)
Space heating requirement - total per year (kWh/year)												14.7361
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												14.7361
Space heating per m2										(98c) / (4) =		0.2377 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	5.6373	2.1936	0.4278	0.0115	0.0001	0.0000	0.0000	0.0000	0.0000	0.0124	0.7229	5.7304 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.3768	12.3768	12.7893	12.3768	12.7893 (231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												14.7361 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764

Full SAP Calculation Printout



Water heating fuel used	726.6710 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400) mechanical ventilation fans (SFP = 0.8400)	150.5841 (230a)
Total electricity for the above, kWh/year	150.5841 (231)
Electricity for lighting (calculated in Appendix L)	145.1281 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1037.1193 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	14.7361	16.4900	2.4300 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	16.4900	119.8280 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313 (249)
Energy for lighting	145.1281	16.4900	23.9316 (250)
Additional standing charges			0.0000 (251)
Total energy cost			171.0210 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.5754 (257)
SAP value	90.6728
SAP rating (Section 12)	91 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	14.7361	0.1616	2.3819 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			104.9953 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			146.8296 (272)
CO2 emissions per m2			2.3700 (273)
EI value			98.1612
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes

Full SAP Calculation Printout



Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
3.8500 (17)
0.1925 (18)
3 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor
(20) = 1 - [0.075 x (19)] = 0.7750 (20)
(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1604	0.1566	0.1604	0.1455	0.1492	0.1268	0.1231	0.1231	0.1268	0.1417	0.1417	0.1455	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.3004	0.2966	0.3004	0.2855	0.2892	0.2668	0.2631	0.2631	0.2668	0.2817	0.2817	0.2855	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.6000	0.7752	6.6667			(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999	(29a)
Total net area of external elements Aum(A, m2)			22.2100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 9.2526			(33)
Main dwelling								
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001	(32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000	(32)
Party Floor 1			62.0000			40.0000	2480.0000	(32d)
Party Ceiling 1			62.0000			40.0000	2480.0000	(32b)
Internal Wall 1			96.0200			9.0000	864.1800	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 17922.2800	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							289.0690	(35)
List of Thermal Bridges								
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					4.7700	0.0340	0.1622	
E3 Sill					4.7700	0.0260	0.1240	
E4 Jamb					10.8200	0.0300	0.3246	
E18 Party wall between dwellings					4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)					18.7400	-0.0180	-0.3373	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					47.1400	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							0.4109	(36)
Point Thermal bridges							(36a) = 0.0000	
Total fabric heat loss							(33) + (36) + (36a) = 9.6635	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	14.5653	14.3845	14.5653	13.8419	14.0228	12.9376	12.7568	12.7568	12.9376	13.6611	13.6611	13.8419	(38)
Heat transfer coeff	24.2288	24.0480	24.2288	23.5054	23.6863	22.6011	22.4203	22.4203	22.6011	23.3246	23.3246	23.5054	(39)
Average = Sum(39)m / 12 =												23.3246	
HLP	0.3908	0.3879	0.3908	0.3791	0.3820	0.3645	0.3616	0.3616	0.3645	0.3762	0.3762	0.3791	(40)
HLP (average)												0.3762	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376	(42)
Hot water usage for mixer showers														
80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	79.9692	(42a)	
Hot water usage for baths														
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	25.1446	(42b)	
Hot water usage for other uses														
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	35.4969	(42c)	
Average daily hot water use (litres/day)													129.6745	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	140.6107	(44)	
Energy content	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)	
Energy content (annual)										Total =	Sum(45)m =	2153.9058		
Distribution loss (46)m = 0.15 x (45)m														
33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	33.0243	(46)	
Water storage loss:														
Store volume													201.0000	(47)
a) If manufacturer declared loss factor is known													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)	
If cylinder contains dedicated solar storage														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	247.1137	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h														
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	247.1137	(64)	
									Total per year (kWh/year) =	Sum(64)m =	2471.2368	2471.2368	(64)	
Electric shower(s)														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =														
Heat gains from water heating, kWh/month														

Full SAP Calculation Printout



74.2523 65.4019 68.7631 58.6849 55.6944 48.8817 47.2704 49.8613 51.2028 58.6606 64.2963 73.2040 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924	(72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Table 6b	Specific data or Table 6c	FF	Access factor Table 6d			Gains W

Northwest				8.6000	9.9768	0.2400		0.0000		0.7700		15.8559 (81)	

Solar gains	15.8559	33.1182	62.3563	104.4552	136.9322	149.4328	136.4321	108.1317	78.0748	43.2583	20.5050	13.9393	(83)
Total gains	491.8304	507.0747	521.0588	533.8494	538.1758	524.8589	496.3538	471.0766	455.4701	446.7751	455.9790	477.3561	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	205.4747	207.0200	205.4747	211.7985	210.1813	220.2725	222.0493	222.0493	220.2725	213.4407	213.4407	211.7985	
alpha	14.6983	14.8013	14.6983	15.1199	15.0121	15.6848	15.8033	15.8033	15.6848	15.2294	15.2294	15.1199	
util living area	0.7785	0.7239	0.6414	0.4931	0.3609	0.2325	0.1716	0.1904	0.3176	0.5116	0.6747	0.7878	(86)
MIT	20.9959	20.9985	20.9997	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9996	20.9958	(87)
Th 2	20.6219	20.6247	20.6219	20.6329	20.6301	20.6465	20.6493	20.6493	20.6465	20.6356	20.6356	20.6329	(88)
util rest of house	0.7611	0.7066	0.6239	0.4770	0.3446	0.2173	0.1558	0.1737	0.3000	0.4926	0.6562	0.7710	(89)
MIT 2	20.6180	20.6232	20.6217	20.6329	20.6301	20.6465	20.6493	20.6493	20.6465	20.6356	20.6352	20.6288	(90)
Living area fraction										flA = Living area / (4) =		0.3702	(91)
MIT	20.7579	20.7621	20.7616	20.7688	20.7670	20.7774	20.7791	20.7791	20.7774	20.7705	20.7701	20.7647	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.7579	20.7621	20.7616	20.7688	20.7670	20.7774	20.7791	20.7791	20.7774	20.7705	20.7701	20.7647	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7674	0.7129	0.6303	0.4830	0.3506	0.2229	0.1617	0.1799	0.3065	0.4996	0.6630	0.7770	(94)
Useful gains	377.4293	361.4985	328.4432	257.8229	188.7094	117.0146	80.2445	84.7286	139.6158	223.2242	302.3242	370.9178	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	379.3722	362.2137	328.5816	257.8251	188.7094	117.0146	80.2445	84.7286	139.6158	223.2271	302.5213	372.9054	(97)
Space heating kWh	1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788	(98a)
Space heating requirement - total per year (kWh/year)												3.6535	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3.6535	
Space heating per m ²										(98c) / (4) =		0.0589	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	1.4455	0.4806	0.1030	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.1419	1.4788	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													

Full SAP Calculation Printout



Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
													(213)
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3.6535	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												150.5841	(230a)
Total electricity for the above, kWh/year												150.5841	(231)
Electricity for lighting (calculated in Appendix L)												145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1026.0368	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost f/year	
Space heating - main system 1	3.6535	28.4300	1.0387	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	28.4300	206.5926	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111	(249)
Energy for lighting	145.1281	28.4300	41.2599	(250)
Additional standing charges			0.0000	(251)
Total energy cost			291.7023	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3.6535	0.1618	0.5913	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			103.2047	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	145.1281	0.1443	20.9465	(268)
Total CO2, kg/year			145.0390	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3.6535	1.5989	5.8415	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	1.5222	1106.1095	(278)
Space and water heating			1111.9510	(279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036	(281)
Energy for lighting	145.1281	1.5338	222.6023	(282)
Total Primary energy kWh/year			1562.3570	(286)

Full SAP Calculation Printout



Property Reference	Plot 9			Issued on Date	27/08/2025
Assessment Reference	Plot 9	Prop Type Ref			
Property	Flat 9, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.57	TER	10.07
Environmental	98 A	% DER < TER			74.48
CO ₂ Emissions (t/year)	0.13	DFEE	9.29	TFEE	13.52
Compliance Check	See BREL	% DFEE < TFEE			31.25
% DPER < TPER	47.93	DPER	27.65	TPER	53.10
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15009.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							300.1936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3389 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.9130	12.7672	12.6213	11.8921	11.7462	11.0170	11.0170	10.8711	11.3087	11.7462	12.0379	12.3296 (38)
Average = Sum(39)m / 12 =	19.4341	19.2882	19.1424	18.4131	18.2673	17.5380	17.5380	17.3922	17.8297	18.2673	18.5590	18.8507 (39)
												18.3767
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3887	0.3858	0.3828	0.3683	0.3653	0.3508	0.3508	0.3478	0.3566	0.3653	0.3712	0.3770 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700									0.7700		12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	214.5385	216.1607	217.8077	226.4339	228.2418	237.7323	237.7323	239.7259	233.8430	228.2418	224.6545	221.1781
alpha	15.3026	15.4107	15.5205	16.0956	16.2161	16.8488	16.8488	16.9817	16.5895	16.2161	15.9770	15.7452
util living area	0.8367	0.7653	0.6813	0.5289	0.3971	0.2664	0.1924	0.2092	0.3341	0.5338	0.7094	0.8390 (86)
MIT	20.9911	20.9974	20.9995	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9993	20.9918 (87)
Th 2	20.6239	20.6266	20.6294	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6403	20.6348 (88)
util rest of house	0.8203	0.7483	0.6640	0.5133	0.3819	0.2522	0.1775	0.1939	0.3173	0.5156	0.6913	0.8231 (89)
MIT 2	20.6152	20.6242	20.6289	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6397	20.6268 (90)
Living area fraction	20.7829	20.7906	20.7942	20.8022	20.8038	20.8114	20.8114	20.8129	fLA = Living area / (4) =	20.8038	20.8001	0.4460 (91)
MIT	20.7829	20.7906	20.7942	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8001	20.7896 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7829	20.7906	20.7942	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8001	20.7896 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8273	0.7558	0.6717	0.5203	0.3887	0.2585	0.1841	0.2007	0.3248	0.5237	0.6993	0.8299 (94)
Useful gains	316.7126	305.4456	273.4363	219.1545	166.3008	108.9350	73.8589	76.7496	119.6074	186.3923	254.0035	309.3785 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.3293	306.5014	273.6251	219.1573	166.3009	108.9350	73.8589	76.7496	119.6074	186.3948	254.2599	312.7245 (97)
Space heating kWh	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (98a)
Space heating requirement - total per year (kWh/year)												6.2187
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6.2187
Space heating per m2										(98c) / (4) =		0.1244 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												6.2187 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)
Total electricity for the above, kWh/year												121.4388 (231)
Electricity for lighting (calculated in Appendix L)												124.5474 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	907.7538 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	6.2187	0.1621	1.0078 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			93.5551 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			128.3761 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	6.2187	1.5996	9.9477 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1007.7119 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1382.4594 (286)
Dwelling Primary energy Rate (DPER)			27.6500 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

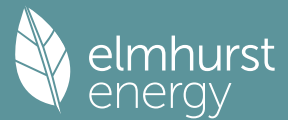
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type			5.9700	1.1450	6.8359		(27)					
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724		(29a)					
Total net area of external elements Aum(A, m2)			14.1500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		8.3083		(33)					
Main dwelling												
Corridor			22.1400	0.0000	0.0000		(32)					
Party Wall			31.4300	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							310.1936 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590						
E3 Sill				3.1800	0.0500	0.1590						
E4 Jamb				7.5200	0.0500	0.3760						
E18 Party wall between dwellings				4.7400	0.0600	0.2844						
E7 Party floor between dwellings (in blocks of flats)				11.9400	0.0700	0.8358						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				45.2000	0.0000	0.0000						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.8142 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	10.1225 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960 (38)
Average = Sum(39)m / 12 =	33.0230	32.8930	32.7656	32.1670	32.0550	31.5337	31.5337	31.4372	31.7345	32.0550	32.2816	32.5184 (39)
												32.1665
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6605	0.6579	0.6553	0.6433	0.6411	0.6307	0.6307	0.6287	0.6347	0.6411	0.6456	0.6504 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	52.3556	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													98.5597 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	25.1167	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)													
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

6. Solar gains

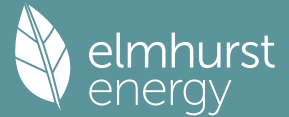
[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



	m2				Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d	W	
Northwest	5.9700				11.2829	0.6300		0.7000		0.7700	20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	473.0747	442.3087	415.8430	411.5583	416.3553 (84)
7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.4619	130.9775	131.4869	133.9336	134.4015	136.6235	136.6235	137.0430	135.7589	134.4015	133.4583	132.4862
alpha	9.6975	9.7318	9.7658	9.9289	9.9601	10.1082	10.1082	10.1362	10.0506	9.9601	9.8972	9.8324
util living area	0.9796	0.9587	0.9076	0.7510	0.5577	0.3811	0.2744	0.3057	0.4948	0.7824	0.9423	0.9826 (86)
MIT	20.7420	20.8226	20.9135	20.9869	20.9992	21.0000	21.0000	21.0000	20.9998	20.9843	20.8811	20.7325 (87)
Th 2	20.3759	20.3782	20.3805	20.3912	20.3932	20.4025	20.4025	20.4042	20.3989	20.3932	20.3891	20.3849 (88)
util rest of house	0.9735	0.9476	0.8867	0.7172	0.5216	0.3455	0.2371	0.2661	0.4518	0.7431	0.9259	0.9774 (89)
MIT 2	20.0897	20.1890	20.2954	20.3803	20.3926	20.4025	20.4025	20.4042	20.3988	20.3809	20.2691	20.0861 (90)
Living area fraction	20.3806	20.4716	20.5711	20.6508	20.6632	20.6690	20.6690	20.6699	20.6668	20.6500	20.5420	20.3744 (92)
MIT	20.3806	20.4716	20.5711	20.6508	20.6632	20.6690	20.6690	20.6699	20.6668	20.6500	20.5420	20.3744 (93)
Temperature adjustment	20.3806	20.4716	20.5711	20.6508	20.6632	20.6690	20.6690	20.6699	20.6668	20.6500	20.5420	20.3744 (93)
adjusted MIT	20.3806	20.4716	20.5711	20.6508	20.6632	20.6690	20.6690	20.6699	20.6668	20.6500	20.5420	20.3744 (93)
8. Space heating requirement												
Utilisation	0.9735	0.9494	0.8935	0.7318	0.5377	0.3614	0.2538	0.2837	0.4710	0.7601	0.9303	0.9773 (94)
Useful gains	416.3614	434.2672	423.9966	372.7417	287.0371	191.3727	128.3096	134.2341	208.3384	316.0736	382.8902	406.8836 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	531.0310	512.1968	461.0464	377.9894	287.3148	191.3768	128.3097	134.2344	208.3956	322.1533	433.9305	525.9658 (97)
Space heating kWh	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98a)
Space heating requirement - total per year (kWh/year)	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98c)
Space heating per m2										(98c) / (4) =		5.9820 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	92.4314	56.7375	29.8647	4.0936	0.2238	0.0000	0.0000	0.0000	0.0000	4.9007	39.8148	95.9882 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater (217)m	82.3647	81.7490	80.8817	79.9862	79.8107	79.8000	79.8000	79.8000	79.8000	80.0191	81.2507	79.8000 (216)
Fuel for water heating, kWh/month	233.5684	208.2674	224.1968	200.8996	196.1970	177.9421	176.5248	182.9609	184.3137	203.5930	211.5166	82.4532 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												324.0546 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000

Full SAP Calculation Printout



Water heating fuel used	2430.9690 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2155.6107 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	324.0546	0.2100	68.0515 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2430.9690	0.2100	510.5035 (264)
Space and water heating			578.5550 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			503.6868 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	324.0546	1.1300	366.1817 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2430.9690	1.1300	2746.9950 (278)
Space and water heating			3113.1767 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2655.1603 (286)
Target Primary Energy Rate (TPER)			53.1000 (287)

Full SAP Calculation Printout



Property Reference	Plot 9			Issued on Date	27/08/2025
Assessment Reference	Plot 9	Prop Type Ref			
Property	Flat 9, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.57	TER	10.07
Environmental	98 A	% DER < TER			74.48
CO ₂ Emissions (t/year)	0.13	DFEE	9.29	TFEE	13.52
Compliance Check	See BREL	% DFEE < TFEE			31.25
% DPER < TPER	47.93	DPER	27.65	TPER	53.10
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume			118.5000 (4)

2. Ventilation rate

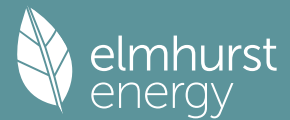
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.3613 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2800 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3570	0.3500	0.3430	0.3080	0.3010	0.2660	0.2660	0.2590	0.2800	0.3010	0.3150	0.3290 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5637	0.5612	0.5588	0.5474	0.5453	0.5354	0.5354	0.5335	0.5392	0.5453	0.5496	0.5541 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15509.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							310.1936 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081
E3 Sill					3.1800	0.0260	0.0827
E4 Jamb					7.5200	0.0300	0.2256

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2000	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.3389 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
22.0443	21.9475	21.8527	21.4072	21.3238	20.9358	20.9358	20.8640	21.0853	21.3238	21.4924	21.6687	(38)
(38)m												
Heat transfer coeff	28.5653	28.4685	28.3737	27.9282	27.8449	27.4569	27.4569	27.3850	27.6063	27.8449	28.0135	28.1898 (39)
Average = Sum(39)m / 12 =												27.9278
HLP	0.5713	0.5694	0.5675	0.5586	0.5569	0.5491	0.5491	0.5477	0.5521	0.5569	0.5603	0.5638 (40)
HLP (average)												0.5586
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Energy content (annual)												832.1197
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (64)
12Total per year (kWh/year)												707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												478.7637 (64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (73)

6. Solar gains

[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)						
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	331.8630	354.4053	360.2546	381.3959	392.1659	390.0297	372.8334	352.0659	335.5333	318.3307	318.9282	322.7690 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	150.8209	151.3335	151.8394	154.2613	154.7230	156.9094	156.9094	157.3211	156.0599	154.7230	153.7918	152.8301
alpha	11.0547	11.0889	11.1226	11.2841	11.3149	11.4606	11.4606	11.4881	11.4040	11.3149	11.2528	11.1887

Full SAP Calculation Printout



util living area	0.9944	0.9863	0.9645	0.8527	0.6583	0.4505	0.3240	0.3578	0.5673	0.8688	0.9790	0.9956 (86)
MIT	20.7095	20.7849	20.8736	20.9748	20.9984	21.0000	21.0000	21.0000	20.9997	20.9742	20.8473	20.6988 (87)
Th 2	20.4559	20.4576	20.4594	20.4674	20.4689	20.4760	20.4760	20.4773	20.4733	20.4689	20.4659	20.4627 (88)
util rest of house	0.9925	0.9819	0.9539	0.8242	0.6215	0.4136	0.2854	0.3171	0.5242	0.8365	0.9717	0.9941 (89)
MIT 2	20.1948	20.2700	20.3557	20.4502	20.4681	20.4760	20.4760	20.4773	20.4732	20.4521	20.3381	20.1905 (90)
Living area fraction	20.4243	20.4997	20.5866	20.6842	20.7046	20.7097	20.7097	20.7104	20.7080	20.6850	20.5652	20.4460 (91)
MIT	20.4243	20.4997	20.5866	20.6842	20.7046	20.7097	20.7097	20.7104	20.7080	20.6850	20.5652	20.4172 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4243	20.4997	20.5866	20.6842	20.7046	20.7097	20.7097	20.7104	20.7080	20.6850	20.5652	20.4172 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9924	0.9823	0.9566	0.8361	0.6379	0.4301	0.3027	0.3353	0.5434	0.8502	0.9732	0.9939	(94)
Useful gains	329.3396	348.1297	344.6235	318.8945	250.1567	167.7470	112.8395	118.0408	182.3435	270.6320	310.3798	320.8100	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	460.5968	444.1002	399.6902	329.1108	250.7322	167.7530	112.8396	118.0411	182.4233	280.8144	377.2074	457.1584	(97)
Space heating kWh	97.6554	64.4922	40.9696	7.3557	0.4282	0.0000	0.0000	0.0000	0.0000	7.5757	48.1158	101.4432	(98a)
Space heating requirement - total per year (kWh/year)												368.0357	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	97.6554	64.4922	40.9696	7.3557	0.4282	0.0000	0.0000	0.0000	0.0000	7.5757	48.1158	101.4432	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												368.0357	
Space heating per m2										(98c) / (4) =		7.3607	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	258.0948	203.1810	208.1263	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9985	0.9998	0.9995	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	257.6963	203.1379	208.0246	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	417.5437	399.4079	376.8553	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	115.0901	146.0250	125.6100	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	28.7725	36.5062	31.4025	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												96.6813	(107)
Energy for space heating												7.3607	(99)
Energy for space cooling												1.9336	(108)
Total												9.2943	(109)
Fabric Energy Efficiency (DFEE)												9.3	(109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)	

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1688 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4188 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3246 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724			(29a)
Total net area of external elements Aum(A, m2)			14.1500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	8.3083			(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000			(32)
Party Wall			31.4300	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

310.1936 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	3.1800	0.0500	0.1590	
E4 Jamb	7.5200	0.0500	0.3760	
E18 Party wall between dwellings	4.7400	0.0600	0.2844	
E7 Party floor between dwellings (in blocks of flats)	11.9400	0.0700	0.8358	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				1.8142 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	10.1225 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Heat transfer coeff	33.0230	32.8930	32.7656	32.1670	32.0550	31.5337	31.5337	31.4372	31.7345	32.0550	32.2816	32.5184	(39)
Average = Sum(39)m / 12 =													32.1665

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6605	0.6579	0.6553	0.6433	0.6411	0.6307	0.6307	0.6287	0.6347	0.6411	0.6456	0.6504	(40)
HLP (average)													0.6433
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476		(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383		(42c)
Average daily hot water use (litres/day)													50.1040 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)										Total = Sum(45)m =			832.1197
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(64)
													707.3017 (64)
12Total per year (kWh/year)													707 (64)
Electric shower(s)													
42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893		(64a)
													478.7637 (64a)
Heat gains from water heating, kWh/month													
28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844		(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203		(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376		(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505		(69)

Full SAP Calculation Printout



Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.9700		11.2829		0.6300		0.7000		0.7700		20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	337.5612	368.2691	387.6595	427.8883	455.6099	457.7476	436.1007	402.0087	369.3784	336.1345	326.6467	326.9751 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.4619	130.9775	131.4869	133.9336	134.4015	136.6235	136.6235	137.0430	135.7589	134.4015	133.4583	132.4862
alpha	9.6975	9.7318	9.7658	9.9289	9.9601	10.1082	10.1082	10.1362	10.0506	9.9601	9.8972	9.8324
util living area	0.9967	0.9909	0.9716	0.8599	0.6510	0.4408	0.3182	0.3597	0.5915	0.9050	0.9879	0.9974 (86)
MIT	20.5813	20.6793	20.8081	20.9584	20.9970	20.9999	21.0000	21.0000	20.9991	20.9430	20.7540	20.5706 (87)
Th 2	20.3759	20.3782	20.3805	20.3912	20.3932	20.4025	20.4025	20.4042	20.3989	20.3932	20.3891	20.3849 (88)
util rest of house	0.9955	0.9878	0.9622	0.8294	0.6098	0.3997	0.2749	0.3131	0.5406	0.8747	0.9831	0.9965 (89)
MIT 2	19.9965	20.0951	20.2211	20.3624	20.3916	20.4025	20.4025	20.4042	20.3985	20.3543	20.1786	19.9939 (90)
Living area fraction	fLA = Living area / (4) =											0.4460 (91)
MIT	20.2573	20.3556	20.4829	20.6282	20.6616	20.6689	20.6690	20.6699	20.6664	20.6168	20.4352	20.2511 (92)
Temperature adjustment	0.0000											0.0000
adjusted MIT	20.2573	20.3556	20.4829	20.6282	20.6616	20.6689	20.6690	20.6699	20.6664	20.6168	20.4352	20.2511 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9952	0.9877	0.9639	0.8417	0.6281	0.4180	0.2942	0.3339	0.5634	0.8866	0.9835	0.9962 (94)
Useful gains	335.9321	363.7232	373.6787	360.1568	286.1841	191.3594	128.3093	134.2330	208.0918	298.0084	321.2513	325.7379 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	526.9595	508.3828	458.1581	377.2612	287.2644	191.3760	128.3097	134.2343	208.3804	321.0901	430.4817	521.9566 (97)
Space heating kWh	142.1243	97.2112	62.8527	12.3152	0.8037	0.0000	0.0000	0.0000	0.0000	17.1728	78.6459	145.9867 (98a)
Space heating requirement - total per year (kWh/year)												557.1125
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	142.1243	97.2112	62.8527	12.3152	0.8037	0.0000	0.0000	0.0000	0.0000	17.1728	78.6459	145.9867 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												557.1125
Space heating per m2												(98c) / (4) = 11.1422 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	296.4169	233.3495	238.9225	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9979	0.9996	0.9990	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	295.7974	233.2611	238.6879	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	499.4277	475.9778	437.7817	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	146.6138	180.5812	148.1258	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fC = cooled area / (4) =											1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	36.6535	45.1453	37.0314	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												118.8302 (107)
Energy for space heating												11.1422 (99)
Energy for space cooling												2.3766 (108)
Total												13.5189 (109)
Fabric Energy Efficiency (TFEE)												13.5 (109)

Full SAP Calculation Printout



Property Reference	Plot 9			Issued on Date	27/08/2025
Assessment Reference	Plot 9	Prop Type Ref			
Property	Flat 9, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.57	TER	10.07
Environmental	98 A	% DER < TER			74.48
CO ₂ Emissions (t/year)	0.13	DFEE	9.29	TFEE	13.52
Compliance Check	See BREL	% DFEE < TFEE			31.25
% DPER < TPER	47.93	DPER	27.65	TPER	53.10
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15009.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							300.1936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3389 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.9130	12.7672	12.6213	11.8921	11.7462	11.0170	11.0170	10.8711	11.3087	11.7462	12.0379	12.3296 (38)
Average = Sum(39)m / 12 =	19.4341	19.2882	19.1424	18.4131	18.2673	17.5380	17.5380	17.3922	17.8297	18.2673	18.5590	18.8507 (39)
												18.3767
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3887	0.3858	0.3828	0.3683	0.3653	0.3508	0.3508	0.3478	0.3566	0.3653	0.3712	0.3770 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700									0.7700		12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	214.5385	216.1607	217.8077	226.4339	228.2418	237.7323	237.7323	239.7259	233.8430	228.2418	224.6545	221.1781
alpha	15.3026	15.4107	15.5205	16.0956	16.2161	16.8488	16.8488	16.9817	16.5895	16.2161	15.9770	15.7452
util living area	0.8367	0.7653	0.6813	0.5289	0.3971	0.2664	0.1924	0.2092	0.3341	0.5338	0.7094	0.8390 (86)
MIT	20.9911	20.9974	20.9995	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9993	20.9918 (87)
Th 2	20.6239	20.6266	20.6294	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6403	20.6348 (88)
util rest of house	0.8203	0.7483	0.6640	0.5133	0.3819	0.2522	0.1775	0.1939	0.3173	0.5156	0.6913	0.8231 (89)
MIT 2	20.6152	20.6242	20.6289	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6397	20.6268 (90)
Living area fraction									fLA = Living area / (4) =			0.4460 (91)
MIT	20.7829	20.7906	20.7942	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8001	20.7896 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7829	20.7906	20.7942	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8001	20.7896 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8273	0.7558	0.6717	0.5203	0.3887	0.2585	0.1841	0.2007	0.3248	0.5237	0.6993	0.8299 (94)
Useful gains	316.7126	305.4456	273.4363	219.1545	166.3008	108.9350	73.8589	76.7496	119.6074	186.3923	254.0035	309.3785 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.3293	306.5014	273.6251	219.1573	166.3009	108.9350	73.8589	76.7496	119.6074	186.3948	254.2599	312.7245 (97)
Space heating kWh	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (98a)
Space heating requirement - total per year (kWh/year)												6.2187
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6.2187
Space heating per m2										(98c) / (4) =		0.1244 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	2.6908	0.7095	0.1404	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.1846	2.4894 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												6.2187 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)
Total electricity for the above, kWh/year												121.4388 (231)
Electricity for lighting (calculated in Appendix L)												124.5474 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	907.7538 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	6.2187	0.1621	1.0078 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			93.5551 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			128.3761 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	6.2187	1.5996	9.9477 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1007.7119 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1382.4594 (286)
Dwelling Primary energy Rate (DPER)			27.6500 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

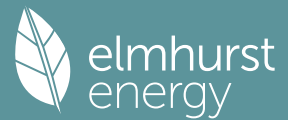
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type			5.9700	1.1450	6.8359		(27)					
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724		(29a)					
Total net area of external elements Aum(A, m2)			14.1500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		8.3083		(33)					
Main dwelling												
Corridor			22.1400	0.0000	0.0000		(32)					
Party Wall			31.4300	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							310.1936 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590						
E3 Sill				3.1800	0.0500	0.1590						
E4 Jamb				7.5200	0.0500	0.3760						
E18 Party wall between dwellings				4.7400	0.0600	0.2844						
E7 Party floor between dwellings (in blocks of flats)				11.9400	0.0700	0.8358						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				45.2000	0.0000	0.0000						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.8142 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	10.1225 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960
Average = Sum(39)m / 12 =	33.0230	32.8930	32.7656	32.1670	32.0550	31.5337	31.5337	31.4372	31.7345	32.0550	32.2816	32.5184
												32.1665
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6605	0.6579	0.6553	0.6433	0.6411	0.6307	0.6307	0.6287	0.6347	0.6411	0.6456	0.6504
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	52.3556	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													98.5597 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													1637.0557
25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	25.1167	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)													1962.4258 (64)
Electric shower(s)													1962 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

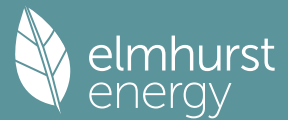
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

6. Solar gains

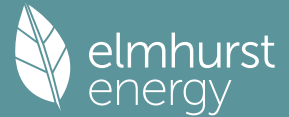
[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



	m2				Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d	W	
Northwest	5.9700				11.2829	0.6300		0.7000		0.7700	20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	473.0747	442.3087	415.8430	411.5583	416.3553 (84)
7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.4619	130.9775	131.4869	133.9336	134.4015	136.6235	136.6235	137.0430	135.7589	134.4015	133.4583	132.4862
alpha	9.6975	9.7318	9.7658	9.9289	9.9601	10.1082	10.1082	10.1362	10.0506	9.9601	9.8972	9.8324
util living area	0.9796	0.9587	0.9076	0.7510	0.5577	0.3811	0.2744	0.3057	0.4948	0.7824	0.9423	0.9826 (86)
MIT	20.7420	20.8226	20.9135	20.9869	20.9992	21.0000	21.0000	21.0000	20.9998	20.9843	20.8811	20.7325 (87)
Th 2	20.3759	20.3782	20.3805	20.3912	20.3932	20.4025	20.4025	20.4042	20.3989	20.3932	20.3891	20.3849 (88)
util rest of house	0.9735	0.9476	0.8867	0.7172	0.5216	0.3455	0.2371	0.2661	0.4518	0.7431	0.9259	0.9774 (89)
MIT 2	20.0897	20.1890	20.2954	20.3803	20.3926	20.4025	20.4025	20.4042	20.3988	20.3809	20.2691	20.0861 (90)
Living area fraction	20.3806	20.4716	20.5711	20.6508	20.6632	20.6690	20.6690	20.6699	20.6668	20.6500	20.5420	20.3744 (92)
MIT	20.3806	20.4716	20.5711	20.6508	20.6632	20.6690	20.6690	20.6699	20.6668	20.6500	20.5420	20.3744 (93)
Temperature adjustment												0.0000
adjusted MIT	20.3806	20.4716	20.5711	20.6508	20.6632	20.6690	20.6690	20.6699	20.6668	20.6500	20.5420	20.3744 (93)
8. Space heating requirement												
Utilisation	0.9735	0.9494	0.8935	0.7318	0.5377	0.3614	0.2538	0.2837	0.4710	0.7601	0.9303	0.9773 (94)
Useful gains	416.3614	434.2672	423.9966	372.7417	287.0371	191.3727	128.3096	134.2341	208.3384	316.0736	382.8902	406.8836 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	531.0310	512.1968	461.0464	377.9894	287.3148	191.3768	128.3097	134.2344	208.3956	322.1533	433.9305	525.9658 (97)
Space heating kWh	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98a)
Space heating requirement - total per year (kWh/year)												299.1024
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												299.1024
Space heating per m2										(98c) / (4) =		5.9820 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	85.3142	52.3687	27.5651	3.7784	0.2066	0.0000	0.0000	0.0000	0.0000	4.5233	36.7490	88.5971 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	92.4314	56.7375	29.8647	4.0936	0.2238	0.0000	0.0000	0.0000	0.0000	4.9007	39.8148	95.9882 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater (217)m	82.3647	81.7490	80.8817	79.9862	79.8107	79.8000	79.8000	79.8000	79.8000	80.0191	81.2507	79.8000 (216)
Fuel for water heating, kWh/month	233.5684	208.2674	224.1968	200.8996	196.1970	177.9421	176.5248	182.9609	184.3137	203.5930	211.5166	82.4532 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												324.0546 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000

Full SAP Calculation Printout



Water heating fuel used	2430.9690 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2155.6107 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	324.0546	0.2100	68.0515 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2430.9690	0.2100	510.5035 (264)
Space and water heating			578.5550 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			503.6868 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	324.0546	1.1300	366.1817 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2430.9690	1.1300	2746.9950 (278)
Space and water heating			3113.1767 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2655.1603 (286)
Target Primary Energy Rate (TPER)			53.1000 (287)

Full SAP Calculation Printout



Property Reference	Plot 9			Issued on Date	27/08/2025
Assessment Reference	Plot 9	Prop Type Ref			
Property	Flat 9, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.57	TER	10.07
Environmental	98 A	% DER < TER			74.48
CO ₂ Emissions (t/year)	0.13	DFEE	9.29	TFEE	13.52
Compliance Check	See BREL	% DFEE < TFEE			31.25
% DPER < TPER	47.93	DPER	27.65	TPER	53.10
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15509.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							310.1936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2000	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.3389 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.9130	12.7672	12.6213	11.8921	11.7462	11.0170	11.0170	10.8711	11.3087	11.7462	12.0379	12.3296 (38)
Average = Sum(39)m / 12 =	19.4341	19.2882	19.1424	18.4131	18.2673	17.5380	17.5380	17.3922	17.8297	18.2673	18.5590	18.8507 (39)
												18.3767
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3887	0.3858	0.3828	0.3683	0.3653	0.3508	0.3508	0.3478	0.3566	0.3653	0.3712	0.3770 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
Hot water usage for baths												
Hot water usage for other uses												
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Distribution loss	(46)m = 0.15 x (45)m											1938.9067
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
												2256.2377 (64)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Pumps, fans	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700											12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	420.3031	431.2727	438.5037	442.6707	444.6142	429.3686	409.3093	391.7531	379.6128	377.2367	389.2227	407.5463 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	221.6852	223.3615	225.0633	233.9769	235.8450	245.6516	245.6516	247.7116	241.6327	235.8450	232.1381	228.5460
alpha	15.7790	15.8908	16.0042	16.5985	16.7230	17.3768	17.3768	17.5141	17.1088	16.7230	16.4759	16.2364
util living area	0.7692	0.7190	0.6328	0.5033	0.3821	0.2614	0.1885	0.2042	0.3241	0.5036	0.6625	0.7741 (86)
MIT	20.9974	20.9990	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9976 (87)
Th 2	20.6239	20.6266	20.6294	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6403	20.6348 (88)
util rest of house	0.7526	0.7026	0.6167	0.4885	0.3675	0.2475	0.1739	0.1892	0.3078	0.4865	0.6455	0.7580 (89)
MIT 2	20.6215	20.6258	20.6292	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6401	20.6325 (90)
Living area fraction									fLA = Living area /	(4) =		0.4460 (91)
MIT	20.7891	20.7922	20.7945	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8005	20.7953 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7891	20.7922	20.7945	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8005	20.7953 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7599	0.7099	0.6239	0.4951	0.3740	0.2537	0.1804	0.1959	0.3151	0.4941	0.6531	0.7651 (94)
Useful gains	319.3861	306.1413	273.5771	219.1565	166.3009	108.9350	73.8589	76.7496	119.6074	186.3941	254.1887	311.8307 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.4512	306.5330	273.6314	219.1574	166.3009	108.9350	73.8589	76.7496	119.6074	186.3948	254.2679	312.8333 (97)
Space heating kWh	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (98a)
Space heating requirement - total per year (kWh/year)												1.9002
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1.9002
Space heating per m2										(98c) / (4) =		0.0380 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater												344.1753 (216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1.9002 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)
Total electricity for the above, kWh/year												121.4388 (231)
Electricity for lighting (calculated in Appendix L)												124.5474 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	903.4353 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1.9002	16.4900	0.3134 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			148.9765 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.5645 (257)
SAP value	90.8488
SAP rating (Section 12)	91 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1.9002	0.1620	0.3078 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.8551 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.6762 (272)
CO2 emissions per m2			2.5500 (273)
EI value			98.1991
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8500 (17)
Infiltration rate	0.1925 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1492 (21)

Full SAP Calculation Printout



Wind speed	Jan 4.3000	Feb 4.2000	Mar 4.3000	Apr 3.9000	May 4.0000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.4000	Oct 3.8000	Nov 3.8000	Dec 3.9000 (22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1604	0.1566	0.1604	0.1455	0.1492	0.1268	0.1231	0.1231	0.1268	0.1417	0.1417	0.1455 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3004	0.2966	0.3004	0.2855	0.2892	0.2668	0.2631	0.2631	0.2668	0.2817	0.2817	0.2855 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
Total net area of external elements Aum(A, m2)			14.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	6.1821		(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999	(32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =	15509.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								310.1936 (35)
List of Thermal Bridges								
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081	
E3 Sill					3.1800	0.0260	0.0827	
E4 Jamb					7.5200	0.0300	0.2256	
E18 Party wall between dwellings					4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)					11.9400	-0.0180	-0.2149	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					45.2000	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							(36a) =	0.3389 (36)
Point Thermal bridges							(33) + (36) + (36a) =	6.5210 (37)
Total fabric heat loss								

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 11.7462	Feb 11.6004	Mar 11.7462	Apr 11.1628	May 11.3087	Jun 10.4336	Jul 10.2877	Aug 10.2877	Sep 10.4336	Oct 11.0170	Nov 11.0170	Dec 11.1628 (38)
Heat transfer coeff	18.2673	18.1214	18.2673	17.6839	17.8297	16.9546	16.8088	16.8088	16.9546	17.5380	17.5380	17.6839 (39)
Average = Sum(39)m / 12 =												17.5380

HLP	Jan 0.3653	Feb 0.3624	Mar 0.3653	Apr 0.3537	May 0.3566	Jun 0.3391	Jul 0.3362	Aug 0.3362	Sep 0.3391	Oct 0.3508	Nov 0.3508	Dec 0.3537 (40)
HLP (average)												0.3508
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748		(44)
201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856		(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278		(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Full SAP Calculation Printout



(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d		Gains W

Northwest				5.9700	9.9768	0.2400		0.0000		0.7700	11.0070 (81)	

Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	235.8450	237.7432	235.8450	243.6256	241.6327	254.1043	256.3092	256.3092	254.1043	245.6516	245.6516	243.6256		
alpha	16.7230	16.8495	16.7230	17.2417	17.1088	17.9403	18.0873	18.0873	17.9403	17.3768	17.3768	17.2417		
util living area	0.6930	0.6463	0.5780	0.4499	0.3331	0.2151	0.1583	0.1739	0.2869	0.4567	0.5969	0.6990	(86)	
MIT	20.9996	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9996	(87)	
Th 2	20.6458	20.6485	20.6458	20.6567	20.6540	20.6705	20.6732	20.6732	20.6705	20.6595	20.6595	20.6567	(88)	
util rest of house	0.6776	0.6315	0.5631	0.4361	0.3191	0.2020	0.1447	0.1597	0.2722	0.4409	0.5816	0.6842	(89)	
MIT 2	20.6454	20.6484	20.6458	20.6567	20.6540	20.6705	20.6732	20.6732	20.6705	20.6595	20.6595	20.6564	(90)	
Living area fraction									fLA = Living area / (4) =			0.4460	(91)	
MIT	20.8034	20.8052	20.8037	20.8098	20.8083	20.8175	20.8190	20.8190	20.8175	20.8114	20.8113	20.8095	(92)	
Temperature adjustment												0.0000		
adjusted MIT	20.8034	20.8052	20.8037	20.8098	20.8083	20.8175	20.8190	20.8190	20.8175	20.8114	20.8113	20.8095	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.6845	0.6381	0.5698	0.4423	0.3253	0.2078	0.1508	0.1660	0.2787	0.4480	0.5884	0.6908	(94)	
Useful gains	286.6967	273.6758	248.4944	194.6965	142.7861	88.4599	60.8306	64.1923	105.4146	168.5642	228.1838	281.1922	(95)	
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)	
Heat loss rate W	286.8579	273.7270	248.5032	194.6966	142.7861	88.4599	60.8306	64.1923	105.4146	168.5642	228.1931	281.3414	(97)	
Space heating kWh	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(98a)	
Space heating requirement - total per year (kWh/year)												0.2787		
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)												0.0000		
Space heating kWh	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												0.2787		
Space heating per m2										(98c) / (4) =		0.0056	(99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2												0.0000	(213)	
Water heating														
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)	
(217)m													(217)	
Fuel for water heating, kWh/month														

Full SAP Calculation Printout



66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	(232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											0.2787	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											344.1753	
Water heating fuel used											655.5490	(219)
Space cooling fuel											0.0000	(221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)											121.4388	(230a)
Total electricity for the above, kWh/year											121.4388	(231)
Electricity for lighting (calculated in Appendix L)											124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											0.0000	(233)
Wind generation											0.0000	(234)
Hydro-electric generation (Appendix N)											0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)											0.0000	(235)
Appendix Q - special features												
Energy saved or generated											-0.0000	(236)
Energy used											0.0000	(237)
Total delivered energy for all uses											901.8138	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.2787	28.4300	0.0792 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (249a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	124.5474	28.4300	35.4088 (250)
Additional standing charges			0.0000 (251)
Total energy cost			256.3857 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.2787	0.1621	0.0452 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.5924 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.4135 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	0.2787	1.5998	0.4458 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			998.2100 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1372.9575 (286)

SAP 10 EPC IMPROVEMENTS

Plot 9

Current energy efficiency rating:	B 91
Current environmental impact rating:	A 98

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Full SAP Calculation Printout



Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: B 91
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£256	£256	£0
Space heating	£35	£35	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£256	£256	£0
Total cost of uses	£256	£256	£0
Delivered energy	18 kWh/m²	18 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	27 kWh/m²	27 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.8500 (17)
Infiltration rate		0.1925 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1492 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1902	0.1865	0.1828	0.1641	0.1604	0.1417	0.1417	0.1380	0.1492	0.1604	0.1678	0.1753 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3302	0.3265	0.3228	0.3041	0.3004	0.2817	0.2817	0.2780	0.2892	0.3004	0.3078	0.3153 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m2)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		6.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)

Full SAP Calculation Printout



Party Wall	31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1	50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1	50.0000			40.0000	2000.0000 (32b)
Internal Wall 1	71.1200			9.0000	640.0800 (32c)

Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 15509.6799 (34)
 Thermal mass parameter (TMP = C_m / TFA) in kJ/m²K 310.1936 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	3.1800	0.0340	0.1081
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827
E3 Sill	7.5200	0.0300	0.2256
E4 Jamb	4.7400	0.0290	0.1375
E18 Party wall between dwellings	11.9400	-0.0180	-0.2149
E7 Party floor between dwellings (in blocks of flats)	45.2000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.3389 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	6.5210 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.9130	12.7672	12.6213	11.8921	11.7462	11.0170	11.0170	10.8711	11.3087	11.7462	12.0379	12.3296	(38)
Heat transfer coeff	19.4341	19.2882	19.1424	18.4131	18.2673	17.5380	17.5380	17.3922	17.8297	18.2673	18.5590	18.8507	(39)
Average = Sum(39)m / 12 =												18.3767	
HLP	0.3887	0.3858	0.3828	0.3683	0.3653	0.3508	0.3508	0.3478	0.3566	0.3653	0.3712	0.3770	(40)
HLP (average)												0.3675	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)												116.7306	(43)
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)										Total = Sum(45)m =		1938.9067	
Distribution loss (46)m = $0.15 \times (45)\text{m}$	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)

Full SAP Calculation Printout



Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	420.3031	431.2727	438.5037	442.6707	444.6142	429.3686	409.3093	391.7531	379.6128	377.2367	389.2227	407.5463 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	221.6852	223.3615	225.0633	233.9769	235.8450	245.6516	245.6516	247.7116	241.6327	235.8450	232.1381	228.5460
alpha	15.7790	15.8908	16.0042	16.5985	16.7230	17.3768	17.3768	17.5141	17.1088	16.7230	16.4759	16.2364
util living area	0.7692	0.7190	0.6328	0.5033	0.3821	0.2614	0.1885	0.2042	0.3241	0.5036	0.6625	0.7741 (86)
MIT	20.9974	20.9990	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9976 (87)
Th 2	20.6239	20.6266	20.6294	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6403	20.6348 (88)
util rest of house	0.7526	0.7026	0.6167	0.4885	0.3675	0.2475	0.1739	0.1892	0.3078	0.4865	0.6455	0.7580 (89)
MIT 2	20.6215	20.6258	20.6292	20.6430	20.6458	20.6595	20.6595	20.6622	20.6540	20.6458	20.6401	20.6325 (90)
Living area fraction									fLA = Living area / (4) =			0.4460 (91)
MIT	20.7891	20.7922	20.7945	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8005	20.7953 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7891	20.7922	20.7945	20.8022	20.8038	20.8114	20.8114	20.8129	20.8083	20.8038	20.8005	20.7953 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7599	0.7099	0.6239	0.4951	0.3740	0.2537	0.1804	0.1959	0.3151	0.4941	0.6531	0.7651 (94)
Useful gains	319.3861	306.1413	273.5771	219.1565	166.3009	108.9350	73.8589	76.7496	119.6074	186.3941	254.1887	311.8307 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.4512	306.5330	273.6314	219.1574	166.3009	108.9350	73.8589	76.7496	119.6074	186.3948	254.2679	312.8333 (97)
Space heating kWh	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (98a)
Space heating requirement - total per year (kWh/year)												1.9002
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1.9002
Space heating per m2										(98c) / (4) =		0.0380 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	0.7924	0.2632	0.0404	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0571	0.7460 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1.9002 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753

Full SAP Calculation Printout



Water heating fuel used	655.5490 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400) mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	903.4353 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1.9002	16.4900	0.3134 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			148.9765 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 0.5645 (257)
SAP value	90.8488
SAP rating (Section 12)	91 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1.9002	0.1620	0.3078 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.8551 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.6762 (272)
CO2 emissions per m2			2.5500 (273)
EI value			98.1991
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes

Full SAP Calculation Printout



Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
3.8500 (17)
0.1925 (18)
3 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor
(20) = 1 - [0.075 x (19)] = 0.7750 (20)
(21) = (18) x (20) = 0.1492 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1604	0.1566	0.1604	0.1455	0.1492	0.1268	0.1231	0.1231	0.1268	0.1417	0.1417	0.1455	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.3004	0.2966	0.3004	0.2855	0.2892	0.2668	0.2631	0.2631	0.2668	0.2817	0.2817	0.2855	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
Total net area of external elements Aum(A, m2)			14.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 6.1821			(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999	(32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							(28)...(30) + (32) + (32a)...(32e) = 15509.6799	(34)
List of Thermal Bridges							310.1936	(35)
K1 Element				Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081		
E3 Sill				3.1800	0.0260	0.0827		
E4 Jamb				7.5200	0.0300	0.2256		
E18 Party wall between dwellings				4.7400	0.0290	0.1375		
E7 Party floor between dwellings (in blocks of flats)				11.9400	-0.0180	-0.2149		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				45.2000	0.0000	0.0000		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							0.3389	(36)
Point Thermal bridges							(36a) = 0.0000	
Total fabric heat loss							(33) + (36) + (36a) = 6.5210	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	11.7462	11.6004	11.7462	11.1628	11.3087	10.4336	10.2877	10.2877	10.4336	11.0170	11.0170	11.1628	(38)
Average = Sum(39)m / 12 =	18.2673	18.1214	18.2673	17.6839	17.8297	16.9546	16.8088	16.8088	16.9546	17.5380	17.5380	17.6839	(39)
HLP	0.3653	0.3624	0.3653	0.3537	0.3566	0.3391	0.3362	0.3362	0.3391	0.3508	0.3508	0.3537	(40)
HLP (average)												0.3508	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers														
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	71.9889	(42a)	
Hot water usage for baths														
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)	
Hot water usage for other uses														
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)	
Average daily hot water use (litres/day)													116.7306	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	126.5748	(44)	
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1938.9067		
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	29.7278	(46)	
Water storage loss:														
Store volume													201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	225.1370	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h														
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	225.1370	(64)	
Electric shower(s)														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														

Full SAP Calculation Printout



66.8404 58.8737 61.8994 52.8272 50.1352 44.0026 42.5520 44.8842 46.0917 52.8051 57.8782 65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]														
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.9700				9.9768		0.2400		0.0000		0.7700		11.0070 (81)	
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)		
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	235.8450	237.7432	235.8450	243.6256	241.6327	254.1043	256.3092	256.3092	254.1043	245.6516	245.6516	243.6256	
alpha	16.7230	16.8495	16.7230	17.2417	17.1088	17.9403	18.0873	18.0873	17.9403	17.3768	17.3768	17.2417	
util living area	0.6930	0.6463	0.5780	0.4499	0.3331	0.2151	0.1583	0.1739	0.2869	0.4567	0.5969	0.6990	(86)
MIT	20.9996	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9996	(87)
Th 2	20.6458	20.6485	20.6458	20.6567	20.6540	20.6705	20.6732	20.6732	20.6705	20.6595	20.6595	20.6567	(88)
util rest of house	0.6776	0.6315	0.5631	0.4361	0.3191	0.2020	0.1447	0.1597	0.2722	0.4409	0.5816	0.6842	(89)
MIT 2	20.6454	20.6484	20.6458	20.6567	20.6540	20.6705	20.6732	20.6732	20.6705	20.6595	20.6595	20.6564	(90)
Living area fraction									flA = Living area / (4) =			0.4460	(91)
MIT	20.8034	20.8052	20.8037	20.8098	20.8083	20.8175	20.8190	20.8190	20.8175	20.8114	20.8113	20.8095	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.8034	20.8052	20.8037	20.8098	20.8083	20.8175	20.8190	20.8190	20.8175	20.8114	20.8113	20.8095	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6845	0.6381	0.5698	0.4423	0.3253	0.2078	0.1508	0.1660	0.2787	0.4480	0.5884	0.6908	(94)
Useful gains	286.6967	273.6758	248.4944	194.6965	142.7861	88.4599	60.8306	64.1923	105.4146	168.5642	228.1838	281.1922	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	286.8579	273.7270	248.5032	194.6966	142.7861	88.4599	60.8306	64.1923	105.4146	168.5642	228.1931	281.3414	(97)
Space heating kWh	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(98a)
Space heating requirement - total per year (kWh/year)												0.2787	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.2787	
Space heating per m ²										(98c) / (4) =		0.0056	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	0.1199	0.0344	0.0065	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0067	0.1109	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													

Full SAP Calculation Printout



Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
													(213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(221)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(222)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												0.2787	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												901.8138	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	0.2787	28.4300	0.0792	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	124.5474	28.4300	35.4088	(250)
Additional standing charges			0.0000	(251)
Total energy cost			256.3857	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	0.2787	0.1621	0.0452	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			92.5924	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			127.4135	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	0.2787	1.5998	0.4458	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	1.5220	997.7642	(278)
Space and water heating			998.2100	(279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126	(281)
Energy for lighting	124.5474	1.5338	191.0349	(282)
Total Primary energy kWh/year			1372.9575	(286)

Full SAP Calculation Printout



Property Reference	Plot 10			Issued on Date	27/08/2025
Assessment Reference	Plot 10	Prop Type Ref			
Property	Flat 10, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.54	TER	9.93
Environmental	98 A	% DER < TER			74.42
CO ₂ Emissions (t/year)	0.13	DFEE	9.18	TFEE	13.38
Compliance Check	See BREL	% DFEE < TFEE			31.45
% DPER < TPER	47.64	DPER	27.41	TPER	52.34
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7700 (17)
Infiltration rate	0.1885 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1461 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1863	0.1826	0.1790	0.1607	0.1570	0.1388	0.1388	0.1351	0.1461	0.1570	0.1643	0.1717 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3263	0.3226	0.3190	0.3007	0.2970	0.2788	0.2788	0.2751	0.2861	0.2970	0.3043	0.3117 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.3100	5.9700	8.3400	0.1900	1.5846	150.0000	1251.0001 (29a)
Total net area of external elements Aum(A, m ²)			14.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.2125		(33)
Main dwelling							
Corridor			14.4300	0.0000	0.0000	180.0000	2597.4001 (32)
Party Wall			39.3900	0.0000	0.0000	180.0000	7090.1999 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Party Ceiling 1			51.0000			30.0000	1530.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15148.6800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							297.0329 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	12.0800	-0.0180	-0.2174	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.4200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3364 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5489 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.0136	12.8680	12.7223	11.9939	11.8482	11.1198	11.1198	10.9742	11.4112	11.8482	12.1396	12.4309 (38)
Average = Sum(39)m / 12 =	19.5626	19.4169	19.2712	18.5428	18.3972	17.6688	17.6688	17.5231	17.9601	18.3972	18.6885	18.9799 (39)
												18.5064
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3836	0.3807	0.3779	0.3636	0.3607	0.3464	0.3464	0.3436	0.3522	0.3607	0.3664	0.3722 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths												
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses												
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Distribution loss	(46)m = 0.15 x (45)m											
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
12Total per year (kWh/year)												2274.4719 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	86.8243	86.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Pumps, fans	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Total internal gains	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
	376.1328	384.7396	367.0660	351.6998	332.2354	318.9035	305.4404	307.0498	317.5847	330.0552	352.9786	368.2415 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700											
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	388.5808	410.0778	412.7174	426.6725	433.0134	426.3435	405.9483	387.1759	373.2116	361.0205	368.6413	378.4072 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	215.1031	216.7169	218.3552	226.9323	228.7292	238.1583	238.1583	240.1382	234.2949	228.7292	225.1634	221.7070	
alpha	15.3402	15.4478	15.5570	16.1288	16.2486	16.8772	16.8772	17.0092	16.6197	16.2486	16.0109	15.7805	
util living area	0.8308	0.7596	0.6765	0.5258	0.3951	0.2652	0.1915	0.2082	0.3320	0.5300	0.7039	0.8332 (86)	
MIT	20.9920	20.9976	20.9996	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9994	20.9926 (87)	
Th 2	20.6287	20.6314	20.6340	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6447	20.6394 (88)	
util rest of house	0.8145	0.7428	0.6596	0.5105	0.3803	0.2513	0.1769	0.1931	0.3156	0.5121	0.6861	0.8174 (89)	
MIT 2	20.6208	20.6291	20.6336	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6442	20.6321 (90)	
Living area fraction	fLA = Living area / (4) =												0.4412 (91)
MIT	20.7846	20.7917	20.7951	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8009	20.7911 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.7846	20.7917	20.7951	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8009	20.7911 (93)	

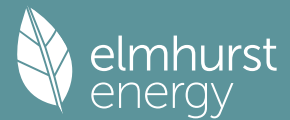
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8214	0.7501	0.6671	0.5173	0.3868	0.2574	0.1833	0.1997	0.3229	0.5200	0.6940	0.8241 (94)
Useful gains	319.1831	307.6146	275.3131	220.7122	167.4964	109.7582	74.4207	77.3381	120.4941	187.7310	255.8208	311.8474 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	322.4803	308.5674	275.4834	220.7147	167.4964	109.7582	74.4207	77.3381	120.4941	187.7332	256.0498	314.8973 (97)
Space heating kWh	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (98a)
Space heating requirement - total per year (kWh/year)												5.6577
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5.6577
Space heating per m2	(98c) / (4) =											0.1109 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7103	12.6034	11.3479	8.3140	6.4220	5.2468	5.8583	7.6149	9.8910	12.9775	14.6581	16.1469 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												5.6577 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												123.8676 (230a)
Total electricity for the above, kWh/year												123.8676 (231)
Electricity for lighting (calculated in Appendix L)												126.7911 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	917.8314 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5.6577	0.1621	0.9170 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			94.3086 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	126.7911	0.1443	18.2999 (268)
Total CO2, kg/year			129.7904 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5.6577	1.5997	9.0505 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1015.9033 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	126.7911	1.5338	194.4764 (282)
Total Primary energy kWh/year			1397.7665 (286)
Dwelling Primary energy Rate (DPER)			27.4100 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling			m2		m2			m2		W/m2K		W/K		kJ/m2K		kJ/K
TER Opening Type								5.9700		1.1450		6.8359				(27)
External Wall			14.3100		5.9700			8.3400		0.1800		1.5012				(29a)
Total net area of external elements Aum(A, m2)								14.3100								(31)
Fabric heat loss, W/K = Sum (A x U)								(26)...(30) + (32) =				8.3371				(33)
Main dwelling																
Corridor								14.4300		0.0000		0.0000				(32)
Party Wall								39.3900		0.0000		0.0000				(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K															307.0329	(35)
List of Thermal Bridges																
K1 Element									Length		Psi-value		Total			
E2 Other lintels (including other steel lintels)									3.1800		0.0500		0.1590			
E3 Sill									3.1800		0.0500		0.1590			
E4 Jamb									7.5200		0.0500		0.3760			
E18 Party wall between dwellings									4.7400		0.0600		0.2844			
E7 Party floor between dwellings (in blocks of flats)									12.0800		0.0700		0.8456			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)									45.4200		0.0000		0.0000			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)															1.8240	(36)
Point Thermal bridges												(36a) =			0.0000	
Total fabric heat loss												(33) + (36) + (36a) =			10.1611	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)																
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Heat transfer coeff	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982				(38)
Average = Sum(39)m / 12 =	33.4659	33.3353	33.2074	32.6065	32.4941	31.9707	31.9707	31.8738	32.1723	32.4941	32.7215	32.9593				(39)
												32.6060				
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
HLP (average)	0.6562	0.6536	0.6511	0.6393	0.6371	0.6269	0.6269	0.6250	0.6308	0.6371	0.6416	0.6463				(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31				

4. Water heating energy requirements (kWh/year)																

Assumed occupancy																1.7196 (42)
Hot water usage for mixer showers																
	53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478				(42a)
Hot water usage for baths																
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594				(42b)
Hot water usage for other uses																
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401				(42c)
Average daily hot water use (litres/day)												99.4866				(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Daily hot water use	108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473				(44)
Energy conte	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194				(45)
Energy content (annual)																
Distribution loss (46)m = 0.15 x (45)m																
	25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529				(46)
Water storage loss:																
Store volume															150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):															1.3938	(48)
Temperature factor from Table 2b															0.5400	(49)
Enter (49) or (54) in (55)															0.7527	(55)
Total storage loss																
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325				(56)
If cylinder contains dedicated solar storage																
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325				(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624				(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				(61)
Total heat required for water heating calculated for each month																
	218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143				(62)
WWHRS	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036				(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000				(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				(63d)
Output from w/h	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107				(64)
12Total per year (kWh/year)															1975.7233	(64)
Electric shower(s)															1976	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	(64a)
															0.0000	(64a)
Heat gains from water heating, kWh/month																
	94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749				(65)

5. Internal gains (see Table 5 and 5a)																

Metabolic gains (Table 5), Watts																
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785				(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441				(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199				(68)
Pumps, fans	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979				(69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000				(70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828				(71)
Total internal gains	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383				(72)
	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957				(73)

6. Solar gains																

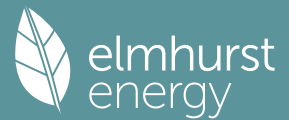
[Jan]	Area	Solar flux	a				FF	Access				Gains				

Full SAP Calculation Printout



		m2				Table 6a	Specific data		Specific data		factor		W
						W/m2	or Table 6b		or Table 6c		Table 6d		
Northwest		5.9700				11.2829	0.6300		0.7000		0.7700		20.5858 (81)
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)	
Total gains	433.2595	463.1924	480.0235	514.6395	538.8636	534.4542	510.2861	477.7357	447.1280	420.8013	416.8344	421.8072 (84)	
7. Mean internal temperature (heating season)													
Temperature during heating periods in the living area from Table 9, Th1 (C)													
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	129.9722	130.4811	130.9838	133.3978	133.8593	136.0507	136.0507	136.4644	135.1981	133.8593	132.9289	131.9699	
alpha	9.6648	9.6987	9.7323	9.8932	9.9240	10.0700	10.0700	10.0976	10.0132	9.9240	9.8619	9.7980	
util living area	0.9794	0.9586	0.9082	0.7530	0.5600	0.3828	0.2757	0.3069	0.4963	0.7833	0.9423	0.9825 (86)	
MIT	20.7407	20.8213	20.9121	20.9864	20.9992	21.0000	21.0000	21.0000	20.9998	20.9839	20.8801	20.7311 (87)	
Th 2	20.3797	20.3820	20.3842	20.3947	20.3967	20.4059	20.4059	20.4076	20.4023	20.3967	20.3927	20.3885 (88)	
util rest of house	0.9734	0.9476	0.8875	0.7194	0.5240	0.3473	0.2384	0.2674	0.4534	0.7444	0.9260	0.9773 (89)	
MIT 2	20.0918	20.1910	20.2975	20.3834	20.3961	20.4059	20.4059	20.4076	20.4022	20.3840	20.2713	20.0879 (90)	
Living area fraction	fLA = Living area / (4) =												
MIT	20.3781	20.4691	20.5686	20.6494	20.6622	20.6680	20.6680	20.6689	20.6659	20.6487	20.5399	20.3716 (92)	
Temperature adjustment	0.0000												
adjusted MIT	20.3781	20.4691	20.5686	20.6494	20.6622	20.6680	20.6680	20.6689	20.6659	20.6487	20.5399	20.3716 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9734	0.9493	0.8941	0.7337	0.5399	0.3630	0.2549	0.2848	0.4723	0.7610	0.9303	0.9771 (94)	
Useful gains	421.7159	439.7182	429.1662	377.6058	290.9194	193.9928	130.0562	136.0668	211.1778	320.2269	387.7756	412.1464 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	538.0663	519.0005	467.1832	383.1077	291.2178	193.9974	130.0563	136.0671	211.2390	326.5229	439.7734	533.0059 (97)	
Space heating kWh	86.5646	53.2777	28.2847	3.9614	0.2220	0.0000	0.0000	0.0000	0.0000	4.6843	37.4384	89.9194 (98a)	
Space heating requirement - total per year (kWh/year)	304.3525												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)	0.0000												
Space heating kWh	86.5646	53.2777	28.2847	3.9614	0.2220	0.0000	0.0000	0.0000	0.0000	4.6843	37.4384	89.9194 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	304.3525												
Space heating per m2	(98c) / (4) = 5.9677 (99)												
9a. Energy requirements - Individual heating systems, including micro-CHP													
Fraction of space heat from secondary/supplementary system (Table 11)													
Fraction of space heat from main system(s)													
Efficiency of main space heating system 1 (in %)													
Efficiency of main space heating system 2 (in %)													
Efficiency of secondary/supplementary heating system, %													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	86.5646	53.2777	28.2847	3.9614	0.2220	0.0000	0.0000	0.0000	0.0000	4.6843	37.4384	89.9194 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	93.7862	57.7223	30.6443	4.2919	0.2405	0.0000	0.0000	0.0000	0.0000	5.0750	40.5617	97.4208 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)	
Water heating requirement	82.3783	81.7645	80.8997	79.9938	79.8114	79.8000	79.8000	79.8000	79.8000	80.0252	81.2649	79.8000 (216)	
Efficiency of water heater (217)m	235.1941	209.7021	225.7133	202.2398	197.4914	179.0842	177.6359	184.1325	185.5158	204.9446	212.9467	82.4677 (217)	
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	232.5889 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
(221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Pumps and Fa	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)	
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)												
Electricity generated by PVs (Appendix M) (negative quantity)	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)	
(233a)m	Electricity generated by wind turbines (Appendix M) (negative quantity)												
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
(234a)m	Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
(235a)m	Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
(235c)m	Electricity generated by PVs (Appendix M) (negative quantity)												
Electricity generated by PVs (Appendix M) (negative quantity)	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635 (233b)	
(233b)m	Electricity generated by wind turbines (Appendix M) (negative quantity)												
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
(234b)m	Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
(235b)m	Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
(235d)m	Annual totals kWh/year												
Space heating fuel - main system 1	329.7427 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												
Efficiency of water heater	79.8000												

Full SAP Calculation Printout



Water heating fuel used	2447.1893 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	141.4370 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-840.2676 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2164.1015 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	329.7427	0.2100	69.2460 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2447.1893	0.2100	513.9098 (264)
Space and water heating			583.1557 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4370	0.1443	20.4137 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832
PV Unit electricity exported	-425.6145	0.1255	-53.4200
Total			-108.9032 (269)
Total CO2, kg/year			506.5956 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	329.7427	1.1300	372.6093 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2447.1893	1.1300	2765.3240 (278)
Space and water heating			3137.9332 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			2669.2028 (286)
Target Primary Energy Rate (TPER)			52.3400 (287)

Full SAP Calculation Printout



Property Reference	Plot 10			Issued on Date	27/08/2025
Assessment Reference	Plot 10	Prop Type Ref			
Property	Flat 10, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.54	TER	9.93
Environmental	98 A	% DER < TER			74.42
CO ₂ Emissions (t/year)	0.13	DFEE	9.18	TFEE	13.38
Compliance Check	See BREL	% DFEE < TFEE			31.45
% DPER < TPER	47.64	DPER	27.41	TPER	52.34
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7700 (17)
Infiltration rate	0.3540 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2743 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3498	0.3429	0.3360	0.3018	0.2949	0.2606	0.2606	0.2538	0.2743	0.2949	0.3086	0.3223 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5612	0.5588	0.5565	0.5455	0.5435	0.5340	0.5340	0.5322	0.5376	0.5435	0.5476	0.5519 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.3100	5.9700	8.3400	0.1900	1.5846	150.0000	1251.0001 (29a)
Total net area of external elements Aum(A, m ²)			14.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.2125		(33)
Main dwelling							
Corridor			14.4300	0.0000	0.0000	180.0000	2597.4001 (32)
Party Wall			39.3900	0.0000	0.0000	180.0000	7090.1999 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Party Ceiling 1			51.0000			40.0000	2040.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15658.6800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							307.0329 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	12.0800	-0.0180	-0.2174
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.4200	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.3364 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	6.5489 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
22.3833	22.2886	22.1957	21.7596	21.6779	21.2980	21.2980	21.2277	21.4444	21.6779	21.8430	22.0156	(38)
(38)m												
Heat transfer coeff	28.9323	28.8375	28.7447	28.3085	28.2269	27.8470	27.8470	27.7766	27.9933	28.2269	28.3920	28.5646 (39)
Average = Sum(39)m / 12 =												28.3081
HLP	0.5673	0.5654	0.5636	0.5551	0.5535	0.5460	0.5460	0.5446	0.5489	0.5535	0.5567	0.5601 (40)
HLP (average)												0.5551
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												50.5753 (43)
Daily hot water use	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995 (44)
Energy conte	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725 (45)
Energy content (annual)												839.9482
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (64)
12Total per year (kWh/year)												713.9560 (64)
Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.2649 (64a)
Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169 (72)
Total internal gains	324.6838	334.5534	319.8076	311.5186	296.2212	287.2957	276.8459	276.4442	284.5528	292.1140	308.2842	317.7546 (73)

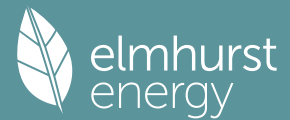
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northwest				5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)			
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	337.1318	359.8916	365.4590	386.4913	396.9993	394.7358	377.3539	356.5703	340.1797	323.0793	323.9470	327.9202 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	150.3385	150.8324	151.3197	153.6512	154.0955	156.1977	156.1977	156.5933	155.3812	154.0955	153.1995	152.2738
alpha	11.0226	11.0555	11.0880	11.2434	11.2730	11.4132	11.4132	11.4396	11.3587	11.2730	11.2133	11.1516

Full SAP Calculation Printout



util living area	0.9942	0.9859	0.9640	0.8527	0.6591	0.4515	0.3247	0.3583	0.5674	0.8679	0.9785	0.9954 (86)
MIT	20.7104	20.7857	20.8737	20.9745	20.9983	21.0000	21.0000	21.0000	20.9997	20.9742	20.8478	20.6993 (87)
Th 2	20.4595	20.4612	20.4629	20.4706	20.4721	20.4788	20.4788	20.4801	20.4762	20.4721	20.4691	20.4661 (88)
util rest of house	0.9923	0.9814	0.9533	0.8243	0.6225	0.4147	0.2862	0.3178	0.5245	0.8358	0.9710	0.9939 (89)
MIT 2	20.1993	20.2742	20.3592	20.4531	20.4712	20.4788	20.4788	20.4801	20.4761	20.4551	20.3417	20.1943 (90)
Living area fraction	20.4248	20.4999	20.5862	20.6831	20.7037	20.7087	20.7088	20.7095	20.7071	20.6841	20.5649	20.4412 (91)
MIT	20.4248	20.4999	20.5862	20.6831	20.7037	20.7087	20.7088	20.7095	20.7071	20.6841	20.5649	20.4171 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4248	20.4999	20.5862	20.6831	20.7037	20.7087	20.7088	20.7095	20.7071	20.6841	20.5649	20.4171 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9921	0.9818	0.9560	0.8360	0.6387	0.4309	0.3032	0.3357	0.5435	0.8492	0.9725	0.9937	(94)
Useful gains	334.4732	353.3398	349.3719	323.1207	253.5458	170.1035	114.4163	119.7018	184.8719	274.3462	315.0507	325.8559	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	466.5262	449.8619	404.9019	333.5622	254.1475	170.1100	114.4164	119.7021	184.9551	284.6429	382.2963	463.2345	(97)
Space heating kWh	98.2474	64.8628	41.3143	7.5179	0.4477	0.0000	0.0000	0.0000	0.0000	7.6608	48.4168	102.2097	(98a)
Space heating requirement - total per year (kWh/year)												370.6774	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	98.2474	64.8628	41.3143	7.5179	0.4477	0.0000	0.0000	0.0000	0.0000	7.6608	48.4168	102.2097	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												370.6774	
Space heating per m2										(98c) / (4) =		7.2682	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	261.7616	206.0676	211.1023	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9984	0.9998	0.9995	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	261.3322	206.0206	210.9926	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	421.8534	403.5510	381.0218	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	115.5753	146.9626	126.5017	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	28.8938	36.7407	31.6254	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												97.2599	(107)
Energy for space heating												7.2682	(99)
Energy for space cooling												1.9071	(108)
Total												9.1752	(109)
Fabric Energy Efficiency (DFEE)												9.2	(109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1655 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4155	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3220 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	14.3100	5.9700	8.3400	0.1800	1.5012			(29a)
Total net area of external elements Aum(A, m2)			14.3100					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	8.3371			(33)
Main dwelling								
Corridor			14.4300	0.0000	0.0000			(32)
Party Wall			39.3900	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

307.0329 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	3.1800	0.0500	0.1590	
E4 Jamb	7.5200	0.0500	0.3760	
E18 Party wall between dwellings	4.7400	0.0600	0.2844	
E7 Party floor between dwellings (in blocks of flats)	12.0800	0.0700	0.8456	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.4200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				1.8240 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	10.1611 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982	(38)
Average = Sum(39)m / 12 =	33.4659	33.3353	33.2074	32.6065	32.4941	31.9707	31.9707	31.8738	32.1723	32.4941	32.7215	32.9593	(39)
													32.6060

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6562	0.6536	0.6511	0.6393	0.6371	0.6269	0.6269	0.6250	0.6308	0.6371	0.6416	0.6463	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
													0.6393
													31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	22.8594	(42b)
Hot water usage for other uses													
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	32.2401	(42c)
Average daily hot water use (litres/day)													50.5753 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995	(44)
Energy content (annual)	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725	(45)
Distribution loss (46)m = 0.15 x (45)m													839.9482
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316	73.3316	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316	(64)
													713.9560 (64)
													714 (64)

12Total per year (kWh/year)

Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850	(64a)
													483.2649 (64a)
Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)

Full SAP Calculation Printout



Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169 (72)
Total internal gains	322.2036	331.8074	317.3273	308.9557	293.7410	284.7328	274.3657	273.9640	281.9899	289.6338	305.7214	315.2744 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.9700		11.2829		0.6300		0.7000		0.7700		20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	342.7895	373.7105	392.8233	432.9418	460.4027	462.4118	440.5808	406.4725	373.9830	340.8426	331.6237	332.0858 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	129.9722	130.4811	130.9838	133.3978	133.8593	136.0507	136.0507	136.4644	135.1981	133.8593	132.9289	131.9699
alpha	9.6648	9.6987	9.7323	9.8932	9.9240	10.0700	10.0700	10.0976	10.0132	9.9240	9.8619	9.7980
util living area	0.9965	0.9907	0.9714	0.8606	0.6529	0.4424	0.3193	0.3607	0.5923	0.9045	0.9876	0.9973 (86)
MIT	20.5812	20.6790	20.8072	20.9576	20.9969	20.9999	21.0000	21.0000	20.9991	20.9427	20.7540	20.5703 (87)
Th 2	20.3797	20.3820	20.3842	20.3947	20.3967	20.4059	20.4059	20.4076	20.4023	20.3967	20.3927	20.3885 (88)
util rest of house	0.9953	0.9876	0.9621	0.8305	0.6119	0.4014	0.2762	0.3143	0.5416	0.8744	0.9827	0.9964 (89)
MIT 2	20.0001	20.0984	20.2238	20.3652	20.3950	20.4058	20.4059	20.4076	20.4019	20.3574	20.1820	19.9972 (90)
Living area fraction	20.2564	20.3546	20.4812	20.6266	20.6606	20.6679	20.6680	20.6689	20.6654	20.6156	20.4343	20.2501 (92)
MIT	20.2564	20.3546	20.4812	20.6266	20.6606	20.6679	20.6680	20.6689	20.6654	20.6156	20.4343	20.2501 (93)
Temperature adjustment	20.2564	20.3546	20.4812	20.6266	20.6606	20.6679	20.6680	20.6689	20.6654	20.6156	20.4343	20.2501 (93)
adjusted MIT	20.2564	20.3546	20.4812	20.6266	20.6606	20.6679	20.6680	20.6689	20.6654	20.6156	20.4343	20.2501 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9950	0.9874	0.9637	0.8425	0.6299	0.4195	0.2952	0.3347	0.5640	0.8861	0.9831	0.9961 (94)
Useful gains	341.0823	368.9983	378.5644	364.7401	290.0230	193.9786	130.0559	136.0656	210.9212	302.0095	326.0226	330.7864 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	533.9960	515.1830	464.2792	382.3622	291.1647	193.9965	130.0563	136.0670	211.2231	325.4489	436.3189	528.9983 (97)
Space heating kWh	143.5278	98.2361	63.7718	12.6879	0.8494	0.0000	0.0000	0.0000	0.0000	17.4389	79.4133	147.4696 (98a)
Space heating requirement - total per year (kWh/year)												563.3950
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	143.5278	98.2361	63.7718	12.6879	0.8494	0.0000	0.0000	0.0000	0.0000	17.4389	79.4133	147.4696 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												563.3950
Space heating per m ²										(98c) / (4) =		11.0470 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	300.5245	236.5831	242.2406	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9978	0.9996	0.9990	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	299.8544	236.4867	241.9876	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	503.7338	480.1170	441.9432	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000											
		0.0000	0.0000	0.0000	0.0000	146.7932	181.2610	148.7669	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	36.6983	45.3152	37.1917	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												119.2053 (107)
Energy for space heating												11.0470 (99)
Energy for space cooling												2.3374 (108)
Total												13.3843 (109)
Fabric Energy Efficiency (TFEE)												13.4 (109)

Full SAP Calculation Printout



Property Reference	Plot 10			Issued on Date	27/08/2025
Assessment Reference	Plot 10	Prop Type Ref			
Property	Flat 10, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.54	TER	9.93
Environmental	98 A	% DER < TER			74.42
CO ₂ Emissions (t/year)	0.13	DFEE	9.18	TFEE	13.38
Compliance Check	See BREL	% DFEE < TFEE			31.45
% DPER < TPER	47.64	DPER	27.41	TPER	52.34
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7700 (17)
Infiltration rate	0.1885 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1461 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1863	0.1826	0.1790	0.1607	0.1570	0.1388	0.1388	0.1351	0.1461	0.1570	0.1643	0.1717 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3263	0.3226	0.3190	0.3007	0.2970	0.2788	0.2788	0.2751	0.2861	0.2970	0.3043	0.3117 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.3100	5.9700	8.3400	0.1900	1.5846	150.0000	1251.0001 (29a)
Total net area of external elements Aum(A, m ²)			14.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.2125		(33)
Main dwelling							
Corridor			14.4300	0.0000	0.0000	180.0000	2597.4001 (32)
Party Wall			39.3900	0.0000	0.0000	180.0000	7090.1999 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Party Ceiling 1			51.0000			30.0000	1530.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15148.6800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							297.0329 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	12.0800	-0.0180	-0.2174	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.4200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3364 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5489 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.0136	12.8680	12.7223	11.9939	11.8482	11.1198	11.1198	10.9742	11.4112	11.8482	12.1396	12.4309 (38)
Average = Sum(39)m / 12 =	19.5626	19.4169	19.2712	18.5428	18.3972	17.6688	17.6688	17.5231	17.9601	18.3972	18.6885	18.9799 (39)
												18.5064
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3836	0.3807	0.3779	0.3636	0.3607	0.3464	0.3464	0.3436	0.3522	0.3607	0.3664	0.3722 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths												
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses												
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Distribution loss	(46)m = 0.15 x (45)m											
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
12Total per year (kWh/year)												2274.4719 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	86.8243	86.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Pumps, fans	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Total internal gains	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
	376.1328	384.7396	367.0660	351.6998	332.2354	318.9035	305.4404	307.0498	317.5847	330.0552	352.9786	368.2415 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700											
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	388.5808	410.0778	412.7174	426.6725	433.0134	426.3435	405.9483	387.1759	373.2116	361.0205	368.6413	378.4072 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	215.1031	216.7169	218.3552	226.9323	228.7292	238.1583	238.1583	240.1382	234.2949	228.7292	225.1634	221.7070	
alpha	15.3402	15.4478	15.5570	16.1288	16.2486	16.8772	16.8772	17.0092	16.6197	16.2486	16.0109	15.7805	
util living area	0.8308	0.7596	0.6765	0.5258	0.3951	0.2652	0.1915	0.2082	0.3320	0.5300	0.7039	0.8332 (86)	
MIT	20.9920	20.9976	20.9996	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9994	20.9926 (87)	
Th 2	20.6287	20.6314	20.6340	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6447	20.6394 (88)	
util rest of house	0.8145	0.7428	0.6596	0.5105	0.3803	0.2513	0.1769	0.1931	0.3156	0.5121	0.6861	0.8174 (89)	
MIT 2	20.6208	20.6291	20.6336	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6442	20.6321 (90)	
Living area fraction	fLA = Living area / (4) =												0.4412 (91)
MIT	20.7846	20.7917	20.7951	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8009	20.7911 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.7846	20.7917	20.7951	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8009	20.7911 (93)	

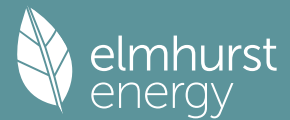
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8214	0.7501	0.6671	0.5173	0.3868	0.2574	0.1833	0.1997	0.3229	0.5200	0.6940	0.8241 (94)
Useful gains	319.1831	307.6146	275.3131	220.7122	167.4964	109.7582	74.4207	77.3381	120.4941	187.7310	255.8208	311.8474 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	322.4803	308.5674	275.4834	220.7147	167.4964	109.7582	74.4207	77.3381	120.4941	187.7332	256.0498	314.8973 (97)
Space heating kWh	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (98a)
Space heating requirement - total per year (kWh/year)												5.6577
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5.6577
Space heating per m2	(98c) / (4) =											0.1109 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	2.4531	0.6403	0.1267	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.1649	2.2692 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7103	12.6034	11.3479	8.3140	6.4220	5.2468	5.8583	7.6149	9.8910	12.9775	14.6581	16.1469 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												5.6577 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												123.8676 (230a)
Total electricity for the above, kWh/year												123.8676 (231)
Electricity for lighting (calculated in Appendix L)												126.7911 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	917.8314 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5.6577	0.1621	0.9170 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			94.3086 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	126.7911	0.1443	18.2999 (268)
Total CO2, kg/year			129.7904 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5.6577	1.5997	9.0505 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1015.9033 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	126.7911	1.5338	194.4764 (282)
Total Primary energy kWh/year			1397.7665 (286)
Dwelling Primary energy Rate (DPER)			27.4100 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

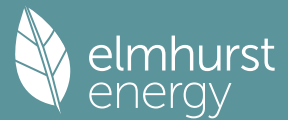
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type			5.9700	1.1450	6.8359		(27)					
External Wall	14.3100	5.9700	8.3400	0.1800	1.5012		(29a)					
Total net area of external elements Aum(A, m2)			14.3100				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		8.3371		(33)					
Main dwelling												
Corridor			14.4300	0.0000	0.0000		(32)					
Party Wall			39.3900	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						307.0329	(35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590						
E3 Sill				3.1800	0.0500	0.1590						
E4 Jamb				7.5200	0.0500	0.3760						
E18 Party wall between dwellings				4.7400	0.0600	0.2844						
E7 Party floor between dwellings (in blocks of flats)				12.0800	0.0700	0.8456						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				45.4200	0.0000	0.0000						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.8240 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	10.1611 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982 (38)
Average = Sum(39)m / 12 =	33.4659	33.3353	33.2074	32.6065	32.4941	31.9707	31.9707	31.8738	32.1723	32.4941	32.7215	32.9593 (39)
												32.6060
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6562	0.6536	0.6511	0.6393	0.6371	0.6269	0.6269	0.6250	0.6308	0.6371	0.6416	0.6463 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
Hot water usage for baths	53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478	(42a)
Hot water usage for other uses	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Average daily hot water use (litres/day)	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Daily hot water use	108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473	(44)
Energy conte	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194	(45)
Energy content (annual)										Total = Sum(45)m =		1652.4520	(45)
Distribution loss (46)m = 0.15 x (45)m	25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143	(62)
WWHRS	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1975.7233	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383	(72)
Total internal gains	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957	(73)

6. Solar gains

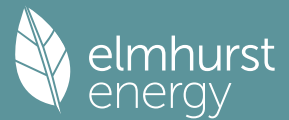
[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



		m2				Table 6a	Specific data		Specific data		factor		W
						W/m2	or Table 6b		or Table 6c		Table 6d		
Northwest		5.9700				11.2829	0.6300		0.7000		0.7700		20.5858 (81)
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)	
Total gains	433.2595	463.1924	480.0235	514.6395	538.8636	534.4542	510.2861	477.7357	447.1280	420.8013	416.8344	421.8072 (84)	
7. Mean internal temperature (heating season)													
Temperature during heating periods in the living area from Table 9, Th1 (C)													
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	129.9722	130.4811	130.9838	133.3978	133.8593	136.0507	136.0507	136.4644	135.1981	133.8593	132.9289	131.9699	
alpha	9.6648	9.6987	9.7323	9.8932	9.9240	10.0700	10.0700	10.0976	10.0132	9.9240	9.8619	9.7980	
util living area	0.9794	0.9586	0.9082	0.7530	0.5600	0.3828	0.2757	0.3069	0.4963	0.7833	0.9423	0.9825 (86)	
MIT	20.7407	20.8213	20.9121	20.9864	20.9992	21.0000	21.0000	21.0000	20.9998	20.9839	20.8801	20.7311 (87)	
Th 2	20.3797	20.3820	20.3842	20.3947	20.3967	20.4059	20.4059	20.4076	20.4023	20.3967	20.3927	20.3885 (88)	
util rest of house	0.9734	0.9476	0.8875	0.7194	0.5240	0.3473	0.2384	0.2674	0.4534	0.7444	0.9260	0.9773 (89)	
MIT 2	20.0918	20.1910	20.2975	20.3834	20.3961	20.4059	20.4059	20.4076	20.4022	20.3840	20.2713	20.0879 (90)	
Living area fraction	fLA = Living area / (4) =												
MIT	20.3781	20.4691	20.5686	20.6494	20.6622	20.6680	20.6680	20.6689	20.6659	20.6487	20.5399	20.3716 (92)	
Temperature adjustment	0.0000												
adjusted MIT	20.3781	20.4691	20.5686	20.6494	20.6622	20.6680	20.6680	20.6689	20.6659	20.6487	20.5399	20.3716 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9734	0.9493	0.8941	0.7337	0.5399	0.3630	0.2549	0.2848	0.4723	0.7610	0.9303	0.9771 (94)	
Useful gains	421.7159	439.7182	429.1662	377.6058	290.9194	193.9928	130.0562	136.0668	211.1778	320.2269	387.7756	412.1464 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	538.0663	519.0005	467.1832	383.1077	291.2178	193.9974	130.0563	136.0671	211.2390	326.5229	439.7734	533.0059 (97)	
Space heating kWh	86.5646	53.2777	28.2847	3.9614	0.2220	0.0000	0.0000	0.0000	0.0000	4.6843	37.4384	89.9194 (98a)	
Space heating requirement - total per year (kWh/year)	304.3525												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)	0.0000												
Space heating kWh	86.5646	53.2777	28.2847	3.9614	0.2220	0.0000	0.0000	0.0000	0.0000	4.6843	37.4384	89.9194 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	304.3525												
Space heating per m2	(98c) / (4) = 5.9677 (99)												
9a. Energy requirements - Individual heating systems, including micro-CHP													
Fraction of space heat from secondary/supplementary system (Table 11)													
Fraction of space heat from main system(s)													
Efficiency of main space heating system 1 (in %)													
Efficiency of main space heating system 2 (in %)													
Efficiency of secondary/supplementary heating system, %													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	86.5646	53.2777	28.2847	3.9614	0.2220	0.0000	0.0000	0.0000	0.0000	4.6843	37.4384	89.9194 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	93.7862	57.7223	30.6443	4.2919	0.2405	0.0000	0.0000	0.0000	0.0000	5.0750	40.5617	97.4208 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)	
Water heating requirement	82.3783	81.7645	80.8997	79.9938	79.8114	79.8000	79.8000	79.8000	79.8000	80.0252	81.2649	79.8000 (216)	
Efficiency of water heater (217)m	235.1941	209.7021	225.7133	202.2398	197.4914	179.0842	177.6359	184.1325	185.5158	204.9446	212.9467	82.4677 (217)	
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	232.5889 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
(221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Pumps and Fa	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)	
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)												
Electricity generated by PVs (Appendix M) (negative quantity)	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)	
(233a)m	Electricity generated by wind turbines (Appendix M) (negative quantity)												
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
(234a)m	Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
(235a)m	Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
(235c)m	Electricity generated by PVs (Appendix M) (negative quantity)												
Electricity generated by PVs (Appendix M) (negative quantity)	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635 (233b)	
(233b)m	Electricity generated by wind turbines (Appendix M) (negative quantity)												
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
(234b)m	Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
(235b)m	Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
(235d)m	Annual totals kWh/year												
Space heating fuel - main system 1	329.7427 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												
Efficiency of water heater	79.8000												

Full SAP Calculation Printout



Water heating fuel used	2447.1893 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	141.4370 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-840.2676 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2164.1015 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	329.7427	0.2100	69.2460 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2447.1893	0.2100	513.9098 (264)
Space and water heating			583.1557 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4370	0.1443	20.4137 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832
PV Unit electricity exported	-425.6145	0.1255	-53.4200
Total			-108.9032 (269)
Total CO2, kg/year			506.5956 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	329.7427	1.1300	372.6093 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2447.1893	1.1300	2765.3240 (278)
Space and water heating			3137.9332 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			2669.2028 (286)
Target Primary Energy Rate (TPER)			52.3400 (287)

Full SAP Calculation Printout



Property Reference	Plot 10			Issued on Date	27/08/2025
Assessment Reference	Plot 10	Prop Type Ref			
Property	Flat 10, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.54	TER	9.93
Environmental	98 A	% DER < TER			74.42
CO ₂ Emissions (t/year)	0.13	DFEE	9.18	TFEE	13.38
Compliance Check	See BREL	% DFEE < TFEE			31.45
% DPER < TPER	47.64	DPER	27.41	TPER	52.34
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7700 (17)
Infiltration rate	0.1885 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1461 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1863	0.1826	0.1790	0.1607	0.1570	0.1388	0.1388	0.1351	0.1461	0.1570	0.1643	0.1717 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3263	0.3226	0.3190	0.3007	0.2970	0.2788	0.2788	0.2751	0.2861	0.2970	0.3043	0.3117 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.3100	5.9700	8.3400	0.1900	1.5846	150.0000	1251.0001 (29a)
Total net area of external elements Aum(A, m ²)			14.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.2125		(33)
Main dwelling							
Corridor			14.4300	0.0000	0.0000	180.0000	2597.4001 (32)
Party Wall			39.3900	0.0000	0.0000	180.0000	7090.1999 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Party Ceiling 1			51.0000			40.0000	2040.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15658.6800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							307.0329 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	12.0800	-0.0180	-0.2174	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.4200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3364 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5489 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.0136	12.8680	12.7223	11.9939	11.8482	11.1198	11.1198	10.9742	11.4112	11.8482	12.1396	12.4309 (38)
Average = Sum(39)m / 12 =	19.5626	19.4169	19.2712	18.5428	18.3972	17.6688	17.6688	17.5231	17.9601	18.3972	18.6885	18.9799 (39)
												18.5064
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3836	0.3807	0.3779	0.3636	0.3607	0.3464	0.3464	0.3436	0.3522	0.3607	0.3664	0.3722 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths												
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses												
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Energy content (annual)												
Distribution loss	(46)m = 0.15 x (45)m											
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
												2274.4719 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	17.9486	15.9418	12.9647	9.8151	7.3369	6.1941	6.6930	8.6998	11.6769	14.8264	17.3047	18.4474 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Pumps, fans	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Total internal gains	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
	413.6892	411.7523	398.4746	372.9564	348.7221	326.4792	313.1530	316.0034	328.5510	351.1735	378.8668	403.0407 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700											12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	426.1372	437.0905	444.1260	447.9291	449.5001	433.9193	413.6609	396.1295	384.1779	382.1388	394.5295	413.2063 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	222.3449	224.0130	225.7064	234.5723	236.4297	246.1763	246.1763	248.2228	242.1828	236.4297	232.7438	229.1711
alpha	15.8230	15.9342	16.0471	16.6382	16.7620	17.4118	17.4118	17.5482	17.1455	16.7620	16.5163	16.2781
util living area	0.7639	0.7142	0.6290	0.5009	0.3806	0.2606	0.1879	0.2035	0.3226	0.5007	0.6582	0.7691 (86)
MIT	20.9977	20.9991	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9978 (87)
Th 2	20.6287	20.6314	20.6340	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6447	20.6394 (88)
util rest of house	0.7476	0.6981	0.6132	0.4863	0.3663	0.2469	0.1736	0.1887	0.3066	0.4838	0.6415	0.7532 (89)
MIT 2	20.6265	20.6306	20.6339	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6446	20.6373 (90)
Living area fraction									fLA = Living area / (4) =			0.4412 (91)
MIT	20.7903	20.7932	20.7954	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8013	20.7964 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7903	20.7932	20.7954	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8013	20.7964 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7547	0.7052	0.6202	0.4927	0.3726	0.2529	0.1799	0.1952	0.3136	0.4913	0.6488	0.7601 (94)
Useful gains	321.6247	308.2410	275.4399	220.7139	167.4964	109.7582	74.4207	77.3381	120.4941	187.7326	255.9857	314.0850 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	322.5914	308.5957	275.4891	220.7148	167.4964	109.7582	74.4207	77.3381	120.4941	187.7333	256.0570	314.9965 (97)
Space heating kWh	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (98a)
Space heating requirement - total per year (kWh/year)												1.7248
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1.7248
Space heating per m2										(98c) / (4) =		0.0338 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater												343.8277 (216)
(217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (217)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7103	12.6034	11.3479	8.3140	6.4220	5.2468	5.8583	7.6149	9.8910	12.9775	14.6581	16.1469 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1.7248 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												123.8676 (230a)
Total electricity for the above, kWh/year												123.8676 (231)
Electricity for lighting (calculated in Appendix L)												126.7911 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	913.8985 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1.7248	16.4900	0.2844 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	16.4900	109.0838 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258 (249)
Energy for lighting	126.7911	16.4900	20.9078 (250)
Additional standing charges			0.0000 (251)
Total energy cost			150.7019 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.5651 (257)
SAP value	90.8392
SAP rating (Section 12)	91 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1.7248	0.1620	0.2794 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			93.6711 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	126.7911	0.1443	18.2999 (268)
Total CO2, kg/year			129.1529 (272)
CO2 emissions per m2			2.5300 (273)
EI value			98.1972
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7700 (17)
Infiltration rate	0.1885 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1461 (21)

Full SAP Calculation Printout



Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1570	0.1534	0.1570	0.1424	0.1461	0.1242	0.1205	0.1205	0.1242	0.1388	0.1388	0.1424	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.2970	0.2934	0.2970	0.2824	0.2861	0.2642	0.2605	0.2605	0.2642	0.2788	0.2788	0.2824	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.3100	5.9700	8.3400	0.1900	1.5846	150.0000	1251.0001	(29a)
Total net area of external elements Aum(A, m2)			14.3100					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Main dwelling								
Corridor			14.4300	0.0000	0.0000	180.0000	2597.4001	(32)
Party Wall			39.3900	0.0000	0.0000	180.0000	7090.1999	(32)
Party Floor 1			51.0000			40.0000	2040.0000	(32d)
Party Ceiling 1			51.0000			40.0000	2040.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 15658.6800 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 307.0329 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	12.0800	-0.0180	-0.2174
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.4200	0.0000	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.3364 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 6.5489 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	11.8482	11.7026	11.8482	11.2655	11.4112	10.5371	10.3915	10.3915	10.5371	11.1198	11.1198	11.2655	(38)
Heat transfer coeff	18.3972	18.2515	18.3972	17.8145	17.9601	17.0861	16.9404	16.9404	17.0861	17.6688	17.6688	17.8145	(39)
Average = Sum(39)m / 12 =													17.6688

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.3607	0.3579	0.3607	0.3493	0.3522	0.3350	0.3322	0.3322	0.3350	0.3464	0.3464	0.3493	(40)
HLP (average)													0.3464
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)
Hot water usage for baths													
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses													
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)													117.8284 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)
Energy content (annual)													Total = Sum(45)m = 1957.1409
Distribution loss (46)m = 0.15 x (45)m													
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9486	15.9418	12.9647	9.8151	7.3369	6.1941	6.6930	8.6998	11.6769	14.8264	17.3047	18.4474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	413.6892	411.7523	398.4746	372.9564	348.7221	326.4792	313.1530	316.0034	328.5510	351.1735	378.8668	403.0407 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

Northwest				5.9700	9.9768	0.2400	0.0000			0.7700	11.0070 (81)	

Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	424.6962	434.7425	441.7615	445.4677	443.7785	430.2134	407.8623	391.0670	382.7494	381.2028	393.1010	412.7171 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	236.4297	238.3168	236.4297	244.1632	242.1828	254.5718	256.7609	256.7609	254.5718	246.1763	246.1763	244.1632
alpha	16.7620	16.8878	16.7620	17.2775	17.1455	17.9715	18.1174	18.1174	17.9715	17.4118	17.4118	17.2775
util living area	0.6883	0.6422	0.5747	0.4479	0.3319	0.2145	0.1578	0.1733	0.2857	0.4542	0.5933	0.6945 (86)
MIT	20.9996	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9997 (87)
Th 2	20.6501	20.6528	20.6501	20.6609	20.6582	20.6743	20.6770	20.6770	20.6743	20.6636	20.6636	20.6609 (88)
util rest of house	0.6733	0.6277	0.5601	0.4343	0.3180	0.2015	0.1444	0.1593	0.2712	0.4386	0.5782	0.6800 (89)
MIT 2	20.6498	20.6527	20.6501	20.6609	20.6582	20.6743	20.6770	20.6770	20.6743	20.6636	20.6635	20.6606 (90)
Living area fraction									fLA = Living area / (4) =			0.4412 (91)
MIT	20.8041	20.8059	20.8045	20.8105	20.8090	20.8180	20.8195	20.8195	20.8180	20.8120	20.8120	20.8102 (92)
Temperature adjustment												0.0000
adjusted MIT	20.8041	20.8059	20.8045	20.8105	20.8090	20.8180	20.8195	20.8195	20.8180	20.8120	20.8120	20.8102 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.6799	0.6341	0.5665	0.4403	0.3241	0.2072	0.1503	0.1655	0.2776	0.4455	0.5848	0.6864 (94)
Useful gains	288.7664	275.6583	250.2754	196.1456	143.8423	89.1553	61.3161	64.7041	106.2414	169.8320	229.8972	283.2963 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	288.9114	275.7044	250.2833	196.1457	143.8423	89.1553	61.3161	64.7041	106.2414	169.8320	229.9055	283.4309 (97)
Space heating kWh	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001 (98a)
Space heating requirement - total per year (kWh/year)												0.2511
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.2511
Space heating per m2										(98c) / (4) =		0.0049 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
(217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (217)
Fuel for water heating, kWh/month												

Full SAP Calculation Printout



Space cooling fuel requirement (221)m	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Lighting	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Electricity generated by PVs (Appendix M) (negative quantity)	15.7103	12.6034	11.3479	8.3140	6.4220	5.2468	5.8583	7.6149	9.8910	12.9775	14.6581	16.1469 (232)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												0.2511 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												123.8676 (230a)
Total electricity for the above, kWh/year												123.8676 (231)
Electricity for lighting (calculated in Appendix L)												126.7911 (232)

Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												912.4248 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.2511	28.4300	0.0714 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	28.4300	188.0687 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156 (249)
Energy for lighting	126.7911	28.4300	36.0467 (250)
Additional standing charges			0.0000 (251)
Total energy cost			259.4024 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.2511	0.1621	0.0407 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			93.4323 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	126.7911	0.1443	18.2999 (268)
Total CO2, kg/year			128.9142 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	0.2511	1.5998	0.4017 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1007.2544 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	126.7911	1.5338	194.4764 (282)
Total Primary energy kWh/year			1389.1177 (286)

SAP 10 EPC IMPROVEMENTS

Plot 10

Current energy efficiency rating:	B 91
Current environmental impact rating:	A 98

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Full SAP Calculation Printout



Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0		0.00 kg/m²

Potential energy efficiency rating: B 91
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£259	£259	£0
Space heating	£35	£35	£0
Water heating	£188	£188	£0
Lighting	£36	£36	£0
Total cost of fuels	£259	£259	£0
Total cost of uses	£259	£259	£0
Delivered energy	18 kWh/m²	18 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	27 kWh/m²	27 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)

Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
3.7700 (17)
0.1885 (18)
3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1461 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1863	0.1826	0.1790	0.1607	0.1570	0.1388	0.1388	0.1351	0.1461	0.1570	0.1643	0.1717 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3263	0.3226	0.3190	0.3007	0.2970	0.2788	0.2788	0.2751	0.2861	0.2970	0.3043	0.3117 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.3100	5.9700	8.3400	0.1900	1.5846	150.0000	1251.0001 (29a)
Total net area of external elements Aum(A, m2)			14.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.2125		(33)
Main dwelling							
Corridor			14.4300	0.0000	0.0000	180.0000	2597.4001 (32)

Full SAP Calculation Printout



Party Wall	39.3900	0.0000	0.0000	180.0000	7090.1999 (32)
Party Floor 1	51.0000			40.0000	2040.0000 (32d)
Party Ceiling 1	51.0000			40.0000	2040.0000 (32b)
Internal Wall 1	71.1200			9.0000	640.0800 (32c)

Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 15658.6800 (34)

Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$ 307.0329 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	3.1800	0.0340	0.1081
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827
E3 Sill	7.5200	0.0300	0.2256
E4 Jamb	4.7400	0.0290	0.1375
E18 Party wall between dwellings	12.0800	-0.0180	-0.2174
E7 Party floor between dwellings (in blocks of flats)	45.4200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.3364 (36)
Point Thermal bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 6.5489 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	13.0136	12.8680	12.7223	11.9939	11.8482	11.1198	11.1198	10.9742	11.4112	11.8482	12.1396	12.4309 (38)
Heat transfer coeff	19.5626	19.4169	19.2712	18.5428	18.3972	17.6688	17.6688	17.5231	17.9601	18.3972	18.6885	18.9799 (39)
Average = $\text{Sum}(39)\text{m} / 12 =$												18.5064
HLP	0.3836	0.3807	0.3779	0.3636	0.3607	0.3464	0.3464	0.3436	0.3522	0.3607	0.3664	Dec 0.3722 (40)
HLP (average)												0.3629
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Energy content (annual)										Total =	Sum(45)m =	1957.1409
Distribution loss (46)m = $0.15 \times (45)\text{m}$	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9486	15.9418	12.9647	9.8151	7.3369	6.1941	6.6930	8.6998	11.6769	14.8264	17.3047	18.4474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	413.6892	411.7523	398.4746	372.9564	348.7221	326.4792	313.1530	316.0034	328.5510	351.1735	378.8668	403.0407 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)

Full SAP Calculation Printout



Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	426.1372	437.0905	444.1260	447.9291	449.5001	433.9193	413.6609	396.1295	384.1779	382.1388	394.5295	413.2063 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	222.3449	224.0130	225.7064	234.5723	236.4297	246.1763	246.1763	248.2228	242.1828	236.4297	232.7438	229.1711
alpha	15.8230	15.9342	16.0471	16.6382	16.7620	17.4118	17.4118	17.5482	17.1455	16.7620	16.5163	16.2781
util living area	0.7639	0.7142	0.6290	0.5009	0.3806	0.2606	0.1879	0.2035	0.3226	0.5007	0.6582	0.7691 (86)
MIT	20.9977	20.9991	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9978 (87)
Th 2	20.6287	20.6314	20.6340	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6447	20.6394 (88)
util rest of house	0.7476	0.6981	0.6132	0.4863	0.3663	0.2469	0.1736	0.1887	0.3066	0.4838	0.6415	0.7532 (89)
MIT 2	20.6265	20.6306	20.6339	20.6474	20.6501	20.6636	20.6636	20.6662	20.6582	20.6501	20.6446	20.6373 (90)
Living area fraction	20.7903	20.7932	20.7954	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8013	20.7964 (91)
MIT	20.7903	20.7932	20.7954	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8013	20.7964 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7903	20.7932	20.7954	20.8030	20.8045	20.8120	20.8120	20.8135	20.8090	20.8045	20.8013	20.7964 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7547	0.7052	0.6202	0.4927	0.3726	0.2529	0.1799	0.1952	0.3136	0.4913	0.6488	0.7601 (94)
Useful gains	321.6247	308.2410	275.4399	220.7139	167.4964	109.7582	74.4207	77.3381	120.4941	187.7326	255.9857	314.0850 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	322.5914	308.5957	275.4891	220.7148	167.4964	109.7582	74.4207	77.3381	120.4941	187.7333	256.0570	314.9965 (97)
Space heating kWh	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (98a)
Space heating requirement - total per year (kWh/year)												1.7248
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1.7248
Space heating per m2										(98c) / (4) =		0.0338 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	0.7193	0.2384	0.0366	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0513	0.6781 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7103	12.6034	11.3479	8.3140	6.4220	5.2468	5.8583	7.6149	9.8910	12.9775	14.6581	16.1469 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1.7248 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277

Full SAP Calculation Printout



Water heating fuel used	661.5151 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400) mechanical ventilation fans (SFP = 0.8400)	123.8676 (230a)
Total electricity for the above, kWh/year	123.8676 (231)
Electricity for lighting (calculated in Appendix L)	126.7911 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	913.8985 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1.7248	16.4900	0.2844 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	16.4900	109.0838 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258 (249)
Energy for lighting	126.7911	16.4900	20.9078 (250)
Additional standing charges			0.0000 (251)
Total energy cost			150.7019 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.5651 (257)
SAP value	90.8392
SAP rating (Section 12)	91 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1.7248	0.1620	0.2794 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			93.6711 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	126.7911	0.1443	18.2999 (268)
Total CO2, kg/year			129.1529 (272)
CO2 emissions per m2			2.5300 (273)
EI value			98.1972
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes

Full SAP Calculation Printout



Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
3.7700 (17)
0.1885 (18)
3 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor
(20) = 1 - [0.075 x (19)] = 0.7750 (20)
(21) = (18) x (20) = 0.1461 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1570	0.1534	0.1570	0.1424	0.1461	0.1242	0.1205	0.1205	0.1242	0.1388	0.1388	0.1424	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.2970	0.2934	0.2970	0.2824	0.2861	0.2642	0.2605	0.2605	0.2642	0.2788	0.2788	0.2824	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.3100	5.9700	8.3400	0.1900	1.5846	150.0000	1251.0001	(29a)
Total net area of external elements Aum(A, m2)			14.3100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 6.2125			(33)
Main dwelling								
Corridor			14.4300	0.0000	0.0000	180.0000	2597.4001	(32)
Party Wall			39.3900	0.0000	0.0000	180.0000	7090.1999	(32)
Party Floor 1			51.0000			40.0000	2040.0000	(32d)
Party Ceiling 1			51.0000			40.0000	2040.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15658.6800	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							307.0329	(35)
List of Thermal Bridges								
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081	
E3 Sill					3.1800	0.0260	0.0827	
E4 Jamb					7.5200	0.0300	0.2256	
E18 Party wall between dwellings					4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)					12.0800	-0.0180	-0.2174	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					45.4200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							(36a) = 0.0000	(36)
Point Thermal bridges							(33) + (36) + (36a) = 6.5489	(37)
Total fabric heat loss								

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	11.8482	11.7026	11.8482	11.2655	11.4112	10.5371	10.3915	10.3915	10.5371	11.1198	11.1198	11.2655	(38)
Heat transfer coeff	18.3972	18.2515	18.3972	17.8145	17.9601	17.0861	16.9404	16.9404	17.0861	17.6688	17.6688	17.8145	(39)
Average = Sum(39)m / 12 =												17.6688	
HLP	0.3607	0.3579	0.3607	0.3493	0.3522	0.3350	0.3322	0.3322	0.3350	0.3464	0.3464	0.3493	(40)
HLP (average)												0.3464	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196	(42)
Hot water usage for mixer showers														
72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	72.6657	(42a)	
Hot water usage for baths														
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	22.8594	(42b)	
Hot water usage for other uses														
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	32.2401	(42c)	
Average daily hot water use (litres/day)												117.8284	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	127.7652	(44)	
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)	
Energy content (annual)														
Distribution loss (46)m = 0.15 x (45)m													1957.1409	
30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	30.0074	(46)	
Water storage loss:														
Store volume													201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)	
If cylinder contains dedicated solar storage														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	227.0008	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h														
229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	227.0008	(64)	
Electric shower(s)														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month														

Full SAP Calculation Printout



67.4690 59.4273 62.4816 53.3240 50.6067 44.4164 42.9522 45.3063 46.5252 53.3017 58.4225 66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9486	15.9418	12.9647	9.8151	7.3369	6.1941	6.6930	8.6998	11.6769	14.8264	17.3047	18.4474	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	413.6892	411.7523	398.4746	372.9564	348.7221	326.4792	313.1530	316.0034	328.5510	351.1735	378.8668	403.0407	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c				Access factor Table 6d			Gains W
-----								-----						
Northwest				5.9700	9.9768	0.2400	0.0000				0.7700			11.0070 (81)
-----								-----						
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343			9.6765 (83)
Total gains	424.6962	434.7425	441.7615	445.4677	443.7785	430.2134	407.8623	391.0670	382.7494	381.2028	393.1010	412.7171	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	236.4297	238.3168	236.4297	244.1632	242.1828	254.5718	256.7609	256.7609	254.5718	246.1763	246.1763	244.1632	
alpha	16.7620	16.8878	16.7620	17.2775	17.1455	17.9715	18.1174	18.1174	17.9715	17.4118	17.4118	17.2775	
util living area	0.6883	0.6422	0.5747	0.4479	0.3319	0.2145	0.1578	0.1733	0.2857	0.4542	0.5933	0.6945	(86)
MIT	20.9996	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9997	(87)
Th 2	20.6501	20.6528	20.6501	20.6609	20.6582	20.6743	20.6770	20.6770	20.6743	20.6636	20.6636	20.6609	(88)
util rest of house	0.6733	0.6277	0.5601	0.4343	0.3180	0.2015	0.1444	0.1593	0.2712	0.4386	0.5782	0.6800	(89)
MIT 2	20.6498	20.6527	20.6501	20.6609	20.6582	20.6743	20.6770	20.6770	20.6743	20.6636	20.6635	20.6606	(90)
Living area fraction									fLA = Living area / (4) =			0.4412	(91)
MIT	20.8041	20.8059	20.8045	20.8105	20.8090	20.8180	20.8195	20.8195	20.8180	20.8120	20.8120	20.8102	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.8041	20.8059	20.8045	20.8105	20.8090	20.8180	20.8195	20.8195	20.8180	20.8120	20.8120	20.8102	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6799	0.6341	0.5665	0.4403	0.3241	0.2072	0.1503	0.1655	0.2776	0.4455	0.5848	0.6864	(94)
Useful gains	288.7664	275.6583	250.2754	196.1456	143.8423	89.1553	61.3161	64.7041	106.2414	169.8320	229.8972	283.2963	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	288.9114	275.7044	250.2833	196.1457	143.8423	89.1553	61.3161	64.7041	106.2414	169.8320	229.9055	283.4309	(97)
Space heating kWh	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001	(98a)
Space heating requirement - total per year (kWh/year)												0.2511	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.2511	
Space heating per m ²										(98c) / (4) =		0.0049	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	0.1079	0.0310	0.0059	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0060	0.1001	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													

Full SAP Calculation Printout



Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												0.0000 (213)
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater												343.8277 (216)
(217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (217)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7103	12.6034	11.3479	8.3140	6.4220	5.2468	5.8583	7.6149	9.8910	12.9775	14.6581	16.1469 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												0.2511 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												123.8676 (230a)
Total electricity for the above, kWh/year												123.8676 (231)
Electricity for lighting (calculated in Appendix L)												126.7911 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												912.4248 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.2511	28.4300	0.0714 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	28.4300	188.0687 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156 (249)
Energy for lighting	126.7911	28.4300	36.0467 (250)
Additional standing charges			0.0000 (251)
Total energy cost			259.4024 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.2511	0.1621	0.0407 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			93.4323 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	126.7911	0.1443	18.2999 (268)
Total CO2, kg/year			128.9142 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	0.2511	1.5998	0.4017 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1007.2544 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	126.7911	1.5338	194.4764 (282)
Total Primary energy kWh/year			1389.1177 (286)

Full SAP Calculation Printout



Property Reference	Plot 11			Issued on Date	27/08/2025
Assessment Reference	Plot 11	Prop Type Ref			
Property	Flat 11, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	80 C	DER	6.25	TER	15.82
Environmental	96 A	% DER < TER			60.49
CO ₂ Emissions (t/year)	0.28	DFEE	41.03	TFEE	41.12
Compliance Check	See BREL	% DFEE < TFEE			0.24
% DPER < TPER	22.57	DPER	65.04	TPER	84.01
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.5800	(17)
Infiltration rate	0.1290	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1000 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Balanced mechanical ventilation with heat recovery	0.1275	0.1250	0.1225	0.1100	0.1075	0.0950	0.0950	0.0925	0.1000	0.1075	0.1125	0.1175 (22b)
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2675	0.2650	0.2625	0.2500	0.2475	0.2350	0.2350	0.2325	0.2400	0.2475	0.2525	0.2575 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			25.8400	0.1100	2.8424	20.0000	516.8000 (28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436	9.0000	252.1800 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			110.8300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6339		(33)
Main dwelling							
Corridor			14.4600	0.0000	0.0000	180.0000	2602.8000 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			25.1600			40.0000	1006.4000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		9021.4601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.8914 (35)
List of Thermal Bridges							

6. Solar gains						
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)

Full SAP Calculation Printout



Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	388.5808	410.0778	412.7174	426.6725	433.0134	426.3435	405.9483	387.1759	373.2116	361.0205	368.6413	378.4072 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	53.7578	53.8730	53.9887	54.5748	54.6936	55.2951	55.2951	55.4170	55.0529	54.6936	54.4566	54.2217
alpha	4.5839	4.5915	4.5992	4.6383	4.6462	4.6863	4.6863	4.6945	4.6702	4.6462	4.6304	4.6148
util living area	0.9788	0.9705	0.9564	0.9119	0.8162	0.6400	0.4821	0.5234	0.7461	0.9157	0.9654	0.9811 (86)
MIT	19.8471	19.9833	20.1932	20.5162	20.7887	20.9500	20.9892	20.9844	20.8962	20.5757	20.1759	19.8243 (87)
Th 2	20.1556	20.1572	20.1589	20.1672	20.1689	20.1772	20.1772	20.1788	20.1739	20.1689	20.1655	20.1622 (88)
util rest of house	0.9744	0.9643	0.9467	0.8918	0.7750	0.5709	0.3961	0.4360	0.6830	0.8925	0.9571	0.9771 (89)
MIT 2	18.8161	18.9889	19.2541	19.6569	19.9732	20.1422	20.1722	20.1711	20.0932	19.7353	19.2397	18.7921 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.2709	19.4276	19.6684	20.0360	20.3330	20.4986	20.5327	20.5299	20.4475	20.1061	19.6527	19.2475 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2709	19.4276	19.6684	20.0360	20.3330	20.4986	20.5327	20.5299	20.4475	20.1061	19.6527	19.2475 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9685	0.9577	0.9400	0.8882	0.7837	0.5988	0.4338	0.4741	0.7051	0.8905	0.9509	0.9716 (94)
Useful gains	376.3560	392.7460	387.9495	378.9717	339.3694	255.2884	176.0966	183.5493	263.1480	321.4908	350.5285	367.6529 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	697.8814	675.7669	611.2295	511.3410	395.5479	267.3212	178.2277	186.7537	288.9317	435.5520	577.6470	695.4504 (97)
Space heating kWh	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814 (98a)
Space heating requirement - total per year (kWh/year)												1224.8962
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1224.8962
Space heating per m2	(98c) / (4) =											24.0176 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
(217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(217)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7377	12.6254	11.3677	8.3285	6.4332	5.2560	5.8686	7.6282	9.9082	13.0001	14.6836	16.1751	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													1224.8962 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.8277
Water heating fuel used													661.5151 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	123.8676	(230a)
Total electricity for the above, kWh/year	123.8676	(231)
Electricity for lighting (calculated in Appendix L)	127.0123	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2137.2911	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1224.8962	0.1551	189.9709 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			283.3626 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.0123	0.1443	18.3318 (268)
Total CO2, kg/year			318.8763 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.2500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1224.8962	1.5742	1928.2315 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			2935.0843 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.0123	1.5338	194.8157 (282)
Total Primary energy kWh/year			3317.2868 (286)
Dwelling Primary energy Rate (DPER)			65.0400 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			5.9700	1.1450	6.8359		(27)
Heatloss Floor 1			25.8400	0.1300	3.3592		(28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436		(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)
Total net area of external elements Aum (A, m2)			110.8300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		20.8487		(33)
Main dwelling							
Corridor			14.4600	0.0000	0.0000		(32)
Party Wall			19.6900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

176.8914 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	3.1800	0.0500	0.1590
E4 Jamb	7.5200	0.0500	0.3760
E18 Party wall between dwellings	4.7400	0.0600	0.2844
P4 Party wall - Roof (insulation at ceiling level)	14.4100	0.1200	1.7292
E20 Exposed floor (normal)	12.2200	0.3200	3.9104
E7 Party floor between dwellings (in blocks of flats)	2.1200	0.0700	0.1484
E14 Flat roof	14.3400	0.0800	1.1472
E16 Corner (normal)	2.3700	0.0900	0.2133
P8 Party Wall - Exposed floor (inverted)	7.4800	0.2400	1.7952
E24 Eaves (insulation at ceiling level - inverted)	8.3100	0.2400	1.9944
E21 Exposed floor (inverted)	9.0500	0.3200	2.8960

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

14.8125 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 35.6612 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982	(38)
Heat transfer coeff	58.9660	58.8354	58.7075	58.1066	57.9942	57.4708	57.4708	57.3739	57.6724	57.9942	58.2216	58.4594 (39)
Average = Sum(39)m / 12 =												58.1061

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1562	1.1536	1.1511	1.1393	1.1371	1.1269	1.1269	1.1250	1.1308	1.1371	1.1416	1.1463 (40)
HLP (average)												1.1393
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478 (42a)	
Hot water usage for baths												
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)	
Hot water usage for other uses												
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)	
Average daily hot water use (litres/day)												99.4866 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473 (44)
Energy conte	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194 (45)
Energy content (annual)										Total = Sum(45)m =	1652.4520	
Distribution loss (46)m = 0.15 x (45)m												
	25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529 (46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b 1.3938 (48)

Enter (49) or (54) in (55) 0.5400 (49)

Total storage loss 0.7527 (55)

23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (56)

If cylinder contains dedicated solar storage 23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (57)

Primary loss 23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month 218.0017 192.9113 205.0619 180.3774 174.9534 157.7410 155.6559 161.7216 163.3872 182.0981 193.5456 215.6143 (62)

WWHRS -24.2527 -21.4493 -22.4605 -18.5982 -17.3328 -14.8318 -13.9025 -14.7839 -15.3456 -18.0907 -20.4946 -23.8036 (63a)

PV diverter -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 (63b)

Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)

Output from w/h 193.7490 171.4620 182.6014 161.7793 157.6206 142.9092 141.7534 146.9378 148.0416 164.0073 173.0510 191.8107 (64)

Total per year (kWh/year) = Sum(64)m = 1975.7233 (64)

12Total per year (kWh/year) 1976 (64)

Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 94.2687 83.8181 89.9662 81.0559 79.9551 73.5293 73.5387 75.5556 75.4067 82.3307 85.4344 93.4749 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)

Full SAP Calculation Printout



Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383 (72)
Total internal gains	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957 (73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W
Northwest	5.9700				11.2829		0.6300		0.7000		0.7700	20.5858 (81)
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	433.2595	463.1924	480.0235	514.6395	538.8636	534.4542	510.2861	477.7357	447.1280	420.8013	416.8344	421.8072 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	42.4984	42.5927	42.6855	43.1270	43.2106	43.6041	43.6041	43.6777	43.4517	43.2106	43.0418	42.8667
alpha	3.8332	3.8395	3.8457	3.8751	3.8807	3.9069	3.9069	3.9118	3.8968	3.8807	3.8695	3.8578
util living area	0.9755	0.9662	0.9486	0.8976	0.7955	0.6289	0.4789	0.5268	0.7470	0.9096	0.9613	0.9777 (86)
MIT	19.4655	19.6349	19.9179	20.3391	20.6964	20.9128	20.9767	20.9663	20.8244	20.3957	19.8807	19.4411 (87)
Th 2	19.9552	19.9573	19.9593	19.9688	19.9706	19.9789	19.9789	19.9805	19.9757	19.9706	19.9670	19.9632 (88)
util rest of house	0.9700	0.9586	0.9366	0.8729	0.7465	0.5476	0.3751	0.4208	0.6740	0.8827	0.9513	0.9728 (89)
MIT 2	18.1937	18.4085	18.7648	19.2867	19.6982	19.9208	19.9691	19.9650	19.8436	19.3654	18.7275	18.1683 (90)
Living area fraction	18.7548	18.9496	19.2736	19.7510	20.1386	20.3585	20.4136	20.4068	20.2763	19.8199	19.2363	18.7299 (92)
MIT	18.7548	18.9496	19.2736	19.7510	20.1386	20.3585	20.4136	20.4068	20.2763	19.8199	19.2363	18.7299 (93)
Temperature adjustment												0.0000
adjusted MIT	18.7548	18.9496	19.2736	19.7510	20.1386	20.3585	20.4136	20.4068	20.2763	19.8199	19.2363	18.7299 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9618	0.9494	0.9269	0.8669	0.7552	0.5792	0.4203	0.4665	0.6972	0.8780	0.9424	0.9650 (94)
Useful gains	416.7093	439.7373	444.9104	446.1236	406.9392	309.5346	214.4951	222.8701	311.7241	369.4786	392.8179	407.0501 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	852.3405	826.6122	749.9040	630.5153	489.3909	330.9450	219.1725	229.8832	356.2023	534.7015	706.5941	849.4063 (97)
Space heating kWh	324.1096	259.9800	226.9152	132.7620	61.3440	0.0000	0.0000	0.0000	0.0000	122.9258	225.9189	329.1130 (98a)
Space heating requirement - total per year (kWh/year)												1683.0685
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	324.1096	259.9800	226.9152	132.7620	61.3440	0.0000	0.0000	0.0000	0.0000	122.9258	225.9189	329.1130 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1683.0685
Space heating per m2										(98c) / (4) =		33.0013 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	324.1096	259.9800	226.9152	132.7620	61.3440	0.0000	0.0000	0.0000	0.0000	122.9258	225.9189	329.1130 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	351.1480	281.6684	245.8453	143.8375	66.4616	0.0000	0.0000	0.0000	0.0000	133.1807	244.7659	356.5688 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)
Efficiency of water heater (217)m	85.2047	84.9906	84.5482	83.6200	82.1321	79.8000	79.8000	79.8000	79.8000	83.4222	84.6586	79.8000 (216)
Fuel for water heating, kWh/month	227.3923	201.7423	215.9733	193.4695	191.9111	179.0842	177.6359	184.1325	185.5158	196.5991	204.4104	224.9731 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												1823.4762	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2382.8395	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												141.4370	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-840.2676	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3593.4851	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1823.4762	0.2100	382.9300 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2382.8395	0.2100	500.3963 (264)
Space and water heating			883.3263 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4370	0.1443	20.4137 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832
PV Unit electricity exported	-425.6145	0.1255	-53.4200
Total			-108.9032 (269)
Total CO2, kg/year			806.7661 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.8200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1823.4762	1.1300	2060.5281 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2382.8395	1.1300	2692.6087 (278)
Space and water heating			4753.1367 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			4284.4064 (286)
Target Primary Energy Rate (TPER)			84.0100 (287)

Full SAP Calculation Printout



Property Reference	Plot 11	Issued on Date	27/08/2025
Assessment Reference	Plot 11	Prop Type Ref	
Property	Flat 11, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	80 C	DER	6.25
Environmental	96 A	% DER < TER	60.49
CO ₂ Emissions (t/year)	0.28	DFEE	41.03
Compliance Check	See BREL	% DFEE < TFEE	0.24
% DPER < TPER	22.57	DPER	65.04
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		120.8700 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)

2. Ventilation rate

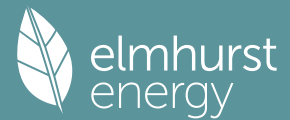
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.5800 (17)
Infiltration rate	0.2945 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2282 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2910	0.2853	0.2796	0.2510	0.2453	0.2168	0.2168	0.2111	0.2282	0.2453	0.2567	0.2681 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5423	0.5407	0.5391	0.5315	0.5301	0.5235	0.5235	0.5223	0.5260	0.5301	0.5330	0.5360 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			25.8400	0.1100	2.8424	20.0000	516.8000 (28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436	9.0000	252.1800 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			110.8300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	18.6339		(33)
Main dwelling							
Corridor			14.4600	0.0000	0.0000	180.0000	2602.8000 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			25.1600			40.0000	1006.4000 (32a)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9021.4601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.8914 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0980	0.3116	
E3 Sill				3.1800	0.0400	0.1272	

Full SAP Calculation Printout



E4 Jamb									7.5200	0.0530	0.3986	
E18 Party wall between dwellings									4.7400	0.0500	0.2370	
P4 Party wall - Roof (insulation at ceiling level)									14.4100	0.1430	2.0606	
E20 Exposed floor (normal)									12.2200	0.3200	3.9104	
E7 Party floor between dwellings (in blocks of flats)									2.1200	0.0520	0.1102	
E14 Flat roof									14.3400	0.1600	2.2944	
E16 Corner (normal)									2.3700	0.0550	0.1303	
P8 Party Wall - Exposed floor (inverted)									7.4800	0.4800	3.5904	
E24 Eaves (insulation at ceiling level - inverted)									8.3100	0.1500	1.2465	
E21 Exposed floor (inverted)									9.0500	0.3200	2.8960	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												17.3133 (36)
Point Thermal bridges												0.0000
Total fabric heat loss											(33) + (36) + (36a) =	35.9472 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	21.6320	21.5665	21.5022	21.2003	21.1439	20.8810	20.8810	20.8323	20.9822	21.1439	21.2581	21.3776 (38)
Average = Sum(39)m / 12 =	57.5793	57.5137	57.4494	57.1476	57.0911	56.8282	56.8282	56.7795	56.9295	57.0911	57.2053	57.3248 (39)
												57.1473
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1290	1.1277	1.1265	1.1205	1.1194	1.1143	1.1143	1.1133	1.1163	1.1194	1.1217	1.1240 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.1205
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.9369 (42b)
Hot water usage for other uses												32.2401 (42c)
Average daily hot water use (litres/day)												50.5753 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995 (44)
Energy content (annual)	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725 (45)
Distribution loss (46)m = 0.15 x (45)m												839.9482
Water storage loss:												0.0000 (46)
Total storage loss												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (64)
12Total per year (kWh/year)												714 (64)
Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.2649 (64a)
Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169 (72)
Total internal gains	324.6838	334.5534	319.8076	311.5186	296.2212	287.2957	276.8459	276.4442	284.5528	292.1140	308.2842	317.7546 (73)
6. Solar gains												
[Jan]												
Area												
Solar flux												
Specific data												
Specific data												
Access factor												
Gains W												
Northwest	5.9700											12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	337.1318	359.8916	365.4590	386.4913	396.9993	394.7358	377.3539	356.5703	340.1797	323.0793	323.9470	327.9202 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.5219	43.5715	43.6203	43.8507	43.8941	44.0972	44.0972	44.1350	44.0187	43.8941	43.8064	43.7151
alpha	3.9015	3.9048	3.9080	3.9234	3.9263	3.9398	3.9398	3.9423	3.9346	3.9263	3.9204	3.9143
util living area	0.9891	0.9846	0.9772	0.9523	0.8942	0.7637	0.6118	0.6594	0.8503	0.9560	0.9823	0.9902 (86)
MIT	19.2741	19.4289	19.6916	20.1095	20.5154	20.8284	20.9471	20.9281	20.7146	20.2155	19.6872	19.2440 (87)
Th 2	19.9772	19.9783	19.9793	19.9841	19.9850	19.9892	19.9892	19.9900	19.9876	19.9850	19.9832	19.9813 (88)
util rest of house	0.9865	0.9809	0.9712	0.9385	0.8603	0.6863	0.4921	0.5428	0.7914	0.9406	0.9773	0.9879 (89)
MIT 2	18.4108	18.5650	18.8261	19.2388	19.6229	19.8917	19.9701	19.9616	19.8058	19.3463	18.8260	18.3838 (90)
Living area fraction	18.7917	18.9461	19.2080	19.6229	20.0167	20.3049	20.4011	20.3880	fLA = Living area / (4) =			0.4412 (91)
MIT	18.7917	18.9461	19.2080	19.6229	20.0167	20.3049	20.4011	20.3880	20.2067	19.7298	19.2060	18.7633 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7917	18.9461	19.2080	19.6229	20.0167	20.3049	20.4011	20.3880	20.2067	19.7298	19.2060	18.7633 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9824	0.9760	0.9654	0.9325	0.8615	0.7126	0.5434	0.5918	0.8059	0.9358	0.9723	0.9842 (94)
Useful gains	331.2079	351.2379	352.8218	360.3963	342.0094	281.3056	205.0602	211.0040	274.1575	302.3322	314.9638	322.7328 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	834.4196	807.8461	730.0653	612.7891	474.8079	324.2019	216.0124	226.4367	347.6539	521.2293	692.5267	834.8394 (97)
Space heating kWh	374.3895	306.8407	280.6691	181.7228	98.8021	0.0000	0.0000	0.0000	0.0000	162.8594	271.8453	381.0073 (98a)
Space heating requirement - total per year (kWh/year)												2058.1362
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	374.3895	306.8407	280.6691	181.7228	98.8021	0.0000	0.0000	0.0000	0.0000	162.8594	271.8453	381.0073 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2058.1362
Space heating per m2										(98c) / (4) =		40.3556 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	534.1849	420.5285	431.5241	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6946	0.7808	0.7453	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	371.0202	328.3517	321.6035	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	421.8534	403.5510	381.0218	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	36.5999	55.9483	44.2072	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	9.1500	13.9871	11.0518	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												34.1888 (107)
Energy for space heating												40.3556 (99)
Energy for space cooling												0.6704 (108)
Total												41.0260 (109)
Fabric Energy Efficiency (DFEE)												41.0 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		Air changes per hour
		20.0000 / (5) = 0.1655 (8)

Full SAP Calculation Printout



Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												5.0000 (17)
Infiltration rate												0.4155 (18)
Number of sides sheltered												3 (19)
Shelter factor												(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.3220 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			5.9700	1.1450	6.8359		(27)
Heatloss Floor 1			25.8400	0.1300	3.3592		(28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436		(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)
Total net area of external elements Aum(A, m2)			110.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 20.8487		(33)
Main dwelling							
Corridor			14.4600	0.0000	0.0000		(32)
Party Wall			19.6900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 176.8914 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	3.1800	0.0500	0.1590
E4 Jamb	7.5200	0.0500	0.3760
E18 Party wall between dwellings	4.7400	0.0600	0.2844
P4 Party wall - Roof (insulation at ceiling level)	14.4100	0.1200	1.7292
E20 Exposed floor (normal)	12.2200	0.3200	3.9104
E7 Party floor between dwellings (in blocks of flats)	2.1200	0.0700	0.1484
E14 Flat roof	14.3400	0.0800	1.1472
E16 Corner (normal)	2.3700	0.0900	0.2133
P8 Party Wall - Exposed floor (inverted)	7.4800	0.2400	1.7952
E24 Eaves (insulation at ceiling level - inverted)	8.3100	0.2400	1.9944
E21 Exposed floor (inverted)	9.0500	0.3200	2.8960

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.8125 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 35.6612 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982 (38)
Average = Sum(39)m / 12 =	58.9660	58.8354	58.7075	58.1066	57.9942	57.4708	57.4708	57.3739	57.6724	57.9942	58.2216	58.1061 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1562	1.1536	1.1511	1.1393	1.1371	1.1269	1.1269	1.1250	1.1308	1.1371	1.1416	1.1463 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												50.5753 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995 (44)
Energy content (annual)	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725 (45)
Distribution loss (46)m = 0.15 x (45)m												839.9482
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (64)
Total per year (kWh/year)												714 (64)

Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850 (64a)
Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169 (72)
Total internal gains	322.2036	331.8074	317.3273	308.9557	293.7410	284.7328	274.3657	273.9640	281.9899	289.6338	305.7214	315.2744 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.9700		11.2829		0.6300		0.7000		0.7700		20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	342.7895	373.7105	392.8233	432.9418	460.4027	462.4118	440.5808	406.4725	373.9830	340.8426	331.6237	332.0858 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	42.4984	42.5927	42.6855	43.1270	43.2106	43.6041	43.6041	43.6777	43.4517	43.2106	43.0418	42.8667
alpha	3.8332	3.8395	3.8457	3.8751	3.8807	3.9069	3.9069	3.9118	3.8968	3.8807	3.8695	3.8578
util living area	0.9885	0.9828	0.9718	0.9352	0.8528	0.6968	0.5440	0.6015	0.8197	0.9494	0.9811	0.9899 (86)
MIT	19.2368	19.4157	19.7167	20.1827	20.5977	20.8746	20.9638	20.9466	20.7490	20.2334	19.6743	19.2121 (87)
Th 2	19.9552	19.9573	19.9593	19.9688	19.9706	19.9789	19.9789	19.9805	19.9757	19.9706	19.9670	19.9632 (88)
util rest of house	0.9858	0.9786	0.9646	0.9175	0.8111	0.6152	0.4305	0.4874	0.7548	0.9320	0.9757	0.9874 (89)
MIT 2	18.3576	18.5364	18.8353	19.2947	19.6793	19.9111	19.9666	19.9604	19.8203	19.3515	18.8012	18.3389 (90)
Living area fraction	18.7455	18.9243	19.2242	19.6865	20.0845	20.3362	20.4065	20.3955	20.2301	19.7406	19.1864	18.7241 (91)
MIT	18.7455	18.9243	19.2242	19.6865	20.0845	20.3362	20.4065	20.3955	20.2301	19.7406	19.1864	18.7241 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7455	18.9243	19.2242	19.6865	20.0845	20.3362	20.4065	20.3955	20.2301	19.7406	19.1864	18.7241 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9815	0.9733	0.9581	0.9117	0.8162	0.6456	0.4798	0.5361	0.7728	0.9273	0.9705	0.9835 (94)
Useful gains	336.4583	363.7253	376.3647	394.7256	375.7979	298.5138	211.3798	217.9232	289.0247	316.0465	321.8315	326.6212 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	851.7925	825.1280	747.0034	626.7658	486.2502	329.6643	218.7632	229.2374	353.5354	530.1005	703.6902	849.0724 (97)
Space heating kWh	383.4087	310.0626	275.7552	167.0689	82.1765	0.0000	0.0000	0.0000	0.0000	159.2561	274.9382	388.7037 (98a)
Space heating requirement - total per year (kWh/year)												2041.3699
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	383.4087	310.0626	275.7552	167.0689	82.1765	0.0000	0.0000	0.0000	0.0000	159.2561	274.9382	388.7037 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2041.3699
Space heating per m ²										(98c) / (4) =		40.0269 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	540.2254	425.2838	436.0414	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7675	0.8414	0.8017	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	414.6056	357.8529	349.5870	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	503.7338	480.1170	441.9432	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	64.1723	90.9645	68.7130	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	16.0431	22.7411	17.1782	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												55.9625 (107)
Energy for space heating												40.0269 (99)
Energy for space cooling												1.0973 (108)
Total												41.1242 (109)
Fabric Energy Efficiency (TFEE)												41.1 (109)

Full SAP Calculation Printout



Property Reference	Plot 11			Issued on Date	27/08/2025
Assessment Reference	Plot 11	Prop Type Ref			
Property	Flat 11, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	80 C	DER	6.25	TER	15.82
Environmental	96 A	% DER < TER			60.49
CO ₂ Emissions (t/year)	0.28	DFEE	41.03	TFEE	41.12
Compliance Check	See BREL	% DFEE < TFEE			0.24
% DPER < TPER	22.57	DPER	65.04	TPER	84.01
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.5800	(17)
Infiltration rate	0.1290	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1000 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Balanced mechanical ventilation with heat recovery	0.1275	0.1250	0.1225	0.1100	0.1075	0.0950	0.0950	0.0925	0.1000	0.1075	0.1125	0.1175 (22b)
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2675	0.2650	0.2625	0.2500	0.2475	0.2350	0.2350	0.2325	0.2400	0.2475	0.2525	0.2575 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			25.8400	0.1100	2.8424	20.0000	516.8000 (28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436	9.0000	252.1800 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			110.8300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6339		(33)
Main dwelling							
Corridor			14.4600	0.0000	0.0000	180.0000	2602.8000 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			25.1600			40.0000	1006.4000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		9021.4601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.8914 (35)
List of Thermal Bridges							

6. Solar gains						
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)

Full SAP Calculation Printout



Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	388.5808	410.0778	412.7174	426.6725	433.0134	426.3435	405.9483	387.1759	373.2116	361.0205	368.6413	378.4072 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	53.7578	53.8730	53.9887	54.5748	54.6936	55.2951	55.2951	55.4170	55.0529	54.6936	54.4566	54.2217
alpha	4.5839	4.5915	4.5992	4.6383	4.6462	4.6863	4.6863	4.6945	4.6702	4.6462	4.6304	4.6148
util living area	0.9788	0.9705	0.9564	0.9119	0.8162	0.6400	0.4821	0.5234	0.7461	0.9157	0.9654	0.9811 (86)
MIT	19.8471	19.9833	20.1932	20.5162	20.7887	20.9500	20.9892	20.9844	20.8962	20.5757	20.1759	19.8243 (87)
Th 2	20.1556	20.1572	20.1589	20.1672	20.1689	20.1772	20.1772	20.1788	20.1739	20.1689	20.1655	20.1622 (88)
util rest of house	0.9744	0.9643	0.9467	0.8918	0.7750	0.5709	0.3961	0.4360	0.6830	0.8925	0.9571	0.9771 (89)
MIT 2	18.8161	18.9889	19.2541	19.6569	19.9732	20.1422	20.1722	20.1711	20.0932	19.7353	19.2397	18.7921 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.2709	19.4276	19.6684	20.0360	20.3330	20.4986	20.5327	20.5299	20.4475	20.1061	19.6527	19.2475 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2709	19.4276	19.6684	20.0360	20.3330	20.4986	20.5327	20.5299	20.4475	20.1061	19.6527	19.2475 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9685	0.9577	0.9400	0.8882	0.7837	0.5988	0.4338	0.4741	0.7051	0.8905	0.9509	0.9716 (94)
Useful gains	376.3560	392.7460	387.9495	378.9717	339.3694	255.2884	176.0966	183.5493	263.1480	321.4908	350.5285	367.6529 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	697.8814	675.7669	611.2295	511.3410	395.5479	267.3212	178.2277	186.7537	288.9317	435.5520	577.6470	695.4504 (97)
Space heating kWh	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814 (98a)
Space heating requirement - total per year (kWh/year)												1224.8962
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1224.8962
Space heating per m2	(98c) / (4) =											24.0176 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	239.2149	190.1901	166.1203	95.3059	41.7968	0.0000	0.0000	0.0000	0.0000	84.8616	163.5254	243.8814	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7377	12.6254	11.3677	8.3285	6.4332	5.2560	5.8686	7.6282	8.3285	13.0001	14.6836	16.1751	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													1224.8962 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.8277
Water heating fuel used													661.5151 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	123.8676	(230a)
Total electricity for the above, kWh/year	123.8676	(231)
Electricity for lighting (calculated in Appendix L)	127.0123	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2137.2911	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1224.8962	0.1551	189.9709 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			283.3626 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.0123	0.1443	18.3318 (268)
Total CO2, kg/year			318.8763 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.2500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1224.8962	1.5742	1928.2315 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			2935.0843 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.0123	1.5338	194.8157 (282)
Total Primary energy kWh/year			3317.2868 (286)
Dwelling Primary energy Rate (DPER)			65.0400 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			5.9700	1.1450	6.8359		(27)
Heatloss Floor 1			25.8400	0.1300	3.3592		(28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436		(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)
Total net area of external elements Aum (A, m2)			110.8300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		20.8487		(33)
Main dwelling							
Corridor			14.4600	0.0000	0.0000		(32)
Party Wall			19.6900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

176.8914 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	3.1800	0.0500	0.1590
E4 Jamb	7.5200	0.0500	0.3760
E18 Party wall between dwellings	4.7400	0.0600	0.2844
P4 Party wall - Roof (insulation at ceiling level)	14.4100	0.1200	1.7292
E20 Exposed floor (normal)	12.2200	0.3200	3.9104
E7 Party floor between dwellings (in blocks of flats)	2.1200	0.0700	0.1484
E14 Flat roof	14.3400	0.0800	1.1472
E16 Corner (normal)	2.3700	0.0900	0.2133
P8 Party Wall - Exposed floor (inverted)	7.4800	0.2400	1.7952
E24 Eaves (insulation at ceiling level - inverted)	8.3100	0.2400	1.9944
E21 Exposed floor (inverted)	9.0500	0.3200	2.8960

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

14.8125 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 35.6612 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982	(38)
Heat transfer coeff	58.9660	58.8354	58.7075	58.1066	57.9942	57.4708	57.4708	57.3739	57.6724	57.9942	58.4594	(39)
Average = Sum(39)m / 12 =											58.1061	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.1562	1.1536	1.1511	1.1393	1.1371	1.1269	1.1269	1.1250	1.1308	1.1371	1.1416	1.1463	(40)
HLP (average)											1.1393	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478	(42a)
Hot water usage for baths												
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses												
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)												99.4866 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473	(44)
Energy conte	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	(45)
Energy content (annual)										Total = Sum(45)m =	1652.4520	
Distribution loss (46)m = 0.15 x (45)m												
25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529	(46)

Water storage loss:

Store volume

150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):

1.3938 (48)

Temperature factor from Table 2b

0.5400 (49)

Enter (49) or (54) in (55)

0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage												
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143	(62)
WWHRS	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

Output from w/h

193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107	(64)
Total per year (kWh/year) = Sum(64)m =											1975.7233	(64)
											1976	(64)

12Total per year (kWh/year)

Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	

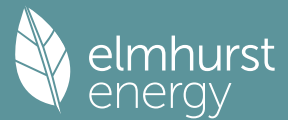
Heat gains from water heating, kWh/month

94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749	(65)
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)

Full SAP Calculation Printout



Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383 (72)
Total internal gains	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957 (73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
Northwest	5.9700				11.2829		0.6300	0.7000	0.7700		20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	433.2595	463.1924	480.0235	514.6395	538.8636	534.4542	510.2861	477.7357	447.1280	420.8013	416.8344	421.8072 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	42.4984	42.5927	42.6855	43.1270	43.2106	43.6041	43.6041	43.6777	43.4517	43.2106	43.0418	42.8667
alpha	3.8332	3.8395	3.8457	3.8751	3.8807	3.9069	3.9069	3.9118	3.8968	3.8807	3.8695	3.8578
util living area	0.9755	0.9662	0.9486	0.8976	0.7955	0.6289	0.4789	0.5268	0.7470	0.9096	0.9613	0.9777 (86)
MIT	19.4655	19.6349	19.9179	20.3391	20.6964	20.9128	20.9767	20.9663	20.8244	20.3957	19.8807	19.4411 (87)
Th 2	19.9552	19.9573	19.9593	19.9688	19.9706	19.9789	19.9789	19.9805	19.9757	19.9706	19.9670	19.9632 (88)
util rest of house	0.9700	0.9586	0.9366	0.8729	0.7465	0.5476	0.3751	0.4208	0.6740	0.8827	0.9513	0.9728 (89)
MIT 2	18.1937	18.4085	18.7648	19.2867	19.6982	19.9208	19.9691	19.9650	19.8436	19.3654	18.7275	18.1683 (90)
Living area fraction									fLA = Living area / (4) =			0.4412 (91)
MIT	18.7548	18.9496	19.2736	19.7510	20.1386	20.3585	20.4136	20.4068	20.2763	19.8199	19.2363	18.7299 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7548	18.9496	19.2736	19.7510	20.1386	20.3585	20.4136	20.4068	20.2763	19.8199	19.2363	18.7299 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9618	0.9494	0.9269	0.8669	0.7552	0.5792	0.4203	0.4665	0.6972	0.8780	0.9424	0.9650 (94)
Useful gains	416.7093	439.7373	444.9104	446.1236	406.9392	309.5346	214.4951	222.8701	311.7241	369.4786	392.8179	407.0501 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	852.3405	826.6122	749.9040	630.5153	489.3909	330.9450	219.1725	229.8832	356.2023	534.7015	706.5941	849.4063 (97)
Space heating kWh	324.1096	259.9800	226.9152	132.7620	61.3440	0.0000	0.0000	0.0000	0.0000	122.9258	225.9189	329.1130 (98a)
Space heating requirement - total per year (kWh/year)												1683.0685
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	324.1096	259.9800	226.9152	132.7620	61.3440	0.0000	0.0000	0.0000	0.0000	122.9258	225.9189	329.1130 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1683.0685
Space heating per m2										(98c) / (4) =		33.0013 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	324.1096	259.9800	226.9152	132.7620	61.3440	0.0000	0.0000	0.0000	0.0000	122.9258	225.9189	329.1130 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	351.1480	281.6684	245.8453	143.8375	66.4616	0.0000	0.0000	0.0000	0.0000	133.1807	244.7659	356.5688 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)
Efficiency of water heater (217)m	85.2047	84.9906	84.5482	83.6200	82.1321	79.8000	79.8000	79.8000	79.8000	83.4222	84.6586	79.8000 (216)
Fuel for water heating, kWh/month	227.3923	201.7423	215.9733	193.4695	191.9111	179.0842	177.6359	184.1325	185.5158	196.5991	204.4104	224.9731 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												1823.4762	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2382.8395	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												141.4370	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-840.2676	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3593.4851	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1823.4762	0.2100	382.9300 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2382.8395	0.2100	500.3963 (264)
Space and water heating			883.3263 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4370	0.1443	20.4137 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832
PV Unit electricity exported	-425.6145	0.1255	-53.4200
Total			-108.9032 (269)
Total CO2, kg/year			806.7661 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.8200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1823.4762	1.1300	2060.5281 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2382.8395	1.1300	2692.6087 (278)
Space and water heating			4753.1367 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			4284.4064 (286)
Target Primary Energy Rate (TPER)			84.0100 (287)

Full SAP Calculation Printout



Property Reference	Plot 11	Issued on Date	27/08/2025
Assessment Reference	Plot 11	Prop Type Ref	
Property	Flat 11, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	80 C	DER	6.25
Environmental	96 A	% DER < TER	60.49
CO ₂ Emissions (t/year)	0.28	DFEE	41.03
Compliance Check	See BREL	TFEE	41.12
% DPER < TPER	22.57	DFEE < TFEE	0.24
		TPER	84.01
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.5800	(17)
Infiltration rate	0.1290	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1000 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1275	0.1250	0.1225	0.1100	0.1075	0.0950	0.0950	0.0925	0.1000	0.1075	0.1125	0.1175 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2675	0.2650	0.2625	0.2500	0.2475	0.2350	0.2350	0.2325	0.2400	0.2475	0.2525	0.2575 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			25.8400	0.1100	2.8424	20.0000	516.8000 (28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436	9.0000	252.1800 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			110.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	18.6339	(33)
Main dwelling							
Corridor			14.4600	0.0000	0.0000	180.0000	2602.8000 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			25.1600			40.0000	1006.4000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9021.4601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		176.8914 (35)
List of Thermal Bridges		

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0980	0.3116
E3 Sill	3.1800	0.0400	0.1272
E4 Jamb	7.5200	0.0530	0.3986
E18 Party wall between dwellings	4.7400	0.0500	0.2370
P4 Party wall - Roof (insulation at ceiling level)	14.4100	0.1430	2.0606
E20 Exposed floor (normal)	12.2200	0.3200	3.9104
E7 Party floor between dwellings (in blocks of flats)	2.1200	0.0520	0.1102
E14 Flat roof	14.3400	0.1600	2.2944
E16 Corner (normal)	2.3700	0.0550	0.1303
P8 Party Wall - Exposed floor (inverted)	7.4800	0.4800	3.5904
E24 Eaves (insulation at ceiling level - inverted)	8.3100	0.1500	1.2465
E21 Exposed floor (inverted)	9.0500	0.3200	2.8960
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.3133 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	35.9472 (37)

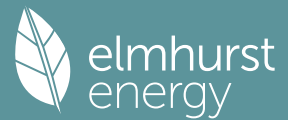
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	10.6685	10.5688	10.4691	9.9707	9.8710	9.3725	9.3725	9.2728	9.5719	9.8710	10.0704	10.2698	(38)
Heat transfer coeff	46.6158	46.5161	46.4164	45.9179	45.8182	45.3197	45.3197	45.2201	45.5191	45.8182	46.0176	46.2170	(39)
Average = Sum(39)m / 12 =												45.8930	
HLP	0.9140	0.9121	0.9101	0.9004	0.8984	0.8886	0.8886	0.8867	0.8925	0.8984	0.9023	0.9062	(40)
HLP (average)												0.8999	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)												117.8284	(43)
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)
Energy content (annual)										Total = Sum(45)m =		1957.1409	
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9799	15.9696	12.9873	9.8323	7.3497	6.2049	6.7047	8.7150	11.6972	14.8523	17.3348	18.4796	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	413.7205	411.7802	398.4972	372.9735	348.7349	326.4901	313.1647	316.0186	328.5713	351.1993	378.8970	403.0728	(73)

6. Solar gains							
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480	(81)

Full SAP Calculation Printout



Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	426.1685	437.1184	444.1486	447.9462	449.5129	433.9301	413.6726	396.1447	384.1983	382.1646	394.5597	413.2385 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	53.7578	53.8730	53.9887	54.5748	54.6936	55.2951	55.2951	55.4170	55.0529	54.6936	54.4566	54.2217	
alpha	4.5839	4.5915	4.5992	4.6383	4.6462	4.6863	4.6863	4.6945	4.6702	4.6462	4.6304	4.6148	
util living area	0.9704	0.9630	0.9443	0.8985	0.8002	0.6311	0.4737	0.5127	0.7320	0.9003	0.9562	0.9738 (86)	
MIT	19.9432	20.0499	20.2648	20.5551	20.8069	20.9528	20.9900	20.9856	20.9044	20.6149	20.2380	19.9147 (87)	
Th 2	20.1556	20.1572	20.1589	20.1672	20.1689	20.1772	20.1772	20.1788	20.1739	20.1689	20.1655	20.1622 (88)	
util rest of house	0.9644	0.9555	0.9325	0.8763	0.7576	0.5622	0.3889	0.4266	0.6683	0.8743	0.9461	0.9685 (89)	
MIT 2	18.9364	19.0716	19.3413	19.7018	19.9917	20.1443	20.1726	20.1718	20.1001	19.7798	19.3160	18.9056 (90)	
Living area fraction									FLA = Living area / (4) =				0.4412 (91)
MIT	19.3806	19.5032	19.7487	20.0782	20.3513	20.5010	20.5332	20.5308	20.4550	20.1483	19.7228	19.3508 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.3806	19.5032	19.7487	20.0782	20.3513	20.5010	20.5332	20.5308	20.4550	20.1483	19.7228	19.3508 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9577	0.9485	0.9258	0.8737	0.7675	0.5902	0.4261	0.4641	0.6911	0.8736	0.9397	0.9621 (94)
Useful gains	408.1449	414.6181	411.1993	391.3656	345.0236	256.0886	176.2731	183.8602	265.5319	333.8659	370.7505	397.5725 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	702.9917	679.2827	614.9577	513.2818	396.3891	267.4314	178.2520	186.7962	289.2720	437.4838	580.8687	700.2230 (97)
Space heating kWh	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (98a)
Space heating requirement - total per year (kWh/year)												1128.3613
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1128.3613
Space heating per m2										(98c) / (4) =		22.1247 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7377	12.6254	11.3677	8.3285	6.4332	5.2560	5.8686	7.6282	9.9082	13.0001	14.6836	16.1751 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1128.3613 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	123.8676 (230a)
Total electricity for the above, kWh/year	123.8676 (231)
Electricity for lighting (calculated in Appendix L)	127.0123 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2040.7562 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1128.3613	16.4900	186.0668 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	16.4900	109.0838 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258 (249)
Energy for lighting	127.0123	16.4900	20.9443 (250)
Additional standing charges			0.0000 (251)
Total energy cost			336.5207 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2620 (257)
SAP value		79.5437
SAP rating (Section 12)		80 (258)
SAP band		C

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1128.3613	0.1551	175.0362 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			268.4278 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.0123	0.1443	18.3318 (268)
Total CO2, kg/year			303.9416 (272)
CO2 emissions per m2			5.9600 (273)
EI value			95.7575
EI rating			96 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000	2.3700	120.8700
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		120.8700 (1b) - (3b)
Dwelling volume			120.8700 (4)
			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.5800 (17)

Full SAP Calculation Printout



Infiltration rate 0.1290 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = $1 - [0.075 \times (19)] = 0.7750$ (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1000 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1075	0.1050	0.1075	0.0975	0.1000	0.0850	0.0825	0.0825	0.0850	0.0950	0.0950	0.0975	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.2475	0.2450	0.2475	0.2375	0.2400	0.2250	0.2225	0.2225	0.2250	0.2350	0.2350	0.2375	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
Heatloss Floor 1			25.8400	0.1100	2.8424	20.0000	516.8000	(28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436	9.0000	252.1800	(29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000	(30)
Total net area of external elements Aum(A, m2)			110.8300					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 18.6339			(33)
Main dwelling								
Corridor			14.4600	0.0000	0.0000	180.0000	2602.8000	(32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001	(32)
Party Floor 1			25.1600			40.0000	1006.4000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 9021.4601 (34)
List of Thermal Bridges 176.8914 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0980	0.3116
E3 Sill	3.1800	0.0400	0.1272
E4 Jamb	7.5200	0.0530	0.3986
E18 Party wall between dwellings	4.7400	0.0500	0.2370
P4 Party wall - Roof (insulation at ceiling level)	14.4100	0.1430	2.0606
E20 Exposed floor (normal)	12.2200	0.3200	3.9104
E7 Party floor between dwellings (in blocks of flats)	2.1200	0.0520	0.1102
E14 Flat roof	14.3400	0.1600	2.2944
E16 Corner (normal)	2.3700	0.0550	0.1303
P8 Party Wall - Exposed floor (inverted)	7.4800	0.4800	3.5904
E24 Eaves (insulation at ceiling level - inverted)	8.3100	0.1500	1.2465
E21 Exposed floor (inverted)	9.0500	0.3200	2.8960
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.3133 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 35.9472 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	9.8710	9.7713	9.8710	9.4722	9.5719	8.9737	8.8741	8.8741	8.9737	9.3725	9.3725	9.4722	(38)
Average = Sum(39)m / 12 =	45.8182	45.7185	45.8182	45.4194	45.5191	44.9210	44.8213	44.8213	44.9210	45.3197	45.3197	45.4194	(39)
													45.3197
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8984	0.8964	0.8984	0.8906	0.8925	0.8808	0.8788	0.8788	0.8808	0.8886	0.8886	0.8906	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
Hot water usage for baths	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)
Hot water usage for other uses	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Average daily hot water use (litres/day)	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
													117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)
Distribution loss (46)m = $0.15 \times (45)m$	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)

Full SAP Calculation Printout



											Total per year (kWh/year) = Sum(64)m =	2274.4719 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9799	15.9696	12.9873	9.8323	7.3497	6.2049	6.7047	8.7150	11.6972	14.8523	17.3348	18.4796 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	413.7205	411.7802	398.4972	372.9735	348.7349	326.4901	313.1647	316.0186	328.5713	351.1993	378.8970	403.0728 (73)

6. Solar gains

[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		Specific data		Specific data		factor		W	
			W/m2		or Table 6b		or Table 6c		Table 6d			
Northwest	5.9700		9.9768		0.2400		0.0000		0.7700		11.0070 (81)	
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	424.7275	434.7703	441.7841	445.4849	443.7913	430.2242	407.8739	391.0821	382.7698	381.2286	393.1312	412.7493 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	54.6936	54.8128	54.6936	55.1738	55.0529	55.7860	55.9101	55.9101	55.7860	55.2951	55.2951	55.1738
alpha	4.6462	4.6542	4.6462	4.6783	4.6702	4.7191	4.7273	4.7273	4.7191	4.6863	4.6863	4.6783
util living area	0.9643	0.9556	0.9344	0.8738	0.7458	0.5467	0.4136	0.4521	0.6910	0.8807	0.9472	0.9688 (86)
MIT	20.0728	20.1739	20.3619	20.6521	20.8769	20.9785	20.9953	20.9928	20.9328	20.6841	20.3418	20.0347 (87)
Th 2	20.1689	20.1705	20.1689	20.1755	20.1739	20.1838	20.1855	20.1855	20.1838	20.1772	20.1772	20.1755 (88)
util rest of house	0.9570	0.9464	0.9203	0.8462	0.6934	0.4708	0.3269	0.3631	0.6216	0.8498	0.9348	0.9624 (89)
MIT 2	19.1095	19.2371	19.4690	19.8232	20.0695	20.1712	20.1838	20.1826	20.1354	19.8673	19.4538	19.0669 (90)
Living area fraction	FLA = Living area / (4) = 0.4412 (91)											
MIT	19.5345	19.6504	19.8629	20.1889	20.4257	20.5274	20.5418	20.5400	20.4872	20.2277	19.8456	19.4939 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5345	19.6504	19.8629	20.1889	20.4257	20.5274	20.5418	20.5400	20.4872	20.2277	19.8456	19.4939 (93)

8. Space heating requirement

Utilisation	0.9502	0.9396	0.9144	0.8467	0.7102	0.5034	0.3652	0.4023	0.6485	0.8519	0.9289	0.9559 (94)
Useful gains	403.5768	408.5026	403.9578	377.1996	315.1834	216.5673	148.9493	157.3363	248.2220	324.7810	365.1902	394.5321 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	661.3612	637.7902	580.1908	471.8561	347.1161	221.3429	149.7838	158.6696	264.4594	409.1312	545.9026	662.8447 (97)
Space heating kWh	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245 (98a)
Space heating requirement - total per year (kWh/year)												961.3948
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												961.3948
Space heating per m2												(98c) / (4) = 18.8509 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245 (98)
Space heating efficiency (main heating system 1)												
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)												
	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245 (211)

Full SAP Calculation Printout



Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7377	12.6254	11.3677	8.3285	6.4332	5.2560	5.8686	7.6282	9.9082	13.0001	14.6836	16.1751	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												961.3948	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.8277	
Water heating fuel used												661.5151	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												123.8676	(230a)
Total electricity for the above, kWh/year												123.8676	(231)
Electricity for lighting (calculated in Appendix L)												127.0123	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1873.7897	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	961.3948	28.4300	273.3245	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	28.4300	188.0687	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156	(249)
Energy for lighting	127.0123	28.4300	36.1096	(250)
Additional standing charges			0.0000	(251)
Total energy cost			532.7184	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	961.3948	0.1556	149.5786	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			242.9703	(265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820	(267)
Energy for lighting	127.0123	0.1443	18.3318	(268)
Total CO2, kg/year			278.4840	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	961.3948	1.5760	1515.1948	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	1.5220	1006.8528	(278)
Space and water heating			2522.0475	(279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869	(281)
Energy for lighting	127.0123	1.5338	194.8157	(282)
Total Primary energy kWh/year			2904.2501	(286)

Full SAP Calculation Printout



SAP 10 EPC IMPROVEMENTS

Plot 11

Current energy efficiency rating: C 80
Current environmental impact rating: A 96

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 80
Potential environmental impact rating: A 96

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current £533	Potential £533	Saving £0
Electricity			
Space heating	£309	£309	£0
Water heating	£188	£188	£0
Lighting	£36	£36	£0
Total cost of fuels	£533	£533	£0
Total cost of uses	£533	£533	£0
Delivered energy	37 kWh/m²	37 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	5 kg/m²	5 kg/m²	0 kg/m²
Primary energy	57 kWh/m²	57 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 120.8700 (5)

2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.5800	(17)
Infiltration rate	0.1290	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1000 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1275	0.1250	0.1225	0.1100	0.1075	0.0950	0.0950	0.0925	0.1000	0.1075	0.1125	0.1175 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2675	0.2650	0.2625	0.2500	0.2475	0.2350	0.2350	0.2325	0.2400	0.2475	0.2525	0.2575 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
Heatloss Floor 1			25.8400	0.1100	2.8424	20.0000	516.8000	(28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436	9.0000	252.1800	(29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000	(30)
Total net area of external elements Aum(A, m2)			110.8300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6339			(33)
Main dwelling								
Corridor			14.4600	0.0000	0.0000	180.0000	2602.8000	(32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001	(32)
Party Floor 1			25.1600			40.0000	1006.4000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 9021.4601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 176.8914 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0980	0.3116
E3 Sill	3.1800	0.0400	0.1272
E4 Jamb	7.5200	0.0530	0.3986
E18 Party wall between dwellings	4.7400	0.0500	0.2370
P4 Party wall - Roof (insulation at ceiling level)	14.4100	0.1430	2.0606
E20 Exposed floor (normal)	12.2200	0.3200	3.9104
E7 Party floor between dwellings (in blocks of flats)	2.1200	0.0520	0.1102
E14 Flat roof	14.3400	0.1600	2.2944
E16 Corner (normal)	2.3700	0.0550	0.1303
P8 Party Wall - Exposed floor (inverted)	7.4800	0.4800	3.5904
E24 Eaves (insulation at ceiling level - inverted)	8.3100	0.1500	1.2465
E21 Exposed floor (inverted)	9.0500	0.3200	2.8960

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 17.3133 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 35.9472 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	10.6685	10.5688	10.4691	9.9707	9.8710	9.3725	9.3725	9.2728	9.5719	9.8710	10.0704	10.2698 (38)
Heat transfer coeff												
	46.6158	46.5161	46.4164	45.9179	45.8182	45.3197	45.3197	45.2201	45.5191	45.8182	46.0176	46.2170 (39)
Average = Sum(39)m / 12 =												45.8930

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9140	0.9121	0.9101	0.9004	0.8984	0.8886	0.8886	0.8867	0.8925	0.8984	0.9023	0.9062 (40)
HLP (average)												0.8999
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)	
Hot water usage for baths													
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)	
Hot water usage for other uses													
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)	
Average daily hot water use (litres/day)												117.8284 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)	
Energy content	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)	
Energy content (annual)										Total = Sum(45)m =		1957.1409	
Distribution loss (46)m = 0.15 x (45)m													
30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)	
Water storage loss:													
Store volume												201.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8694 (55)	
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h													
229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)	
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month													
67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	17.9799	15.9696	12.9873	9.8323	7.3497	6.2049	6.7047	8.7150	11.6972	14.8523	17.3348	18.4796	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)

Full SAP Calculation Printout



Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424 (72)
Total internal gains	413.7205	411.7802	398.4972	372.9735	348.7349	326.4901	313.1647	316.0186	328.5713	351.1993	378.8970 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest				5.9700	11.2829	0.2400	0.0000		0.7700		12.4480 (81)	
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	426.1685	437.1184	444.1486	447.9462	449.5129	433.9301	413.6726	396.1447	384.1983	382.1646	394.5597	413.2385 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	53.7578	53.8730	53.9887	54.5748	54.6936	55.2951	55.2951	55.4170	55.0529	54.6936	54.4566	54.2217
alpha	4.5839	4.5915	4.5992	4.6383	4.6462	4.6863	4.6863	4.6945	4.6702	4.6462	4.6304	4.6148
util living area	0.9704	0.9630	0.9443	0.8985	0.8002	0.6311	0.4737	0.5127	0.7320	0.9003	0.9562	0.9738 (86)
MIT	19.9432	20.0499	20.2648	20.5551	20.8069	20.9528	20.9900	20.9856	20.9044	20.6149	20.2380	19.9147 (87)
Th 2	20.1556	20.1572	20.1589	20.1672	20.1689	20.1772	20.1772	20.1788	20.1739	20.1689	20.1655	20.1622 (88)
util rest of house	0.9644	0.9555	0.9325	0.8763	0.7576	0.5622	0.3889	0.4266	0.6683	0.8743	0.9461	0.9685 (89)
MIT 2	18.9364	19.0716	19.3413	19.7018	19.9917	20.1443	20.1726	20.1718	20.1001	19.7798	19.3160	18.9056 (90)
Living area fraction									FLA = Living area / (4) =			0.4412 (91)
MIT	19.3806	19.5032	19.7487	20.0782	20.3513	20.5010	20.5332	20.5308	20.4550	20.1483	19.7228	19.3508 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3806	19.5032	19.7487	20.0782	20.3513	20.5010	20.5332	20.5308	20.4550	20.1483	19.7228	19.3508 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9577	0.9485	0.9258	0.8737	0.7675	0.5902	0.4261	0.4641	0.6911	0.8736	0.9397	0.9621 (94)
Useful gains	408.1449	414.6181	411.1993	391.3656	345.0236	256.0886	176.2731	183.8602	265.5319	333.8659	370.7505	397.5725 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	702.9917	679.2827	614.9577	513.2818	396.3891	267.4314	178.2520	186.7962	289.2720	437.4838	580.8687	700.2230 (97)
Space heating kWh	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (98a)
Space heating requirement - total per year (kWh/year)												1128.3613
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1128.3613
Space heating per m2										(98c) / (4) =		22.1247 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of total heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	219.3660	177.8546	151.5963	87.7796	38.2160	0.0000	0.0000	0.0000	0.0000	77.0917	151.2851	225.1720 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7377	12.6254	11.3677	8.3285	6.4332	5.2560	5.8686	7.6282	9.9082	13.0001	14.6836	16.1751 (232)

elmhurst
energy

		Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling				
Ground floor		51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 120.8700 (5)

Full SAP Calculation Printout



2. Ventilation rate

											m3 per hour		
Number of open chimneys											0 * 80 =	0.0000 (6a)	
Number of open flues											0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire											0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler											0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater											0 * 35 =	0.0000 (6e)	
Number of blocked chimneys											0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans											0 * 10 =	0.0000 (7a)	
Number of passive vents											0 * 10 =	0.0000 (7b)	
Number of flueless gas fires											0 * 40 =	0.0000 (7c)	
											Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) =	0.0000 (8)	
Pressure test											Yes		
Pressure Test Method											Blower Door		
Measured/design AP50											2.5800 (17)		
Infiltration rate											0.1290 (18)		
Number of sides sheltered											3 (19)		
Shelter factor											(20) = 1 - [0.075 x (19)] =	0.7750 (20)	
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.1000 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)	
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)	
Adj infilt rate													
	0.1075	0.1050	0.1075	0.0975	0.1000	0.0850	0.0825	0.0825	0.0850	0.0950	0.0950	0.0975 (22b)	
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													
													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.2475	0.2450	0.2475	0.2375	0.2400	0.2250	0.2225	0.2225	0.2250	0.2350	0.2350	0.2375 (25)	

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Window			5.9700	0.7752	4.6279			(27)
Heatloss Floor 1			25.8400	0.1100	2.8424	20.0000	516.8000	(28b)
External Wall	33.9900	5.9700	28.0200	0.1800	5.0436	9.0000	252.1800	(29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000	(30)
Total net area of external elements Aum(A, m2)			110.8300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6339			(33)
Main dwelling								
Corridor			14.4600	0.0000	0.0000	180.0000	2602.8000	(32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001	(32)
Party Floor 1			25.1600			40.0000	1006.4000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								
					(28)...(30) + (32) + (32a)...(32e) =		9021.4601	(34)
							176.8914	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0980		0.3116	
E3 Sill				3.1800	0.0400		0.1272	
E4 Jamb				7.5200	0.0530		0.3986	
E18 Party wall between dwellings				4.7400	0.0500		0.2370	
P4 Party wall - Roof (insulation at ceiling level)				14.4100	0.1430		2.0606	
E20 Exposed floor (normal)				12.2200	0.3200		3.9104	
E7 Party floor between dwellings (in blocks of flats)				2.1200	0.0520		0.1102	
E14 Flat roof				14.3400	0.1600		2.2944	
E16 Corner (normal)				2.3700	0.0550		0.1303	
P8 Party Wall - Exposed floor (inverted)				7.4800	0.4800		3.5904	
E24 Eaves (insulation at ceiling level - inverted)				8.3100	0.1500		1.2465	
E21 Exposed floor (inverted)				9.0500	0.3200		2.8960	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							17.3133	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	35.9472	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.7196 (42)											
Hot water usage for mixer showers	72.6657 (42a)											
Hot water usage for baths	22.8594 (42b)											
Hot water usage for other uses	32.2401 (42c)											
Average daily hot water use (litres/day)	117.8284 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)

Full SAP Calculation Printout



Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Energy content (annual)										Total = Sum(45)m =		1957.1409
Distribution loss (46)m = 0.15 x (45)m												
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	17.9799	15.9696	12.9873	9.8323	7.3497	6.2049	6.7047	8.7150	11.6972	14.8523	17.3348	18.4796 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)												
	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains												
	413.7205	411.7802	398.4972	372.9735	348.7349	326.4901	313.1647	316.0186	328.5713	351.1993	378.8970	403.0728 (73)

6. Solar gains

[Jan]												Gains
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		W	

Northwest					5.9700	9.9768	0.2400	0.0000	0.7700		11.0070 (81)	

Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	424.7275	434.7703	441.7841	445.4849	443.7913	430.2242	407.8739	391.0821	382.7698	381.2286	393.1312	412.7493 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	54.6936	54.8128	54.6936	55.1738	55.0529	55.7860	55.9101	55.9101	55.7860	55.2951	55.2951	55.1738
alpha	4.6462	4.6542	4.6462	4.6783	4.6702	4.7191	4.7273	4.7273	4.7191	4.6863	4.6863	4.6783
util living area												
	0.9643	0.9556	0.9344	0.8738	0.7458	0.5467	0.4136	0.4521	0.6910	0.8807	0.9472	0.9688 (86)
MIT	20.0728	20.1739	20.3619	20.6521	20.8769	20.9785	20.9953	20.9928	20.9328	20.6841	20.3418	20.0347 (87)
Th 2	20.1689	20.1705	20.1689	20.1755	20.1739	20.1838	20.1855	20.1855	20.1838	20.1772	20.1772	20.1755 (88)
util rest of house												
	0.9570	0.9464	0.9203	0.8462	0.6934	0.4708	0.3269	0.3631	0.6216	0.8498	0.9348	0.9624 (89)
MIT 2	19.1095	19.2371	19.4690	19.8232	20.0695	20.1712	20.1838	20.1826	20.1354	19.8673	19.4538	19.0669 (90)
Living area fraction												
	19.5345	19.6504	19.8629	20.1889	20.4257	20.5274	20.5418	20.5400	20.4872	20.2277	19.8456	19.4939 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5345	19.6504	19.8629	20.1889	20.4257	20.5274	20.5418	20.5400	20.4872	20.2277	19.8456	19.4939 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9502	0.9396	0.9144	0.8467	0.7102	0.5034	0.3652	0.4023	0.6485	0.8519	0.9289	0.9559 (94)
Useful gains	403.5768	408.5026	403.9578	377.1996	315.1834	216.5673	148.9493	157.3363	248.2220	324.7810	365.1902	394.5321 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W												
	661.3612	637.7902	580.1908	471.8561	347.1161	221.3429	149.7838	158.6696	264.4594	409.1312	545.9026	662.8447 (97)
Space heating kWh												
	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245 (98a)
Space heating requirement - total per year (kWh/year)												961.3948
Solar heating kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh												
	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												961.3948

Full SAP Calculation Printout



Space heating per m2

(98c) / (4) = 18.8509 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	191.7916	154.0812	131.1174	68.1527	23.7579	0.0000	0.0000	0.0000	0.0000	62.7566	130.1129	199.6245	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
(217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(217)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7377	12.6254	11.3677	8.3285	6.4332	5.2560	5.8686	7.6282	9.9082	13.0001	14.6836	16.1751	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													961.3948 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.8277
Water heating fuel used													661.5151 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													123.8676 (230a)
Total electricity for the above, kWh/year													123.8676 (231)
Electricity for lighting (calculated in Appendix L)													127.0123 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													1873.7897 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel	Fuel price	Fuel cost	
	kWh/year	p/kWh	£/year	
Space heating - main system 1	961.3948	28.4300	273.3245	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	28.4300	188.0687	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156	(249)
Energy for lighting	127.0123	28.4300	36.1096	(250)
Additional standing charges			0.0000	(251)
Total energy cost			532.7184	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy	Emission factor	Emissions	
	kWh/year	kg CO2/kWh	kg CO2/year	
Space heating - main system 1	961.3948	0.1556	149.5786	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			242.9703	(265)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.0123	0.1443	18.3318 (268)
Total CO2, kg/year			278.4840 (272)

----- 13a. Primary energy - Individual heating systems including micro-CHP -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	961.3948	1.5760	1515.1948 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			2522.0475 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.0123	1.5338	194.8157 (282)
Total Primary energy kWh/year			2904.2501 (286)

Full SAP Calculation Printout



Property Reference	Plot 12			Issued on Date	27/08/2025
Assessment Reference	Plot 12	Prop Type Ref			
Property	Flat 12, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	82 B	DER	5.61	TER	15.76
Environmental	96 A	% DER < TER			64.40
CO ₂ Emissions (t/year)	0.24	DFEE	35.70	TFEE	40.21
Compliance Check	See BREL	% DFEE < TFEE			11.22
% DPER < TPER	30.08	DPER	58.49	TPER	83.65
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.1100 (17)
Infiltration rate	0.1555 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1205 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1537	0.1506	0.1476	0.1326	0.1296	0.1145	0.1145	0.1115	0.1205	0.1296	0.1356	0.1416 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2937	0.2906	0.2876	0.2726	0.2696	0.2545	0.2545	0.2515	0.2605	0.2696	0.2756	0.2816 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			6.7100	0.7752	5.2016		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	20.0000	1000.0000 (28b)
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798	9.0000	243.9900 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m ²)			133.8200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.5814		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.4600	0.0000	0.0000	180.0000	3502.7998 (32)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8421.6698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							168.4334 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths												
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses												
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy content (annual)												
	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1938.9067
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS												0.0000 (63a)
PV diverter												0.0000 (63b)
Solar input												0.0000 (63c)
FGHRS												0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

6. Solar gains												
[Jan]			Area m ²	Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	
Southeast			6.7100	36.7938		0.2400		0.0000		0.7700	45.6246 (77)	
Solar gains	45.6246	77.7157	106.3339	131.7529	147.5742	146.5071	141.2484	129.4450	115.1372	85.8924	54.6478	39.0452 (83)
Total gains	413.8744	454.1378	465.6204	475.7768	472.5059	458.2040	439.7670	429.5704	425.5615	408.7106	399.9851	399.5302 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	52.6408	52.7808	52.9214	53.6362	53.7815	54.5198	54.5198	54.6700	54.2221	53.7815	53.4917	53.2050
alpha	4.5094	4.5187	4.5281	4.5757	4.5854	4.6347	4.6347	4.6447	4.6148	4.5854	4.5661	4.5470
util living area	0.9669	0.9486	0.9224	0.8604	0.7520	0.5756	0.4244	0.4515	0.6528	0.8600	0.9440	0.9710 (86)
MIT	19.9443	20.1264	20.3463	20.6330	20.8473	20.9662	20.9933	20.9910	20.9383	20.6870	20.2864	19.9146 (87)
Th 2	20.1770	20.1790	20.1810	20.1911	20.1931	20.2032	20.2032	20.2052	20.1992	20.1931	20.1891	20.1851 (88)
util rest of house	0.9606	0.9391	0.9079	0.8345	0.7080	0.5118	0.3498	0.3764	0.5908	0.8294	0.9321	0.9654 (89)
MIT 2	18.9570	19.1853	19.4591	19.8115	20.0542	20.1796	20.2000	20.2007	20.1525	19.8814	19.3956	18.9257 (90)
Living area fraction	fLA = Living area / (4) =											0.4500 (91)
MIT	19.4013	19.6088	19.8583	20.1811	20.4111	20.5336	20.5570	20.5564	20.5061	20.2439	19.7964	19.3707 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.4013	19.6088	19.8583	20.1811	20.4111	20.5336	20.5570	20.5564	20.5061	20.2439	19.7964	19.3707 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9534	0.9315	0.9014	0.8342	0.7204	0.5388	0.3832	0.4100	0.6154	0.8315	0.9254	0.9586 (94)
Useful gains	394.5909	423.0075	419.6918	396.8703	340.4162	246.8911	168.5162	176.1068	261.8782	339.8324	370.1655	382.9864 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	671.0993	651.9262	590.4954	492.0285	378.9092	254.5993	169.7882	177.8533	276.3827	419.4845	555.2525	667.0347 (97)
Space heating kWh	205.7223	153.8334	127.0778	68.5139	28.6388	0.0000	0.0000	0.0000	0.0000	59.2611	133.2626	211.3320 (98a)
Space heating requirement - total per year (kWh/year)	987.6419											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	205.7223	153.8334	127.0778	68.5139	28.6388	0.0000	0.0000	0.0000	0.0000	59.2611	133.2626	211.3320 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	987.6419											
Space heating per m2	(98c) / (4) =											19.7528 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	205.7223	153.8334	127.0778	68.5139	28.6388	0.0000	0.0000	0.0000	0.0000	59.2611	133.2626	211.3320 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	205.7223	153.8334	127.0778	68.5139	28.6388	0.0000	0.0000	0.0000	0.0000	59.2611	133.2626	211.3320 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000 (213)											
Water heating												
Water heating requirement												
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.0128	12.0438	10.8441	7.9449	6.1369	5.0139	5.5982	7.2768	9.4519	12.4013	14.0073	15.4301 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												987.6419 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)			
mechanical ventilation fans (SFP = 0.8400)			121.4388 (230a)
Total electricity for the above, kWh/year			121.4388 (231)
Electricity for lighting (calculated in Appendix L)			121.1620 (232)
Energy saving/generation technologies (Appendices M ,N and Q)			
PV generation			0.0000 (233)
Wind generation			0.0000 (234)
Hydro-electric generation (Appendix N)			0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)			0.0000 (235)
Appendix Q - special features			
Energy saved or generated			-0.0000 (236)
Energy used			0.0000 (237)
Total delivered energy for all uses			1885.7917 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	987.6419	0.1557	153.7961 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			246.3433 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	121.1620	0.1443	17.4874 (268)
Total CO2, kg/year			280.6758 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	987.6419	1.5765	1557.0222 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			2554.7864 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	121.1620	1.5338	185.8423 (282)
Total Primary energy kWh/year			2924.3414 (286)
Dwelling Primary energy Rate (DPER)			58.4900 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

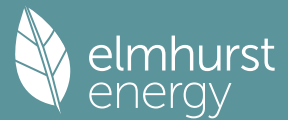
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			6.7100	1.1450	7.6832			(27)					
Heatloss Floor 1			50.0000	0.1300	6.5000			(28b)					
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798			(29a)					
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)					
Total net area of external elements Aum(A, m2)			133.8200					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		24.5630			(33)					
Main dwelling													
Corridor			14.3600	0.0000	0.0000			(32)					
Party Wall			19.4600	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							168.4334	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				8.4400	0.0500		0.4220						
E18 Party wall between dwellings				4.7400	0.0600		0.2844						
P4 Party wall - Roof (insulation at ceiling level)				14.2700	0.1200		1.7124						
E20 Exposed floor (normal)				14.2700	0.3200		4.5664						
E14 Flat roof				14.2700	0.0800		1.1416						
E16 Corner (normal)				2.3700	0.0900		0.2133						
P8 Party Wall - Exposed floor (inverted)				14.2700	0.2400		3.4248						
E24 Eaves (insulation at ceiling level - inverted)				8.2100	0.2400		1.9704						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.0533	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	38.6163	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Average = Sum(39)m / 12 =	61.5168	61.3868	61.2594	60.6608	60.5489	60.0275	60.0275	59.9310	60.2283	60.5489	60.7754	61.0123	(39)
												60.6603	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2303	1.2277	1.2252	1.2132	1.2110	1.2006	1.2006	1.1986	1.2046	1.2110	1.2155	1.2202	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers														
	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)	
Hot water usage for baths														
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses														
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)													98.5597	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Energy content (annual)										Total = Sum(45)m =		1637.0557		
Distribution loss (46)m = 0.15 x (45)m														
	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h														
	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)	
Electric shower(s)												1962	(64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month														
	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	80.4120	89.0275	80.4120	83.0924	80.4120	83.0924	80.4120	80.4120	83.0924	80.4120	83.0924	80.4120	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)	
Water heating gains (Table 5)														
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)	

Full SAP Calculation Printout



Total internal gains
404.9889 413.1748 396.9376 383.1548 365.0645 349.7280 337.3001 338.4578 348.1370 362.5258 383.4773 397.4355 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	
-----						-----		-----			-----	
Southeast				6.7100	36.7938	0.6300		0.7000		0.7700	75.4518 (77)	
-----						-----		-----			-----	
Solar gains	75.4518	128.5223	175.8498	217.8864	244.0509	242.2861	233.5896	214.0697	190.4081	142.0445	90.3738	64.5710 (83)
Total gains	480.4407	541.6970	572.7874	601.0412	609.1154	592.0140	570.8897	552.5275	538.5451	504.5703	473.8511	462.0065 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	38.0278	38.1084	38.1877	38.5645	38.6358	38.9713	38.9713	39.0341	38.8414	38.6358	38.4918	38.3423
alpha	3.5352	3.5406	3.5458	3.5710	3.5757	3.5981	3.5981	3.6023	3.5894	3.5757	3.5661	3.5562
util living area	0.9626	0.9425	0.9132	0.8518	0.7498	0.5932	0.4467	0.4777	0.6718	0.8588	0.9398	0.9668 (86)
MIT	19.3996	19.6455	19.9641	20.3684	20.6971	20.9059	20.9740	20.9664	20.8466	20.4409	19.8643	19.3575 (87)
Th 2	19.8958	19.8979	19.8999	19.9094	19.9112	19.9196	19.9196	19.9211	19.9163	19.9112	19.9076	19.9038 (88)
util rest of house	0.9547	0.9308	0.8952	0.8204	0.6963	0.5108	0.3439	0.3745	0.5941	0.8226	0.9256	0.9599 (89)
MIT 2	18.0754	18.3829	18.7784	19.2715	19.6444	19.8575	19.9087	19.9060	19.8052	19.3680	18.6679	18.0282 (90)
Living area fraction									FLA = Living area /	(4) =		0.4500 (91)
MIT	18.6713	18.9511	19.3120	19.7651	20.1181	20.3293	20.3881	20.3832	20.2739	19.8508	19.2063	18.6264 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6713	18.9511	19.3120	19.7651	20.1181	20.3293	20.3881	20.3832	20.2739	19.8508	19.2063	18.6264 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9436	0.9185	0.8838	0.8157	0.7073	0.5433	0.3894	0.4199	0.6213	0.8203	0.9144	0.9493 (94)
Useful gains	453.3342	497.5417	506.2356	490.2886	430.7979	321.6653	222.3299	231.9791	334.5777	413.9076	433.2891	438.5833 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	884.0760	862.5504	784.8533	659.0868	509.7085	343.9149	227.3885	238.7166	371.8414	560.1265	735.7640	880.1844 (97)
Space heating kWh	320.4719	245.2859	207.2916	121.5347	58.7095	0.0000	0.0000	0.0000	0.0000	108.7868	217.7819	328.5512 (98a)
Space heating requirement - total per year (kWh/year)												1608.4134
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	320.4719	245.2859	207.2916	121.5347	58.7095	0.0000	0.0000	0.0000	0.0000	108.7868	217.7819	328.5512 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1608.4134
Space heating per m2										(98c) / (4) =		32.1683 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	320.4719	245.2859	207.2916	121.5347	58.7095	0.0000	0.0000	0.0000	0.0000	108.7868	217.7819	328.5512 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	347.2068	265.7485	224.5846	131.6735	63.6072	0.0000	0.0000	0.0000	0.0000	117.8622	235.9501	355.9601 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater	85.1957	84.8779	84.3606	83.4418	82.0682	79.8000	79.8000	79.8000	79.8000	83.1753	84.5920	79.8000 (216)
Fuel for water heating, kWh/month	225.8070	200.5900	214.9514	192.5798	190.8000	177.9421	176.5248	182.9609	184.3137	195.8674	203.1619	223.3558 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	16.7080	13.4038	12.0686	8.8420	6.8298	5.5800	6.2304	8.0985	10.5191	13.8017	15.5890	17.1724 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2359	-25.2017	-37.5624	-43.8610	-48.7368	-46.0498	-45.5243	-42.2880	-36.7844	-29.5773	-19.2805	-14.8007 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.1674	-15.3157	-30.8774	-47.0062	-62.7523	-63.2391	-62.4572	-52.5750	-38.1587	-22.0673	-9.6254	-5.6473 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1742.5931	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2368.8547	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												134.8433	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-823.7918	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3508.4993	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1742.5931	0.2100	365.9446	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2368.8547	0.2100	497.4595	(264)
Space and water heating			863.4040	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	134.8433	0.1443	19.4620	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-406.9028	0.1338	-54.4437	
PV Unit electricity exported	-416.8889	0.1255	-52.3262	
Total			-106.7698	(269)
Total CO2, kg/year			788.0255	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.7600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1742.5931	1.1300	1969.1302	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2368.8547	1.1300	2676.8058	(278)
Space and water heating			4645.9361	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	134.8433	1.5338	206.8271	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-406.9028	1.4945	-608.0993	
PV Unit electricity exported	-416.8889	0.4607	-192.0660	
Total			-800.1653	(283)
Total Primary energy kWh/year			4182.6987	(286)
Target Primary Energy Rate (TPER)			83.6500	(287)

Full SAP Calculation Printout



Property Reference	Plot 12			Issued on Date	27/08/2025
Assessment Reference	Plot 12	Prop Type Ref			
Property	Flat 12, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	82 B	DER	5.61	TER	15.76
Environmental	96 A	% DER < TER			64.40
CO ₂ Emissions (t/year)	0.24	DFEE	35.70	TFEE	40.21
Compliance Check	See BREL	% DFEE < TFEE			11.22
% DPER < TPER	30.08	DPER	58.49	TPER	83.65
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.1100 (17)
Infiltration rate	0.3243 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2513 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3204	0.3141	0.3079	0.2764	0.2702	0.2387	0.2387	0.2325	0.2513	0.2702	0.2827	0.2953 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5513	0.5493	0.5474	0.5382	0.5365	0.5285	0.5285	0.5270	0.5316	0.5365	0.5400	0.5436 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			6.7100	0.7752	5.2016		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	20.0000	1000.0000 (28b)
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798	9.0000	243.9900 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m ²)			133.8200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.5814		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.4600	0.0000	0.0000	180.0000	3502.7998 (32)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8421.6698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							168.4334 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0980	0.3116	
E3 Sill				3.1800	0.0400	0.1272	
E4 Jamb				8.4400	0.0530	0.4473	

elmhurst
energy

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	21.5600	21.4821	21.4056	21.0467	20.9796	20.6670	20.6670	20.6091	20.7874	20.9796	21.1154	21.2575 (38)
Heat transfer coeff	54.5166	54.4386	54.3622	54.0033	53.9362	53.6236	53.6236	53.5657	53.7440	53.9362	54.0720	54.2140 (39)
Average = Sum(39)m / 12 =												54.0030
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0903	1.0888	1.0872	1.0801	1.0787	1.0725	1.0725	1.0713	1.0749	1.0787	1.0814	1.0843 (40)
HLP (average)												1.0801
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (64)
12Total per year (kWh/year)												707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
												478.7637 (64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.8251	91.6992	82.8251	85.5859	82.8251	85.5859	82.8251	82.8251	85.5859	82.8251	85.5859	82.8251 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	317.2802	326.7035	312.4683	304.2171	289.2530	280.3836	270.1905	269.8049	277.7002	285.2305	301.0593	310.4685 (73)

[Jan]													
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific Table or Table 6c		Access factor Table 6d	Gains W			
Southeast				6.7100	36.7938	0.2400	0.0000		0.7700	45.6246 (77)			
Solar gains	45.6246	77.7157	106.3339	131.7529	147.5742	146.5071	141.2484	129.4450	115.1372	85.8924	54.6478	39.0452 (83)	
Total gains	362.9048	404.4191	418.8022	435.9700	436.8272	426.8907	411.4389	399.2499	392.8374	371.1228	355.7071	349.5137 (84)	

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
---	--------------

Full SAP Calculation Printout



Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	42.9109	42.9723	43.0327	43.3187	43.3726	43.6254	43.6254	43.6726	43.5277	43.3726	43.2637	43.1503
alpha	3.8607	3.8648	3.8688	3.8879	3.8915	3.9084	3.9084	3.9115	3.9018	3.8915	3.8842	3.8767
util living area	0.9825	0.9723	0.9575	0.9199	0.8466	0.7018	0.5437	0.5777	0.7724	0.9218	0.9704	0.9848 (86)
MIT	19.3761	19.5825	19.8636	20.2581	20.6125	20.8715	20.9639	20.9536	20.8016	20.3565	19.8057	19.3362 (87)
Th 2	20.0087	20.0100	20.0113	20.0171	20.0182	20.0234	20.0234	20.0243	20.0214	20.0182	20.0160	20.0137 (88)
util rest of house	0.9787	0.9662	0.9477	0.9002	0.8061	0.6241	0.4354	0.4709	0.7050	0.8988	0.9629	0.9815 (89)
MIT 2	18.5392	18.7434	19.0206	19.4060	19.7343	19.9516	20.0104	20.0063	19.8999	19.5053	18.9703	18.5035 (90)
Living area fraction									FLA = Living area / (4) =			0.4500 (91)
MIT	18.9158	19.1210	19.4000	19.7894	20.1295	20.3655	20.4395	20.4326	20.3057	19.8884	19.3462	18.8782 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9158	19.1210	19.4000	19.7894	20.1295	20.3655	20.4395	20.4326	20.3057	19.8884	19.3462	18.8782 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9733	0.9594	0.9403	0.8949	0.8112	0.6530	0.4831	0.5174	0.7263	0.8952	0.9565	0.9765 (94)
Useful gains	353.2048	388.0188	393.8124	390.1297	354.3372	278.7707	198.7757	206.5769	285.3285	332.2302	340.2328	341.2919 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	796.8021	774.1724	701.2719	588.0652	454.6549	309.1691	205.8854	216.0078	333.5189	500.9796	662.1773	795.7660 (97)
Space heating kWh	330.0364	259.4952	228.7498	142.5136	74.6364	0.0000	0.0000	0.0000	0.0000	125.5495	231.8000	338.1288 (98a)
Space heating requirement - total per year (kWh/year)												1730.9097
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	330.0364	259.4952	228.7498	142.5136	74.6364	0.0000	0.0000	0.0000	0.0000	125.5495	231.8000	338.1288 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1730.9097
Space heating per m2										(98c) / (4) =		34.6182 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	504.0616	396.8145	407.0993	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7611	0.8406	0.8213	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	383.6646	333.5670	334.3332	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	463.0196	446.8249	434.2385	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	57.1357	84.2638	74.3295	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	14.2839	21.0660	18.5824	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												53.9322 (107)
Energy for space heating												34.6182 (99)
Energy for space cooling												1.0786 (108)
Total												35.6968 (109)
Fabric Energy Efficiency (DFEE)												35.7 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000		
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)

Full SAP Calculation Printout



Infiltration rate	0.4188	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3246 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infiltr rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			6.7100	1.1450	7.6832			(27)
Heatloss Floor 1			50.0000	0.1300	6.5000			(28b)
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798			(29a)
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)
Total net area of external elements Aum(A, m2)			133.8200					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		24.5630			(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000			(32)
Party Wall			19.4600	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 168.4334 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	3.1800	0.0500	0.1590	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	8.4400	0.0500	0.4220	
E4 Jamb	4.7400	0.0600	0.2844	
E18 Party wall between dwellings	14.2700	0.1200	1.7124	
P4 Party wall - Roof (insulation at ceiling level)	14.2700	0.3200	4.5664	
E20 Exposed floor (normal)	14.2700	0.0800	1.1416	
E14 Flat roof	2.3700	0.0900	0.2133	
E16 Corner (normal)	14.2700	0.2400	3.4248	
P8 Party Wall - Exposed floor (inverted)	8.2100	0.2400	1.9704	
E24 Eaves (insulation at ceiling level - inverted)				14.0533 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000
Point Thermal Bridges			(36a) =	
Total fabric heat loss			(33) + (36) + (36a) =	38.6163 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Average = Sum(39)m / 12 =	61.5168	61.3868	61.2594	60.6608	60.5489	60.0275	60.0275	59.9310	60.2283	60.5489	60.7754	61.0123	(39)
													60.6603
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2303	1.2277	1.2252	1.2132	1.2110	1.2006	1.2006	1.1986	1.2046	1.2110	1.2155	1.2202	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													50.1040 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													(61)
WWHRS	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(64)
Total per year (kWh/year)													707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893	(64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844	(65)

5. Internal gains (see Table 5 and 5a)

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	80.4120	89.0275	80.4120	83.0924	80.4120	83.0924	80.4120	80.4120	83.0924	80.4120	83.0924	80.4120 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains												
	314.8670	324.0318	310.0551	301.7235	286.8398	277.8900	267.7773	267.3918	275.2067	282.8173	298.5657	308.0553 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	6.7100		36.7938		0.6300		0.7000		0.7700		75.4518 (77)	
Solar gains	75.4518	128.5223	175.8498	217.8864	244.0509	242.2861	233.5896	214.0697	190.4081	142.0445	90.3738	64.5710 (83)
Total gains	390.3188	452.5540	485.9049	519.6099	530.8907	520.1761	501.3670	481.4615	465.6148	424.8618	388.9396	372.6263 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	38.0278	38.1084	38.1877	38.5645	38.6358	38.9713	38.9713	39.0341	38.8414	38.6358	38.4918	38.3423
alpha	3.5352	3.5406	3.5458	3.5710	3.5757	3.5981	3.5981	3.6023	3.5894	3.5757	3.5661	3.5562
util living area	0.9795	0.9649	0.9430	0.8928	0.8039	0.6522	0.5006	0.5370	0.7357	0.9046	0.9650	0.9824 (86)
MIT	19.1725	19.4360	19.7800	20.2316	20.6119	20.8719	20.9625	20.9511	20.7918	20.3015	19.6652	19.1285 (87)
Th 2	19.8958	19.8979	19.8999	19.9094	19.9112	19.9196	19.9196	19.9211	19.9163	19.9112	19.9076	19.9038 (88)
util rest of house	0.9749	0.9572	0.9300	0.8673	0.7551	0.5681	0.3887	0.4254	0.6603	0.8766	0.9560	0.9784 (89)
MIT 2	18.2557	18.5158	18.8532	19.2915	19.6371	19.8516	19.9070	19.9034	19.7942	19.3665	18.7516	18.2181 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.6682	18.9299	19.2702	19.7146	20.0758	20.3107	20.3820	20.3748	20.2431	19.7873	19.1627	18.6278 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.6682	18.9299	19.2702	19.7146	20.0758	20.3107	20.3820	20.3748	20.2431	19.7873	19.1627	18.6278 (93)

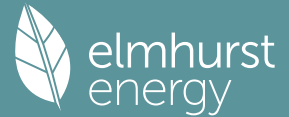
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9682	0.9486	0.9209	0.8620	0.7632	0.6003	0.4381	0.4742	0.6849	0.8728	0.9482	0.9723 (94)
Useful gains	377.8950	429.2979	447.4779	447.9073	405.1947	312.2378	219.6487	228.2851	318.9090	370.8280	368.7795	362.3158 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	883.8891	861.2497	782.2974	656.0212	507.1446	342.7991	227.0221	238.2166	369.9882	556.2779	733.1169	880.2727 (97)
Space heating kWh	376.4595	290.2716	249.1057	149.8419	75.8507	0.0000	0.0000	0.0000	0.0000	137.9747	262.3229	385.3600 (98a)
Space heating requirement - total per year (kWh/year)												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												
Space heating kWh	376.4595	290.2716	249.1057	149.8419	75.8507	0.0000	0.0000	0.0000	0.0000	137.9747	262.3229	385.3600 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
Space heating per m ²	(98c) / (4) =											
	38.5437 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	564.2589	444.2038	455.4756	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7897	0.8599	0.8395	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	445.5801	381.9872	382.3940	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	574.7580	554.5280	532.8539	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	93.0081	128.3704	111.9421	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												
Intermittency factor (Table 10b)												
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.2520	32.0926	27.9855	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	83.3301 (107)											
Energy for space heating	38.5437 (99)											
Energy for space cooling	1.6666 (108)											
Total	40.2103 (109)											
Fabric Energy Efficiency (TFEE)	40.2 (109)											

Full SAP Calculation Printout



Property Reference	Plot 12			Issued on Date	27/08/2025
Assessment Reference	Plot 12	Prop Type Ref			
Property	Flat 12, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	82 B	DER	5.61	TER	15.76
Environmental	96 A	% DER < TER			64.40
CO ₂ Emissions (t/year)	0.24	DFEE	35.70	TFEE	40.21
Compliance Check	See BREL	% DFEE < TFEE			11.22
% DPER < TPER	30.08	DPER	58.49	TPER	83.65
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling				
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(4)
Dwelling volume			118.5000 (5)	

2. Ventilation rate

	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.1100	(17)
Infiltration rate	0.1555	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1205 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1537	0.1506	0.1476	0.1326	0.1296	0.1145	0.1145	0.1115	0.1205	0.1296	0.1356	0.1416	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.2937	0.2906	0.2876	0.2726	0.2696	0.2545	0.2545	0.2515	0.2605	0.2696	0.2756	0.2816	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
Window			6.7100	0.7752	5.2016			(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	20.0000	1000.0000	(28b)
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798	9.0000	243.9900	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m ²)			133.8200					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	21.5814		(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999	(32)
Party Wall			19.4600	0.0000	0.0000	180.0000	3502.7998	(32)
Internal Wall			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								(28)...(30) + (32) + (32a)...(32e) =
List of Thermal Bridges								8421.6698 (34)
K1 Element								168.4334 (35)
				Length	Psi-value		Total	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths												
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses												
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy content (annual)												
	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1938.9067
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS												0.0000 (63a)
PV diverter												0.0000 (63b)
Solar input												0.0000 (63c)
FGHRS												0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

6. Solar gains												
[Jan]			Area m ²	Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast			6.7100	36.7938		0.2400		0.0000		0.7700		45.6246 (77)
Solar gains	45.6246	77.7157	106.3339	131.7529	147.5742	146.5071	141.2484	129.4450	115.1372	85.8924	54.6478	39.0452 (83)
Total gains	413.8744	454.1378	465.6204	475.7768	472.5059	458.2040	439.7670	429.5704	425.5615	408.7106	399.9851	399.5302 (84)

SAP 10 Online 2.22.2 Page 3 of 7

Full SAP Calculation Printout



(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)
mechanical ventilation fans (SFP = 0.8400)
Total electricity for the above, kWh/year
Electricity for lighting (calculated in Appendix L)

121.4388 (230a)
121.4388 (231)
121.1620 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
PV generation
Wind generation
Hydro-electric generation (Appendix N)
Electricity generated - Micro CHP (Appendix N)
Appendix Q - special features
Energy saved or generated
Energy used
Total delivered energy for all uses

0.0000 (233)
0.0000 (234)
0.0000 (235a)
0.0000 (235)
-0.0000 (236)
0.0000 (237)
1885.7917 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	987.6419	0.1557	153.7961 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			246.3433 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	121.1620	0.1443	17.4874 (268)
Total CO2, kg/year			280.6758 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	987.6419	1.5765	1557.0222 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			2554.7864 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	121.1620	1.5338	185.8423 (282)
Total Primary energy kWh/year			2924.3414 (286)
Dwelling Primary energy Rate (DPER)			58.4900 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			6.7100	1.1450	7.6832			(27)					
Heatloss Floor 1			50.0000	0.1300	6.5000			(28b)					
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798			(29a)					
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)					
Total net area of external elements Aum(A, m2)			133.8200					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.5630			(33)					
Main dwelling													
Corridor			14.3600	0.0000	0.0000			(32)					
Party Wall			19.4600	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							168.4334	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590							
E3 Sill				3.1800	0.0500	0.1590							
E4 Jamb				8.4400	0.0500	0.4220							
E18 Party wall between dwellings				4.7400	0.0600	0.2844							
P4 Party wall - Roof (insulation at ceiling level)				14.2700	0.1200	1.7124							
E20 Exposed floor (normal)				14.2700	0.3200	4.5664							
E14 Flat roof				14.2700	0.0800	1.1416							
E16 Corner (normal)				2.3700	0.0900	0.2133							
P8 Party Wall - Exposed floor (inverted)				14.2700	0.2400	3.4248							
E24 Eaves (insulation at ceiling level - inverted)				8.2100	0.2400	1.9704							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.0533	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	38.6163	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Average = Sum(39)m / 12 =	61.5168	61.3868	61.2594	60.6608	60.5489	60.0275	60.0275	59.9310	60.2283	60.5489	60.7754	61.0123	(39)
												60.6603	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2303	1.2277	1.2252	1.2132	1.2110	1.2006	1.2006	1.1986	1.2046	1.2110	1.2155	1.2202	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers														
Hot water usage for baths	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)	
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
												98.5597	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy content (annual)	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
Total per year (kWh/year)													1962.4258	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	80.4120	89.0275	80.4120	83.0924	80.4120	83.0924	80.4120	80.4120	83.0924	80.4120	83.0924	80.4120	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)

Full SAP Calculation Printout



Total internal gains
404.9889 413.1748 396.9376 383.1548 365.0645 349.7280 337.3001 338.4578 348.1370 362.5258 383.4773 397.4355 (73)

6. Solar gains

[Jan]													
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W

Southeast				6.7100	36.7938		0.6300		0.7000		0.7700		75.4518 (77)

Solar gains	75.4518	128.5223	175.8498	217.8864	244.0509	242.2861	233.5896	214.0697	190.4081	142.0445	90.3738		64.5710 (83)
Total gains	480.4407	541.6970	572.7874	601.0412	609.1154	592.0140	570.8897	552.5275	538.5451	504.5703	473.8511		462.0065 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	38.0278	38.1084	38.1877	38.5645	38.6358	38.9713	38.9713	39.0341	38.8414	38.6358	38.4918	38.3423
alpha	3.5352	3.5406	3.5458	3.5710	3.5757	3.5981	3.5981	3.6023	3.5894	3.5757	3.5661	3.5562
util living area	0.9626	0.9425	0.9132	0.8518	0.7498	0.5932	0.4467	0.4777	0.6718	0.8588	0.9398	0.9668 (86)
MIT	19.3996	19.6455	19.9641	20.3684	20.6971	20.9059	20.9740	20.9664	20.8466	20.4409	19.8643	19.3575 (87)
Th 2	19.8958	19.8979	19.8999	19.9094	19.9112	19.9196	19.9196	19.9211	19.9163	19.9112	19.9076	19.9038 (88)
util rest of house	0.9547	0.9308	0.8952	0.8204	0.6963	0.5108	0.3439	0.3745	0.5941	0.8226	0.9256	0.9599 (89)
MIT 2	18.0754	18.3829	18.7784	19.2715	19.6444	19.8575	19.9087	19.9060	19.8052	19.3680	18.6679	18.0282 (90)
Living area fraction									FLA = Living area / (4) =			0.4500 (91)
MIT	18.6713	18.9511	19.3120	19.7651	20.1181	20.3293	20.3881	20.3832	20.2739	19.8508	19.2063	18.6264 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6713	18.9511	19.3120	19.7651	20.1181	20.3293	20.3881	20.3832	20.2739	19.8508	19.2063	18.6264 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9436	0.9185	0.8838	0.8157	0.7073	0.5433	0.3894	0.4199	0.6213	0.8203	0.9144	0.9493 (94)
Useful gains	453.3342	497.5417	506.2356	490.2886	430.7979	321.6653	222.3299	231.9791	334.5777	413.9076	433.2891	438.5833 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	884.0760	862.5504	784.8533	659.0868	509.7085	343.9149	227.3885	238.7166	371.8414	560.1265	735.7640	880.1844 (97)
Space heating kWh	320.4719	245.2859	207.2916	121.5347	58.7095	0.0000	0.0000	0.0000	0.0000	108.7868	217.7819	328.5512 (98a)
Space heating requirement - total per year (kWh/year)												1608.4134
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	320.4719	245.2859	207.2916	121.5347	58.7095	0.0000	0.0000	0.0000	0.0000	108.7868	217.7819	328.5512 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1608.4134
Space heating per m2										(98c) / (4) =		32.1683 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	320.4719	245.2859	207.2916	121.5347	58.7095	0.0000	0.0000	0.0000	0.0000	108.7868	217.7819	328.5512 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	347.2068	265.7485	224.5846	131.6735	63.6072	0.0000	0.0000	0.0000	0.0000	117.8622	235.9501	355.9601 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater	85.1957	84.8779	84.3606	83.4418	82.0682	79.8000	79.8000	79.8000	79.8000	83.1753	84.5920	79.8000 (216)
Fuel for water heating, kWh/month	225.8070	200.5900	214.9514	192.5798	190.8000	177.9421	176.5248	182.9609	184.3137	195.8674	203.1619	223.3558 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	16.7080	13.4038	12.0686	8.8420	6.8298	5.5800	6.2304	8.0985	10.5191	13.8017	15.5890	17.1724 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2359	-25.2017	-37.5624	-43.8610	-48.7368	-46.0498	-45.5243	-42.2880	-36.7844	-29.5773	-19.2805	-14.8007 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.1674	-15.3157	-30.8774	-47.0062	-62.7523	-63.2391	-62.4572	-52.5750	-38.1587	-22.0673	-9.6254	-5.6473 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1742.5931	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2368.8547	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												134.8433	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-823.7918	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3508.4993	(238)

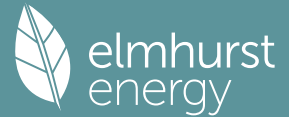
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1742.5931	0.2100	365.9446	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2368.8547	0.2100	497.4595	(264)
Space and water heating			863.4040	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	134.8433	0.1443	19.4620	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-406.9028	0.1338	-54.4437	
PV Unit electricity exported	-416.8889	0.1255	-52.3262	
Total			-106.7698	(269)
Total CO2, kg/year			788.0255	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.7600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1742.5931	1.1300	1969.1302	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2368.8547	1.1300	2676.8058	(278)
Space and water heating			4645.9361	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	134.8433	1.5338	206.8271	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-406.9028	1.4945	-608.0993	
PV Unit electricity exported	-416.8889	0.4607	-192.0660	
Total			-800.1653	(283)
Total Primary energy kWh/year			4182.6987	(286)
Target Primary Energy Rate (TPER)			83.6500	(287)

Full SAP Calculation Printout



Property Reference	Plot 12			Issued on Date	27/08/2025
Assessment Reference	Plot 12	Prop Type Ref			
Property	Flat 12, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	82 B	DER	5.61	TER	15.76
Environmental	96 A	% DER < TER			64.40
CO ₂ Emissions (t/year)	0.24	DFEE	35.70	TFEE	40.21
Compliance Check	See BREL	% DFEE < TFEE			11.22
% DPER < TPER	30.08	DPER	58.49	TPER	83.65
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

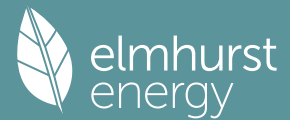
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.1100 (17)
Infiltration rate	0.1555 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1205 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1537	0.1506	0.1476	0.1326	0.1296	0.1145	0.1145	0.1115	0.1205	0.1296	0.1356	0.1416 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2937	0.2906	0.2876	0.2726	0.2696	0.2545	0.2545	0.2515	0.2605	0.2696	0.2756	0.2816 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			6.7100	0.7752	5.2016		(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	20.0000	1000.0000 (28b)
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798	9.0000	243.9900 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m ²)			133.8200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.5814		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.4600	0.0000	0.0000	180.0000	3502.7998 (32)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8421.6698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							168.4334 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						3.1800	0.0980	0.3116				
E3 Sill						3.1800	0.0400	0.1272				
E4 Jamb						8.4400	0.0530	0.4473				
E18 Party wall between dwellings						4.7400	0.0500	0.2370				
P4 Party wall - Roof (insulation at ceiling level)						14.2700	0.1430	2.0406				
E20 Exposed floor (normal)						14.2700	0.3200	4.5664				
E14 Flat roof						14.2700	0.1600	2.2832				
E16 Corner (normal)						2.3700	0.0550	0.1303				
P8 Party Wall - Exposed floor (inverted)						14.2700	0.0000	0.0000				
E24 Eaves (insulation at ceiling level - inverted)						8.2100	0.1500	1.2315				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												11.3752 (36)
Point Thermal bridges												0.0000
Total fabric heat loss									(33) + (36) + (36a) =			32.9566 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	11.4833	11.3655	11.2477	10.6586	10.5408	9.9517	9.9517	9.8339	10.1873	10.5408	10.7764	11.0121 (38)
Average = Sum(39)m / 12 =	44.4399	44.3221	44.2043	43.6152	43.4974	42.9083	42.9083	42.7905	43.1439	43.4974	43.7330	43.9686 (39)
												43.5857
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8888	0.8864	0.8841	0.8723	0.8699	0.8582	0.8582	0.8558	0.8629	0.8699	0.8747	0.8794 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31
												0.8717

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths												
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses												
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												1938.9067
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
												Total per year (kWh/year) = Sum(64)m = 2256.2377 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
	17.1517	15.2340	12.3891	9.3794	7.0112	5.9191	6.3958	8.3136	11.1584	14.1682	16.5364	17.6284 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.3759	405.5089	392.5062	367.4359	343.6403	321.7632	308.6227	311.3947	323.6741	345.8755	373.0979	396.8881 (73)

6. Solar gains												
[Jan]												
			Area	Solar flux	g	FF	Access	Gains				
			m2	Table 6a	Specific data	Specific data	factor	W				
				W/m2	or Table 6b	or Table 6c	Table 6d					
Southeast			6.7100	36.7938	0.2400	0.0000	0.7700	45.6246 (77)				
Solar gains	45.6246	77.7157	106.3339	131.7529	147.5742	146.5071	141.2484	129.4450	115.1372	85.8924	54.6478	39.0452 (83)
Total gains	453.0005	483.2245	498.8401	499.1889	491.2146	468.2703	449.8711	440.8397	438.8112	431.7679	427.7457	435.9333 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	52.6408	52.7808	52.9214	53.6362	53.7815	54.5198	54.5198	54.6700	54.2221	53.7815	53.4917	53.2050	
alpha	4.5094	4.5187	4.5281	4.5757	4.5854	4.6347	4.6347	4.6447	4.6148	4.5854	4.5661	4.5470	
util living area	0.9550	0.9372	0.9050	0.8427	0.7334	0.5649	0.4153	0.4406	0.6374	0.8396	0.9307	0.9606 (86)	
MIT	20.0444	20.1948	20.4142	20.6680	20.8626	20.9687	20.9939	20.9919	20.9440	20.7212	20.3499	20.0100 (87)	
Th 2	20.1770	20.1790	20.1810	20.1911	20.1931	20.2032	20.2032	20.2052	20.1992	20.1931	20.1891	20.1851 (88)	
util rest of house	0.9468	0.9262	0.8882	0.8150	0.6887	0.5018	0.3421	0.3671	0.5756	0.8067	0.9167	0.9534 (89)	
MIT 2	19.0811	19.2688	19.5398	19.8505	20.0691	20.1814	20.2003	20.2012	20.1571	19.9185	19.4722	19.0445 (90)	
Living area fraction									fLA = Living area / (4) =				0.4500 (91)
MIT	19.5146	19.6855	19.9333	20.2184	20.4262	20.5357	20.5574	20.5570	20.5112	20.2797	19.8672	19.4790 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.5146	19.6855	19.9333	20.2184	20.4262	20.5357	20.5574	20.5570	20.5112	20.2797	19.8672	19.4790 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9391	0.9185	0.8825	0.8160	0.7022	0.5287	0.3749	0.3999	0.6004	0.8105	0.9104	0.9460	(94)
Useful gains	425.3984	443.8638	440.2375	407.3613	344.9109	247.5523	168.6449	176.3041	263.4651	349.9408	389.4079	412.3728	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	676.1359	655.3241	593.8070	493.6538	379.5676	254.6900	169.8059	177.8803	276.6049	421.0414	558.3471	671.7965	(97)
Space heating kWh	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113	(98a)
Space heating requirement - total per year (kWh/year)												898.3672	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												898.3672	
Space heating per m2										(98c) / (4) =		17.9673	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater													(216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.0128	12.0438	10.8441	7.9449	6.1369	5.0139	5.5982	7.2768	9.4519	12.4013	14.0073	15.4301	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													898.3672 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 121.4388 (230a)
 Total electricity for the above, kWh/year 121.4388 (231)
 Electricity for lighting (calculated in Appendix L) 121.1620 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1796.5169 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	898.3672	16.4900	148.1407 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	121.1620	16.4900	19.9796 (250)
Additional standing charges			0.0000 (251)
Total energy cost			296.2456 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.3600 (256)
 Energy cost factor (ECF) [(255) x (256)] / [(4) + 45.0] = 1.1226 (257)
 SAP value 81.8024
 SAP rating (Section 12) 82 (258)
 SAP band B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	898.3672	0.1558	139.9352 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			232.4824 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	121.1620	0.1443	17.4874 (268)
Total CO2, kg/year			266.8149 (272)
CO2 emissions per m2			5.3400 (273)
EI value			96.2365
EI rating			96 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
 CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.1100 (17)
Infiltration rate	0.1555 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor											(20) =	1 -	[0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor											(21) =	(18) x (20) =	0.1205 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)		
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)		
Adj infilt rate														
	0.1296	0.1265	0.1296	0.1175	0.1205	0.1024	0.0994	0.0994	0.1024	0.1145	0.1145	0.1175 (22b)		
Balanced mechanical ventilation with heat recovery														
If mechanical ventilation												0.5000 (23a)		
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)		
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)		
Effective ac	0.2696	0.2665	0.2696	0.2575	0.2605	0.2424	0.2394	0.2394	0.2424	0.2545	0.2545	0.2575 (25)		

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Window			6.7100	0.7752	5.2016			(27)				
Heatloss Floor 1			50.0000	0.1100	5.5000	20.0000	1000.0000	(28b)				
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798	9.0000	243.9900	(29a)				
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)				
Total net area of external elements Aum(A, m2)			133.8200					(31)				
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	21.5814			(33)				
Main dwelling												
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999	(32)				
Party Wall			19.4600	0.0000	0.0000	180.0000	3502.7998	(32)				
Internal Wall			71.1200			9.0000	640.0800	(32c)				
Heat capacity Cm = Sum(A x k)						(28)...	(30) + (32) + (32a)...	(32e) = 8421.6698 (34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								168.4334 (35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0980	0.3116						
E3 Sill				3.1800	0.0400	0.1272						
E4 Jamb				8.4400	0.0530	0.4473						
E18 Party wall between dwellings				4.7400	0.0500	0.2370						
P4 Party wall - Roof (insulation at ceiling level)				14.2700	0.1430	2.0406						
E20 Exposed floor (normal)				14.2700	0.3200	4.5664						
E14 Flat roof				14.2700	0.1600	2.2832						
E16 Corner (normal)				2.3700	0.0550	0.1303						
P8 Party Wall - Exposed floor (inverted)				14.2700	0.0000	0.0000						
E24 Eaves (insulation at ceiling level - inverted)				8.2100	0.1500	1.2315						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								11.3752 (36)				
Point Thermal bridges						(36a) =		0.0000				
Total fabric heat loss						(33) + (36) + (36a) =		32.9566 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	10.5408	10.4230	10.5408	10.0695	10.1873	9.4804	9.3626	9.3626	9.4804	9.9517	9.9517	10.0695 (38)
Average = Sum(39)m / 12 =	43.4974	43.3795	43.4974	43.0261	43.1439	42.4370	42.3192	42.3192	42.4370	42.9083	42.9083	43.0261 (39)
												42.9083
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8699	0.8676	0.8699	0.8605	0.8629	0.8487	0.8464	0.8464	0.8487	0.8582	0.8582	0.8605 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
Hot water usage for baths	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Distribution loss (46)m = 0.15 x (45)m	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
	Total = Sum(45)m =											1938.9067
Water storage loss:	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
	Total per year (kWh/year) = Sum(64)m =											2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.1517	15.2340	12.3891	9.3794	7.0112	5.9191	6.3958	8.3136	11.1584	14.1682	16.5364	17.6284	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.3759	405.5089	392.5062	367.4359	343.6403	321.7632	308.6227	311.3947	323.6741	345.8755	373.0979	396.8881	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	

Southeast				6.7100				32.4665	0.2400	0.0000		0.7700	40.2587 (77)

Solar gains	40.2587	70.3449	100.5707	127.1418	138.9482	141.2379	132.8812	121.0167	111.9035	83.0883	49.5548	37.0927 (83)	
Total gains	447.6346	475.8538	493.0769	494.5777	482.5885	463.0011	441.5039	432.4115	435.5775	428.9638	422.6528	433.9808 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	53.7815	53.9276	53.7815	54.3706	54.2221	55.1253	55.2788	55.2788	55.1253	54.5198	54.5198	54.3706	
alpha	4.5854	4.5952	4.5854	4.6247	4.6148	4.6750	4.6853	4.6853	4.6750	4.6347	4.6347	4.6247	
util living area	0.9474	0.9274	0.8913	0.8114	0.6765	0.4854	0.3622	0.3885	0.5958	0.8142	0.9191	0.9537	(86)
MIT	20.1700	20.3095	20.5012	20.7493	20.9151	20.9863	20.9972	20.9960	20.9624	20.7783	20.4463	20.1328	(87)
Th 2	20.1931	20.1951	20.1931	20.2012	20.1992	20.2113	20.2133	20.2133	20.2113	20.2032	20.2032	20.2012	(88)
util rest of house	0.9377	0.9144	0.8721	0.7788	0.6246	0.4183	0.2882	0.3135	0.5315	0.7769	0.9027	0.9451	(89)
MIT 2	19.2506	19.4237	19.6550	19.9524	20.1282	20.2032	20.2122	20.2117	20.1847	19.9914	19.6015	19.2107	(90)
Living area fraction	19.6643	19.8223	20.0358	20.3110	20.4823	20.5556	20.5655	20.5646	20.5347	20.3455	19.9817	19.6257	(91)
MIT	19.6643	19.8223	20.0358	20.3110	20.4823	20.5556	20.5655	20.5646	20.5347	20.3455	19.9817	19.6257	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6643	19.8223	20.0358	20.3110	20.4823	20.5556	20.5655	20.5646	20.5347	20.3455	19.9817	19.6257	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9303	0.9076	0.8679	0.7836	0.6436	0.4479	0.3215	0.3472	0.5585	0.7841	0.8975	0.9379	(94)
Useful gains	416.4341	431.8839	427.9573	387.5340	310.5804	207.3985	141.9415	150.1429	243.2640	336.3313	379.3518	407.0114	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	633.5104	612.6203	558.3242	452.2471	331.4447	210.2991	142.4235	150.8517	251.8500	392.4190	522.6949	633.5880	(97)
Space heating kWh	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(98a)
Space heating requirement - total per year (kWh/year)												755.5784	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												755.5784	
Space heating per m2										(98c) / (4) =		15.1116	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

0.0000 (213)

10a. Fuel costs - using BEDF prices (577)			
	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	755.5784	28.4300	214.8109 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	121.1620	28.4300	34.4464 (250)
Additional standing charges			0.0000 (251)
Total energy cost			470.1549 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	755.5784	0.1562	118.0467 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			210.5940 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	121.1620	0.1443	17.4874 (268)
Total CO2, kg/year			244.9265 (272)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	755.5784	1.5784	1192.6125 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			2190.3766 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	121.1620	1.5338	185.8423 (282)
Total Primary energy kWh/year			2559.9316 (286)

Plot 12

Full SAP Calculation Printout



Current energy efficiency rating:
Current environmental impact rating:

B 82
A 96

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures
(none)

Typical annual savings	Energy efficiency	Environmental impact
Total Savings £0	0.00 kg/m²	

Potential energy efficiency rating: B 82
Potential environmental impact rating: A 96

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current £470	Potential £470	Saving £0
Electricity			
Space heating	£249	£249	£0
Water heating	£186	£186	£0
Lighting	£34	£34	£0
Total cost of fuels	£470	£470	£0
Total cost of uses	£469	£469	£0
Delivered energy	33 kWh/m²	33 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	5 kg/m²	5 kg/m²	0 kg/m²
Primary energy	51 kWh/m²	51 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

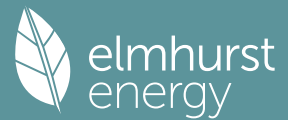
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.1100 (17)
Infiltration rate		0.1555 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1205 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1537	0.1506	0.1476	0.1326	0.1296	0.1145	0.1145	0.1115	0.1205	0.1296	0.1356	0.1416 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2937	0.2906	0.2876	0.2726	0.2696	0.2545	0.2545	0.2515	0.2605	0.2696	0.2756	0.2816 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K						
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
Window			6.7100	0.7752	5.2016			(27)					
Heatloss Floor 1			50.0000	0.1100	5.5000	20.0000	1000.0000	(28b)					
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798	9.0000	243.9900	(29a)					
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)					
Total net area of external elements Aum(A, m2)			133.8200					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.5814			(33)					
Main dwelling													
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999	(32)					
Party Wall			19.4600	0.0000	0.0000	180.0000	3502.7998	(32)					
Internal Wall			71.1200			9.0000	640.0800	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8421.6698	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							168.4334	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				3.1800	0.0980	0.3116							
E3 Sill				3.1800	0.0400	0.1272							
E4 Jamb				8.4400	0.0530	0.4473							
E18 Party wall between dwellings				4.7400	0.0500	0.2370							
P4 Party wall - Roof (insulation at ceiling level)				14.2700	0.1430	2.0406							
E20 Exposed floor (normal)				14.2700	0.3200	4.5664							
E14 Flat roof				14.2700	0.1600	2.2832							
E16 Corner (normal)				2.3700	0.0550	0.1303							
P8 Party Wall - Exposed floor (inverted)				14.2700	0.0000	0.0000							
E24 Eaves (insulation at ceiling level - inverted)				8.2100	0.1500	1.2315							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.3752	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	32.9566	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	11.4833	11.3655	11.2477	10.6586	10.5408	9.9517	9.9517	9.8339	10.1873	10.5408	10.7764	11.0121	(38)
Average = Sum(39)m / 12 =	44.4399	44.3221	44.2043	43.6152	43.4974	42.9083	42.9083	42.7905	43.1439	43.4974	43.7330	43.9686	(39)
												43.5857	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8888	0.8864	0.8841	0.8723	0.8699	0.8582	0.8582	0.8558	0.8629	0.8699	0.8747	0.8794	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.8717	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)										Total = Sum(45)m =		1938.9067	
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
								Total per year (kWh/year) = Sum(64)m =				2256.2377	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
	17.1517	15.2340	12.3891	9.3794	7.0112	5.9191	6.3958	8.3136	11.1584	14.1682	16.5364	17.6284	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains													
	407.3759	405.5089	392.5062	367.4359	343.6403	321.7632	308.6227	311.3947	323.6741	345.8755	373.0979	396.8881	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]												Gains
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	W

Southeast					6.7100	36.7938	0.2400		0.0000		0.7700	45.6246 (77)

Solar gains	45.6246	77.7157	106.3339	131.7529	147.5742	146.5071	141.2484	129.4450	115.1372	85.8924	54.6478	39.0452 (83)
Total gains	453.0005	483.2245	498.8401	499.1889	491.2146	468.2703	449.8711	440.8397	438.8112	431.7679	427.7457	435.9333 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	52.6408	52.7808	52.9214	53.6362	53.7815	54.5198	54.5198	54.6700	54.2221	53.7815	53.4917	53.2050
alpha	4.5094	4.5187	4.5281	4.5757	4.5854	4.6347	4.6347	4.6447	4.6148	4.5854	4.5661	4.5470
util living area	0.9550	0.9372	0.9050	0.8427	0.7334	0.5649	0.4153	0.4406	0.6374	0.8396	0.9307	0.9606 (86)
MIT	20.0444	20.1948	20.4142	20.6680	20.8626	20.9687	20.9939	20.9919	20.9440	20.7212	20.3499	20.0100 (87)
Th 2	20.1770	20.1790	20.1810	20.1911	20.1931	20.2032	20.2032	20.2052	20.1992	20.1931	20.1891	20.1851 (88)
util rest of house	0.9468	0.9262	0.8882	0.8150	0.6887	0.5018	0.3421	0.3671	0.5756	0.8067	0.9167	0.9534 (89)
MIT 2	19.0811	19.2688	19.5398	19.8505	20.0691	20.1814	20.2003	20.2012	20.1571	19.9185	19.4722	19.0445 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5146	19.6855	19.9333	20.2184	20.4262	20.5357	20.5574	20.5570	20.5112	20.2797	19.8672	19.4790 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5146	19.6855	19.9333	20.2184	20.4262	20.5357	20.5574	20.5570	20.5112	20.2797	19.8672	19.4790 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9391	0.9185	0.8825	0.8160	0.7022	0.5287	0.3749	0.3999	0.6004	0.8105	0.9104	0.9460 (94)
Useful gains	425.3984	443.8638	440.2375	407.3613	344.9109	247.5523	168.6449	176.3041	263.4651	349.9408	389.4079	412.3728 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	676.1359	655.3241	593.8070	493.6538	379.5676	254.6900	169.8059	177.8803	276.6049	421.0414	558.3471	671.7965 (97)
Space heating kWh	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113 (98a)
Space heating requirement - total per year (kWh/year)	898.3672											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	898.3672											
Space heating per m2	(98c) / (4) = 17.9673 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	186.5487	142.1013	114.2557	62.1306	25.7845	0.0000	0.0000	0.0000	0.0000	52.8988	121.6362	193.0113 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000 (213)											
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.0128	12.0438	10.8441	7.9449	6.1369	5.0139	5.5982	7.2768	9.4519	12.4013	14.0073	15.4301 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												898.3672	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												121.1620	(232)

Energy saving/generation technologies (Appendices M ,N and Q)

PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses												1796.5169	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	898.3672	16.4900	148.1407	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	121.1620	16.4900	19.9796	(250)
Additional standing charges			0.0000	(251)
Total energy cost			296.2456	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):			0.3600	(256)
Energy cost factor (ECF)			1.1226	(257)
SAP value			81.8024	
SAP rating (Section 12)			82	(258)
SAP band			B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	898.3672	0.1558	139.9352	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			232.4824	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	121.1620	0.1443	17.4874	(268)
Total CO2, kg/year			266.8149	(272)
CO2 emissions per m2			5.3400	(273)
EI value			96.2365	
EI rating			96	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	2.3700	118.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000	

2. Ventilation rate

			m3 per hour	
Number of open chimneys	0	* 80 =	0.0000	(6a)

Full SAP Calculation Printout



Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		0.0000	Air changes per hour	0.0000 (8)
Pressure test				Yes	
Pressure Test Method				Blower Door	
Measured/design AP50				3.1100	(17)
Infiltration rate				0.1555	(18)
Number of sides sheltered				3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =			0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =			0.1205	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Balanced mechanical ventilation with heat recovery	0.1296	0.1265	0.1296	0.1175	0.1205	0.1024	0.0994	0.0994	0.1024	0.1145	0.1145	0.1175
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2696	0.2665	0.2696	0.2575	0.2605	0.2424	0.2394	0.2394	0.2424	0.2545	0.2545	0.2575

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.7100	0.7752	5.2016			(27)
Heatloss Floor 1			50.0000	0.1100	5.5000	20.0000	1000.0000	(28b)
External Wall	33.8200	6.7100	27.1100	0.1800	4.8798	9.0000	243.9900	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)			133.8200					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	21.5814			(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999	(32)
Party Wall			19.4600	0.0000	0.0000	180.0000	3502.7998	(32)
Internal Wall			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)			(28)...	(30) + (32) + (32a)...	(32e) =		8421.6698	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							168.4334	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)				3.1800	0.0980	0.3116		
E3 Sill				3.1800	0.0400	0.1272		
E4 Jamb				8.4400	0.0530	0.4473		
E18 Party wall between dwellings				4.7400	0.0500	0.2370		
P4 Party wall - Roof (insulation at ceiling level)				14.2700	0.1430	2.0406		
E20 Exposed floor (normal)				14.2700	0.3200	4.5664		
E14 Flat roof				14.2700	0.1600	2.2832		
E16 Corner (normal)				2.3700	0.0550	0.1303		
P8 Party Wall - Exposed floor (inverted)				14.2700	0.0000	0.0000		
E24 Eaves (insulation at ceiling level - inverted)				8.2100	0.1500	1.2315		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.3752	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	32.9566	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
If cylinder contains dedicated solar storage												(56)

Full SAP Calculation Printout



Primary loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
	Total per year (kWh/year) = Sum(64)m =											2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.1517	15.2340	12.3891	9.3794	7.0112	5.9191	6.3958	8.3136	11.1584	14.1682	16.5364	17.6284	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.3759	405.5089	392.5062	367.4359	343.6403	321.7632	308.6227	311.3947	323.6741	345.8755	373.0979	396.8881	(73)

6. Solar gains

[Jan]														
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	6.7100				32.4665		0.2400		0.0000		0.7700		40.2587 (77)	
Solar gains	40.2587	70.3449	100.5707	127.1418	138.9482	141.2379	132.8812	121.0167	111.9035	83.0883	49.5548	37.0927	(83)	
Total gains	447.6346	475.8538	493.0769	494.5777	482.5885	463.0011	441.5039	432.4115	435.5775	428.9638	422.6528	433.9808	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	53.7815	53.9276	53.7815	54.3706	54.2221	55.1253	55.2788	55.2788	55.1253	54.5198	54.5198	54.3706
alpha	4.5854	4.5952	4.5854	4.6247	4.6148	4.6750	4.6853	4.6853	4.6750	4.6347	4.6347	4.6247
util living area	0.9474	0.9274	0.8913	0.8114	0.6765	0.4854	0.3622	0.3885	0.5958	0.8142	0.9191	0.9537 (86)
MIT	20.1700	20.3095	20.5012	20.7493	20.9151	20.9863	20.9972	20.9960	20.9624	20.7783	20.4463	20.1328 (87)
Th 2	20.1931	20.1951	20.1931	20.2012	20.1992	20.2113	20.2133	20.2133	20.2113	20.2032	20.2032	20.2012 (88)
util rest of house	0.9377	0.9144	0.8721	0.7788	0.6246	0.4183	0.2882	0.3135	0.5315	0.7769	0.9027	0.9451 (89)
MIT 2	19.2506	19.4237	19.6550	19.9524	20.1282	20.2032	20.2122	20.2117	20.1847	19.9914	19.6015	19.2107 (90)
Living area fraction	19.6643	19.8223	20.0358	20.3110	20.4823	20.5556	20.5655	20.5646	20.5347	20.3455	19.9817	19.6257 (91)
MIT	19.6643	19.8223	20.0358	20.3110	20.4823	20.5556	20.5655	20.5646	20.5347	20.3455	19.9817	19.6257 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6643	19.8223	20.0358	20.3110	20.4823	20.5556	20.5655	20.5646	20.5347	20.3455	19.9817	19.6257 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9303	0.9076	0.8679	0.7836	0.6436	0.4479	0.3215	0.3472	0.5585	0.7841	0.8975	0.9379	(94)
Useful gains	416.4341	431.8839	427.9573	387.5340	310.5804	207.3985	141.9415	150.1429	243.2640	336.3313	379.3518	407.0114	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	633.5104	612.6203	558.3242	452.2471	331.4447	210.2991	142.4235	150.8517	251.8500	392.4190	522.6949	633.5880	(97)
Space heating kWh	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(98a)
Space heating requirement - total per year (kWh/year)												755.5784	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												755.5784	
Space heating per m2												15.1116	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)

Full SAP Calculation Printout



Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	161.5047	121.4549	96.9929	46.5934	15.5231	0.0000	0.0000	0.0000	0.0000	41.7293	103.2071	168.5730	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.0128	12.0438	10.8441	7.9449	6.1369	5.0139	5.5982	7.2768	9.4519	12.4013	14.0073	15.4301	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												755.5784	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												121.1620	(232)
Energy saving/generation technologies (Appendices M, N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1653.7282	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	755.5784	28.4300	214.8109	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	121.1620	28.4300	34.4464	(250)
Additional standing charges			0.0000	(251)
Total energy cost			470.1549	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	755.5784	0.1562	118.0467	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			210.5940	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	121.1620	0.1443	17.4874	(268)
Total CO2, kg/year			244.9265	(272)

13a. Primary energy - Individual heating systems including micro-CHP

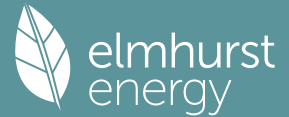
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	755.5784	1.5784	1192.6125	(275)

Full SAP Calculation Printout



Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			2190.3766 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	121.1620	1.5338	185.8423 (282)
Total Primary energy kWh/year			2559.9316 (286)

Full SAP Calculation Printout



Property Reference	Plot 13			Issued on Date	27/08/2025
Assessment Reference	Plot 13	Prop Type Ref			
Property	Flat 13, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	90 B	DER	2.91	TER	11.19
Environmental	98 A	% DER < TER			73.99
CO ₂ Emissions (t/year)	0.14	DFEE	14.87	TFEE	19.59
Compliance Check	See BREL	% DFEE < TFEE			24.12
% DPER < TPER	47.45	DPER	31.07	TPER	59.12
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9400	(17)
Infiltration rate	0.1970	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1527 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1947	0.1908	0.1870	0.1679	0.1641	0.1450	0.1450	0.1412	0.1527	0.1641	0.1718	0.1794 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3347	0.3308	0.3270	0.3079	0.3041	0.2850	0.2850	0.2812	0.2927	0.3041	0.3118	0.3194 (25)

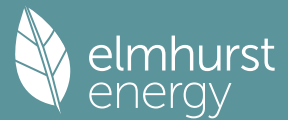
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			27.0200	0.1400	3.7828	20.0000	540.4000 (28b)
External Wall	14.3400	5.9700	8.3700	0.1900	1.5903	150.0000	1255.5000 (29a)
Total net area of external elements Aum(A, m ²)			41.3600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		10.0010		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			39.4400	0.0000	0.0000	180.0000	7099.1998 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Party Ceiling 1			51.0000			30.0000	1530.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	14609.1797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		286.4545 (35)
List of Thermal Bridges		

SAP 10 Online 2.22.2 Page 2 of 7

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	147.2413	148.0592	148.8862	153.1637	154.0489	158.6329	158.6329	159.5826	156.7669	154.0489	152.2887	150.5682
alpha	10.8161	10.8706	10.9257	11.2109	11.2699	11.5755	11.5755	11.6388	11.4511	11.2699	11.1526	11.0379
util living area	0.9533	0.9023	0.8293	0.6806	0.5283	0.3644	0.2611	0.2770	0.4252	0.6714	0.8758	0.9597 (86)
MIT	20.8681	20.9335	20.9741	20.9970	20.9998	21.0000	21.0000	21.0000	21.0000	20.9978	20.9608	20.8615 (87)
Th 2	20.4839	20.4866	20.4894	20.5030	20.5057	20.5194	20.5194	20.5221	20.5139	20.5057	20.5003	20.4948 (88)
util rest of house	0.9429	0.8854	0.8061	0.6536	0.5003	0.3371	0.2326	0.2483	0.3953	0.6404	0.8542	0.9505 (89)
MIT 2	20.3413	20.4185	20.4648	20.5005	20.5056	20.5194	20.5194	20.5221	20.5139	20.5040	20.4624	20.3437 (90)
Living area fraction									fLA = Living area / (4) =			0.4422 (91)
MIT	20.5742	20.6462	20.6900	20.7200	20.7241	20.7319	20.7319	20.7334	20.7288	20.7223	20.6828	20.5727 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5742	20.6462	20.6900	20.7200	20.7241	20.7319	20.7319	20.7334	20.7288	20.7223	20.6828	20.5727 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9449	0.8908	0.8154	0.6654	0.5127	0.3492	0.2452	0.2610	0.4085	0.6540	0.8623	0.9521 (94)
Useful gains	393.7572	404.3402	376.4486	312.0387	237.6593	156.8637	105.7007	110.1964	171.5916	265.8548	346.3186	383.6654 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	448.5332	431.5833	386.7684	313.1731	237.7218	156.8642	105.7007	110.1964	171.5952	266.6520	361.9465	441.2747 (97)
Space heating kWh	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (98a)
Space heating requirement - total per year (kWh/year)												122.3084
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												122.3084
Space heating per m2										(98c) / (4) =		2.3982 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement												
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												122.3084 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)
 mechanical ventilation fans (SFP = 0.8400)
 Total electricity for the above, kWh/year
 Electricity for lighting (calculated in Appendix L)

123.8676 (230a)
 123.8676 (231)
 127.2803 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation
 Wind generation
 Hydro-electric generation (Appendix N)
 Electricity generated - Micro CHP (Appendix N)
 Appendix Q - special features
 Energy saved or generated
 Energy used
 Total delivered energy for all uses

0.0000 (233)
 0.0000 (234)
 0.0000 (235a)
 0.0000 (235)
 -0.0000 (236)
 0.0000 (237)
 1034.9713 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	122.3084	0.1605	19.6358 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			113.0274 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			148.5798 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.9100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	122.3084	1.5942	194.9806 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1201.8334 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			1584.4470 (286)
Dwelling Primary energy Rate (DPER)			31.0700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
 CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
Heatloss Floor 1			27.0200	0.1300	3.5126			(28b)					
External Wall	14.3400	5.9700	8.3700	0.1800	1.5066			(29a)					
Total net area of external elements Aum(A, m2)			41.3600					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	11.8551			(33)					
Main dwelling													
Corridor			14.3600	0.0000	0.0000			(32)					
Party Wall			39.4400	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							296.4545	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E18 Party wall between dwellings				4.7400	0.0600		0.2844						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.6300	0.0000		0.0000						
E20 Exposed floor (normal)				3.2300	0.3200		1.0336						
E7 Party floor between dwellings (in blocks of flats)				8.8700	0.0700		0.6209						
P8 Party Wall - Exposed floor (inverted)				11.0300	0.2400		2.6472						
E21 Exposed floor (inverted)				8.3200	0.3200		2.6624						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.9425	(36)					
Point Thermal Bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	19.7976	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 23.3048	Feb 23.1743	Mar 23.0463	Apr 22.4454	May 22.3330	Jun 21.8096	Jul 21.8096	Aug 21.7127	Sep 22.0112	Oct 22.3330	Nov 22.5604	Dec 22.7982	(38)
Heat transfer coeff	43.1024	42.9718	42.8439	42.2430	42.1306	41.6072	41.6072	41.5103	41.8088	42.1306	42.3580	42.5958	(39)
Average = Sum(39)m / 12 =												42.2425	
HLP	Jan 0.8451	Feb 0.8426	Mar 0.8401	Apr 0.8283	May 0.8261	Jun 0.8158	Jul 0.8158	Aug 0.8139	Sep 0.8198	Oct 0.8261	Nov 0.8305	Dec 0.8352	(40)
HLP (average)												0.8283	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196	(42)
Hot water usage for mixer showers														
Hot water usage for baths	53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478		(42a)
Hot water usage for other uses	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594		(42b)
Average daily hot water use (litres/day)	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401		(42c)
													99.4866	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473		(44)
Energy content (annual)	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194		(45)
Distribution loss (46)m = 0.15 x (45)m													1652.4520	
Water storage loss:	25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529		(46)
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325		(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325		(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624		(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month	218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143		(62)
WWHRS	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036		(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107		(64)
12Total per year (kWh/year)													1975.7233	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month	94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749		(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785		(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441		(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199		(68)
Pumps, fans	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979		(69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000		(70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828		(71)
Total internal gains	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383		(72)
	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957		(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.9700		36.7938		0.6300		0.7000		0.7700		67.1307 (77)	
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	479.8044	535.6378	560.9840	584.5106	589.3381	572.3412	551.8997	535.6886	524.5442	495.9718	471.3392	462.4456 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	97.4372	97.7331	98.0250	99.4194	99.6847	100.9386	100.9386	101.1743	100.4519	99.6847	99.1494	98.5959
alpha	7.4958	7.5155	7.5350	7.6280	7.6456	7.7292	7.7292	7.7450	7.6968	7.6456	7.6100	7.5731
util living area	0.9835	0.9628	0.9227	0.8169	0.6547	0.4646	0.3317	0.3564	0.5475	0.8227	0.9570	0.9867 (86)
MIT	20.5225	20.6606	20.8002	20.9350	20.9885	20.9993	21.0000	20.9999	20.9975	20.9418	20.7341	20.4998 (87)
Th 2	20.2144	20.2166	20.2187	20.2289	20.2308	20.2396	20.2396	20.2413	20.2362	20.2308	20.2269	20.2229 (88)
util rest of house	0.9783	0.9521	0.9024	0.7795	0.6043	0.4097	0.2744	0.2976	0.4881	0.7792	0.9429	0.9825 (89)
MIT 2	19.6792	19.8502	20.0170	20.1720	20.2227	20.2393	20.2396	20.2413	20.2349	20.1829	19.9505	19.6581 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.0521	20.2085	20.3633	20.5094	20.5613	20.5753	20.5758	20.5767	20.5721	20.5185	20.2970	20.0302 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.0521	20.2085	20.3633	20.5094	20.5613	20.5753	20.5758	20.5767	20.5721	20.5185	20.2970	20.0302 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9771	0.9520	0.9064	0.7936	0.6263	0.4340	0.2997	0.3236	0.5143	0.7962	0.9444	0.9812 (94)
Useful gains	468.7998	509.9344	508.4961	463.8844	369.0784	248.3924	165.4118	173.3573	269.7840	394.8940	445.1181	453.7501 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	678.9535	657.8365	593.9583	490.4147	373.3322	248.6160	165.4222	173.3761	270.5895	417.8709	558.9974	674.3018 (97)
Space heating kWh	156.3544	99.3902	63.5839	19.1018	3.1648	0.0000	0.0000	0.0000	0.0000	17.0948	81.9931	164.0905 (98a)
Space heating requirement - total per year (kWh/year)	604.7735											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	156.3544	99.3902	63.5839	19.1018	3.1648	0.0000	0.0000	0.0000	0.0000	17.0948	81.9931	164.0905 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	604.7735											
Space heating per m2	(98c) / (4) = 11.8583 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	156.3544	99.3902	63.5839	19.1018	3.1648	0.0000	0.0000	0.0000	0.0000	17.0948	81.9931	164.0905 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	169.3981	107.6817	68.8883	20.6953	3.4288	0.0000	0.0000	0.0000	0.0000	18.5209	88.8333	177.7795 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)
Efficiency of water heater	83.5832	82.8825	81.9451	80.6633	79.9595	79.8000	79.8000	79.8000	79.8000	80.5708	82.4877	79.8000 (216)
Fuel for water heating, kWh/month	231.8037	206.8735	222.8340	200.5610	197.1255	179.0842	177.6359	184.1325	185.5158	203.5568	209.7901	229.1323 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												655.2259	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2428.0454	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												141.4370	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-840.2676	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2470.4407	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	655.2259	0.2100	137.5974	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2428.0454	0.2100	509.8895	(264)
Space and water heating			647.4870	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	141.4370	0.1443	20.4137	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832	
PV Unit electricity exported	-425.6145	0.1255	-53.4200	
Total			-108.9032	(269)
Total CO2, kg/year			570.9268	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	655.2259	1.1300	740.4053	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2428.0454	1.1300	2743.6913	(278)
Space and water heating			3484.0966	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	141.4370	1.5338	216.9408	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912	
PV Unit electricity exported	-425.6145	0.4607	-196.0808	
Total			-815.7720	(283)
Total Primary energy kWh/year			3015.3662	(286)
Target Primary Energy Rate (TPER)			59.1200	(287)

Full SAP Calculation Printout



Property Reference	Plot 13	Issued on Date	27/08/2025
Assessment Reference	Plot 13	Prop Type Ref	
Property	Flat 13, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	90 B	DER	2.91
Environmental	98 A	% DER < TER	73.99
CO ₂ Emissions (t/year)	0.14	DFEE	14.87
Compliance Check	See BREL	TFEE	19.59
% DPER < TPER	47.45	% DFEE < TFEE	24.12
		DFEE	31.07
		TPER	59.12
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		120.8700 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9400 (17)
Infiltration rate	0.3625 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2809 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3582	0.3511	0.3441	0.3090	0.3020	0.2669	0.2669	0.2598	0.2809	0.3020	0.3160	0.3301 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5641	0.5616	0.5592	0.5477	0.5456	0.5356	0.5356	0.5338	0.5395	0.5456	0.5499	0.5545 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			27.0200	0.1400	3.7828	20.0000	540.4000 (28b)
External Wall	14.3400	5.9700	8.3700	0.1900	1.5903	150.0000	1255.5000 (29a)
Total net area of external elements Aum(A, m ²)			41.3600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 10.0010		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			39.4400	0.0000	0.0000	180.0000	7099.1998 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Party Ceiling 1			51.0000			40.0000	2040.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15119.1797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.4545 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081
E3 Sill					3.1800	0.0260	0.0827

Full SAP Calculation Printout



E4 Jamb									7.5200	0.0300	0.2256	
E18 Party wall between dwellings									4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)									33.6300	0.0000	0.0000	
E20 Exposed floor (normal)									3.2300	0.1690	0.5459	
E7 Party floor between dwellings (in blocks of flats)									8.8700	-0.0180	-0.1597	
P8 Party Wall - Exposed floor (inverted)									11.0300	0.2400	2.6472	
E21 Exposed floor (inverted)									8.3200	0.0750	0.6240	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												4.2113 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 14.2123 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.5019	22.4026	22.3052	21.8478	21.7622	21.3639	21.3639	21.2901	21.5173	21.7622	21.9354	22.1163 (38)
Average = Sum(39)m / 12 =	36.7142	36.6149	36.5175	36.0601	35.9745	35.5762	35.5762	35.5024	35.7296	35.9745	36.1476	36.3286 (39)
												36.0597
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7199	0.7179	0.7160	0.7071	0.7054	0.6976	0.6976	0.6961	0.7006	0.7054	0.7088	0.7123 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.9369 (42b)
Hot water usage for other uses												32.2401 (42c)
Average daily hot water use (litres/day)												50.5753 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995 (44)
Energy content (annual)	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725 (45)
Distribution loss (46)m = 0.15 x (45)m												839.9482
Water storage loss:												
Total storage loss												
If cylinder contains dedicated solar storage												0.0000 (56)
Primary loss												0.0000 (57)
Combi loss												0.0000 (59)
Total heat required for water heating calculated for each month												0.0000 (61)
WWHRS												74.2789 (62)
PV diverter												64.9543 (63a)
Solar input												67.9494 (63b)
FGHRS												58.1281 (63c)
Output from w/h												55.0625 (63d)
	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (64)
12Total per year (kWh/year)												713.9560 (64)
Electric shower(s)												714 (64)
Heat gains from water heating, kWh/month												
	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.2649 (64a)
	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542 (65)

5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Pumps, fans	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Total internal gains	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169 (72)
	324.6838	334.5534	319.8076	311.5186	296.2212	287.2957	276.8459	276.4442	284.5528	292.1140	308.2842	317.7546 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	365.2769	403.6983	414.4147	428.7414	427.5205	417.6455	402.5171	391.6136	386.9923	368.5339	356.9053	352.4938 (84)

7. Mean internal temperature (heating season)												

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)

Full SAP Calculation Printout



Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	114.3910	114.7013	115.0072	116.4659	116.7430	118.0502	118.0502	118.2955	117.5432	116.7430	116.1839	115.6051
alpha	8.6261	8.6468	8.6671	8.7644	8.7829	8.8700	8.8700	8.8864	8.8362	8.7829	8.7456	8.7070
util living area	0.9953	0.9877	0.9713	0.9053	0.7608	0.5440	0.3888	0.4169	0.6327	0.9044	0.9849	0.9964 (86)
MIT	20.5091	20.6247	20.7501	20.9050	20.9817	20.9991	21.0000	20.9999	20.9967	20.9195	20.7025	20.4897 (87)
Th 2	20.3233	20.3250	20.3267	20.3346	20.3361	20.3430	20.3430	20.3443	20.3403	20.3361	20.3331	20.3300 (88)
util rest of house	0.9937	0.9837	0.9620	0.8792	0.7141	0.4888	0.3308	0.3575	0.5743	0.8735	0.9792	0.9952 (89)
MIT 2	19.8801	19.9951	20.1176	20.2649	20.3255	20.3426	20.3430	20.3442	20.3389	20.2802	20.0791	19.8668 (90)
Living area fraction									FLA = Living area / (4) =			0.4422 (91)
MIT	20.1582	20.2735	20.3972	20.5479	20.6156	20.6329	20.6335	20.6342	20.6297	20.5629	20.3548	20.1422 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1582	20.2735	20.3972	20.5479	20.6156	20.6329	20.6335	20.6342	20.6297	20.5629	20.3548	20.1422 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9932	0.9834	0.9631	0.8881	0.7342	0.5132	0.3565	0.3838	0.6001	0.8848	0.9794	0.9948 (94)
Useful gains	362.8091	396.9815	399.1313	380.7764	313.9049	214.3414	143.4852	150.3038	232.2385	326.0904	349.5594	350.6503 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	582.2223	562.8975	507.4922	420.0242	320.7351	214.6262	143.4950	150.3225	233.3047	358.4092	479.1288	579.1581 (97)
Space heating kWh	163.2435	111.4955	80.6205	28.2584	5.0817	0.0000	0.0000	0.0000	0.0000	24.0452	93.2900	170.0098 (98a)
Space heating requirement - total per year (kWh/year)												676.0446
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	163.2435	111.4955	80.6205	28.2584	5.0817	0.0000	0.0000	0.0000	0.0000	24.0452	93.2900	170.0098 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												676.0446
Space heating per m2										(98c) / (4) =		13.2558 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	334.4159	263.2636	269.8181	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9801	0.9952	0.9931	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	327.7652	262.0035	267.9671	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	448.6310	432.9625	421.9815	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	87.0234	127.1935	114.5867	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	21.7559	31.7984	28.6467	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												82.2009 (107)
Energy for space heating												13.2558 (99)
Energy for space cooling												1.6118 (108)
Total												14.8676 (109)
Fabric Energy Efficiency (DFEE)												14.9 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000		
Ground floor		2.3700	120.8700
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		
Dwelling volume			120.8700

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)

Full SAP Calculation Printout



Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infiltr rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
Heatloss Floor 1			27.0200	0.1300	3.5126			(28b)
External Wall	14.3400	5.9700	8.3700	0.1800	1.5066			(29a)
Total net area of external elements Aum(A, m2)			41.3600					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000			(32)
Party Wall			39.4400	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 296.4545 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	3.1800	0.0500	0.1590	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	7.5200	0.0500	0.3760	
E4 Jamb	4.7400	0.0600	0.2844	
E18 Party wall between dwellings	33.6300	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	3.2300	0.3200	1.0336	
E20 Exposed floor (normal)	8.8700	0.0700	0.6209	
E7 Party floor between dwellings (in blocks of flats)	11.0300	0.2400	2.6472	
P8 Party Wall - Exposed floor (inverted)	8.3200	0.3200	2.6624	
E21 Exposed floor (inverted)				

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.9425 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 19.7976 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982	(38)
Heat transfer coeff	43.1024	42.9718	42.8439	42.2430	42.1306	41.6072	41.6072	41.5103	41.8088	42.1306	42.3580	42.5958	(39)
Average = Sum(39)m / 12 =													42.2425

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8451	0.8426	0.8401	0.8283	0.8261	0.8158	0.8158	0.8139	0.8198	0.8261	0.8305	0.8352	(40)
HLP (average)													0.8283
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)													50.5753 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995	(44)
Energy conte	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725	(45)
Energy content (annual)													839.9482
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316	(64)
12Total per year (kWh/year)													713.9560 (64)
Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													483.2649 (64a)
Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

Full SAP Calculation Printout



(66)m	Jan 85.9785	Feb 85.9785	Mar 85.9785	Apr 85.9785	May 85.9785	Jun 85.9785	Jul 85.9785	Aug 85.9785	Sep 85.9785	Oct 85.9785	Nov 85.9785	Dec 85.9785	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169	(72)
Total internal gains	322.2036	331.8074	317.3273	308.9557	293.7410	284.7328	274.3657	273.9640	281.9899	289.6338	305.7214	315.2744	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
-----					5.9700	36.7938	0.6300	0.7000	-----		0.7700	67.1307 (77)	
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499	(83)
Total gains	389.3343	446.1558	473.7838	502.8129	510.8772	500.2988	482.1943	464.4254	451.3992	416.0131	386.1285	372.7243	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	97.4372	97.7331	98.0250	99.4194	99.6847	100.9386	100.9386	101.1743	100.4519	99.6847	99.1494	98.5959	
alpha	7.4958	7.5155	7.5350	7.6280	7.6456	7.7292	7.7292	7.7450	7.6968	7.6456	7.6100	7.5731	
util living area	0.9954	0.9865	0.9658	0.8912	0.7408	0.5303	0.3795	0.4109	0.6316	0.9059	0.9857	0.9966	(86)
MIT	20.3601	20.5150	20.6845	20.8783	20.9742	20.9982	20.9999	20.9998	20.9934	20.8816	20.5981	20.3361	(87)
Th 2	20.2144	20.2166	20.2187	20.2289	20.2308	20.2396	20.2396	20.2413	20.2362	20.2308	20.2269	20.2229	(88)
util rest of house	0.9938	0.9820	0.9546	0.8611	0.6886	0.4683	0.3140	0.3433	0.5651	0.8730	0.9801	0.9953	(89)
MIT 2	19.6384	19.7926	19.9575	20.1408	20.2161	20.2389	20.2396	20.2412	20.2334	20.1485	19.8841	19.6219	(90)
Living area fraction									fLA = Living area / (4) =			0.4422	(91)
MIT	19.9575	20.1120	20.2790	20.4669	20.5513	20.5746	20.5758	20.5766	20.5695	20.4727	20.1998	19.9377	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9575	20.1120	20.2790	20.4669	20.5513	20.5746	20.5758	20.5766	20.5695	20.4727	20.1998	19.9377	(93)

8. Space heating requirement

Utilisation	Jan 0.9931	Feb 0.9813	Mar 0.9556	Apr 0.8710	May 0.7109	Jun 0.4958	Jul 0.3430	Aug 0.3732	Sep 0.5945	Oct 0.8843	Nov 0.9798	Dec 0.9948	(94)
Useful gains	386.6423	437.8071	452.7288	437.9739	363.1968	248.0248	165.3927	173.3202	268.3521	367.8628	378.3475	370.7696	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	674.8758	653.6889	590.3460	488.6202	372.9098	248.5876	165.4205	173.3729	270.4811	415.9405	554.8813	670.3595	(97)
Space heating kWh	214.4458	145.0725	102.3871	36.4653	7.2265	0.0000	0.0000	0.0000	0.0000	35.7698	127.1043	222.8949	(98a)
Space heating requirement - total per year (kWh/year)												891.3663	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	214.4458	145.0725	102.3871	36.4653	7.2265	0.0000	0.0000	0.0000	0.0000	35.7698	127.1043	222.8949	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												891.3663	
Space heating per m ²										(98c) / (4) =		17.4778	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b													
Ext. temp.	Jan 4.3000	Feb 4.9000	Mar 6.5000	Apr 8.9000	May 11.7000	Jun 14.6000	Jul 16.6000	Aug 16.4000	Sep 14.1000	Oct 10.6000	Nov 7.1000	Dec 4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	391.1076	307.8932	315.4780	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9777	0.9936	0.9906	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	382.3917	305.9076	312.5062	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	548.0174	528.7562	509.6803	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	119.2505	165.7994	146.6975	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.8126	41.4499	36.6744	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												107.9369	(107)
Energy for space heating												17.4778	(99)
Energy for space cooling												2.1164	(108)
Total												19.5942	(109)
Fabric Energy Efficiency (TFEE)												19.6	(109)

Full SAP Calculation Printout



Property Reference	Plot 13			Issued on Date	27/08/2025
Assessment Reference	Plot 13	Prop Type Ref			
Property	Flat 13, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	90 B	DER	2.91	TER	11.19
Environmental	98 A	% DER < TER			73.99
CO ₂ Emissions (t/year)	0.14	DFEE	14.87	TFEE	19.59
Compliance Check	See BREL	% DFEE < TFEE			24.12
% DPER < TPER	47.45	DPER	31.07	TPER	59.12
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9400 (17)
Infiltration rate	0.1970 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1527 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1947	0.1908	0.1870	0.1679	0.1641	0.1450	0.1450	0.1412	0.1527	0.1641	0.1718	0.1794 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3347	0.3308	0.3270	0.3079	0.3041	0.2850	0.2850	0.2812	0.2927	0.3041	0.3118	0.3194 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			27.0200	0.1400	3.7828	20.0000	540.4000 (28b)
External Wall	14.3400	5.9700	8.3700	0.1900	1.5903	150.0000	1255.5000 (29a)
Total net area of external elements Aum(A, m ²)			41.3600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		10.0010		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			39.4400	0.0000	0.0000	180.0000	7099.1998 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Party Ceiling 1			51.0000			30.0000	1530.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14609.1797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							286.4545 (35)
List of Thermal Bridges							

elmhurst
energy

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
((66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 ((66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.8243	86.8243	86.8243	86.8243	86.8243	86.8243	86.8243	86.8243	86.8243	86.8243	86.8243	86.8243 ((67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 ((68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 ((69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 ((70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 ((71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 ((72)
Total internal gains	376.1328	384.7396	367.0660	351.6998	332.2354	318.9035	305.4404	307.0498	317.5847	330.0552	352.9786	368.2415 ((73)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	147.2413	148.0592	148.8862	153.1637	154.0489	158.6329	158.6329	159.5826	156.7669	154.0489	152.2887	150.5682
alpha	10.8161	10.8706	10.9257	11.2109	11.2699	11.5755	11.5755	11.6388	11.4511	11.2699	11.1526	11.0379
util living area	0.9533	0.9023	0.8293	0.6806	0.5283	0.3644	0.2611	0.2770	0.4252	0.6714	0.8758	0.9597 (86)
MIT	20.8681	20.9335	20.9741	20.9970	20.9998	21.0000	21.0000	21.0000	21.0000	20.9978	20.9608	20.8615 (87)
Th 2	20.4839	20.4866	20.4894	20.5030	20.5057	20.5194	20.5194	20.5221	20.5139	20.5057	20.5003	20.4948 (88)
util rest of house	0.9429	0.8854	0.8061	0.6536	0.5003	0.3371	0.2326	0.2483	0.3953	0.6404	0.8542	0.9505 (89)
MIT 2	20.3413	20.4185	20.4648	20.5005	20.5056	20.5194	20.5194	20.5221	20.5139	20.5040	20.4624	20.3437 (90)
Living area fraction									fLA = Living area / (4) =			0.4422 (91)
MIT	20.5742	20.6462	20.6900	20.7200	20.7241	20.7319	20.7319	20.7334	20.7288	20.7223	20.6828	20.5727 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5742	20.6462	20.6900	20.7200	20.7241	20.7319	20.7319	20.7334	20.7288	20.7223	20.6828	20.5727 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9449	0.8908	0.8154	0.6654	0.5127	0.3492	0.2452	0.2610	0.4085	0.6540	0.8623	0.9521 (94)
Useful gains	393.7572	404.3402	376.4486	312.0387	237.6593	156.8637	105.7007	110.1964	171.5916	265.8548	346.3186	383.6654 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	448.5332	431.5833	386.7684	313.1731	237.7218	156.8642	105.7007	110.1964	171.5952	266.6520	361.9465	441.2747 (97)
Space heating kWh	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (98a)
Space heating requirement - total per year (kWh/year)												122.3084
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												122.3084
Space heating per m2										(98c) / (4) =		2.3982 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	40.7533	18.3073	7.6779	0.8168	0.0465	0.0000	0.0000	0.0000	0.0000	0.5931	11.2521	42.8614 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												122.3084 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)			
mechanical ventilation fans (SFP = 0.8400)			123.8676 (230a)
Total electricity for the above, kWh/year			123.8676 (231)
Electricity for lighting (calculated in Appendix L)			127.2803 (232)
Energy saving/generation technologies (Appendices M ,N and Q)			
PV generation			0.0000 (233)
Wind generation			0.0000 (234)
Hydro-electric generation (Appendix N)			0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)			0.0000 (235)
Appendix Q - special features			
Energy saved or generated			-0.0000 (236)
Energy used			0.0000 (237)
Total delivered energy for all uses			1034.9713 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	122.3084	0.1605	19.6358 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			113.0274 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			148.5798 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.9100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	122.3084	1.5942	194.9806 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1201.8334 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			1584.4470 (286)
Dwelling Primary energy Rate (DPER)			31.0700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
Heatloss Floor 1			27.0200	0.1300	3.5126			(28b)					
External Wall	14.3400	5.9700	8.3700	0.1800	1.5066			(29a)					
Total net area of external elements Aum(A, m2)			41.3600					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	11.8551			(33)					
Main dwelling													
Corridor			14.3600	0.0000	0.0000			(32)					
Party Wall			39.4400	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							296.4545	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E18 Party wall between dwellings				4.7400	0.0600		0.2844						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.6300	0.0000		0.0000						
E20 Exposed floor (normal)				3.2300	0.3200		1.0336						
E7 Party floor between dwellings (in blocks of flats)				8.8700	0.0700		0.6209						
P8 Party Wall - Exposed floor (inverted)				11.0300	0.2400		2.6472						
E21 Exposed floor (inverted)				8.3200	0.3200		2.6624						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.9425	(36)					
Point Thermal Bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	19.7976	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 23.3048	Feb 23.1743	Mar 23.0463	Apr 22.4454	May 22.3330	Jun 21.8096	Jul 21.8096	Aug 21.7127	Sep 22.0112	Oct 22.3330	Nov 22.5604	Dec 22.7982	(38)
Heat transfer coeff	43.1024	42.9718	42.8439	42.2430	42.1306	41.6072	41.6072	41.5103	41.8088	42.1306	42.3580	42.5958	(39)
Average = Sum(39)m / 12 =												42.2425	
HLP	Jan 0.8451	Feb 0.8426	Mar 0.8401	Apr 0.8283	May 0.8261	Jun 0.8158	Jul 0.8158	Aug 0.8139	Sep 0.8198	Oct 0.8261	Nov 0.8305	Dec 0.8352	(40)
HLP (average)												0.8283	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196	(42)
Hot water usage for mixer showers														
Hot water usage for baths	53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478		(42a)
Hot water usage for other uses	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594		(42b)
Average daily hot water use (litres/day)	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401		(42c)
													99.4866	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473		(44)
Energy content (annual)	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194		(45)
Distribution loss (46)m = 0.15 x (45)m													1652.4520	
Water storage loss:														
Store volume	25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529		(46)
a) If manufacturer declared loss factor is known (kWh/day):													150.0000	(47)
Temperature factor from Table 2b													1.3938	(48)
Enter (49) or (54) in (55)													0.5400	(49)
Total storage loss													0.7527	(55)
If cylinder contains dedicated solar storage														
Primary loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325		(57)
Combi loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325		(59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
WWHRS	218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143		(62)
PV diverter	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036		(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000		(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
12Total per year (kWh/year)	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107		(64)
Electric shower(s)													1975.7233	(64)
Heat gains from water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(64a)
													0.0000	(64a)
	94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749		(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785		(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441		(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199		(68)
Pumps, fans	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979		(69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000		(70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828		(71)
Total internal gains	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383		(72)
	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957		(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.9700		36.7938		0.6300		0.7000		0.7700		67.1307 (77)	
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	479.8044	535.6378	560.9840	584.5106	589.3381	572.3412	551.8997	535.6886	524.5442	495.9718	471.3392	462.4456 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	97.4372	97.7331	98.0250	99.4194	99.6847	100.9386	100.9386	101.1743	100.4519	99.6847	99.1494	98.5959
alpha	7.4958	7.5155	7.5350	7.6280	7.6456	7.7292	7.7292	7.7450	7.6968	7.6456	7.6100	7.5731
util living area	0.9835	0.9628	0.9227	0.8169	0.6547	0.4646	0.3317	0.3564	0.5475	0.8227	0.9570	0.9867 (86)
MIT	20.5225	20.6606	20.8002	20.9350	20.9885	20.9993	21.0000	20.9999	20.9975	20.9418	20.7341	20.4998 (87)
Th 2	20.2144	20.2166	20.2187	20.2289	20.2308	20.2396	20.2396	20.2413	20.2362	20.2308	20.2269	20.2229 (88)
util rest of house	0.9783	0.9521	0.9024	0.7795	0.6043	0.4097	0.2744	0.2976	0.4881	0.7792	0.9429	0.9825 (89)
MIT 2	19.6792	19.8502	20.0170	20.1720	20.2227	20.2393	20.2396	20.2413	20.2349	20.1829	19.9505	19.6581 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.0521	20.2085	20.3633	20.5094	20.5613	20.5753	20.5758	20.5767	20.5721	20.5185	20.2970	20.0302 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.0521	20.2085	20.3633	20.5094	20.5613	20.5753	20.5758	20.5767	20.5721	20.5185	20.2970	20.0302 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9771	0.9520	0.9064	0.7936	0.6263	0.4340	0.2997	0.3236	0.5143	0.7962	0.9444	0.9812 (94)
Useful gains	468.7998	509.9344	508.4961	463.8844	369.0784	248.3924	165.4118	173.3573	269.7840	394.8940	445.1181	453.7501 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	678.9535	657.8365	593.9583	490.4147	373.3322	248.6160	165.4222	173.3761	270.5895	417.8709	558.9974	674.3018 (97)
Space heating kWh	156.3544	99.3902	63.5839	19.1018	3.1648	0.0000	0.0000	0.0000	0.0000	17.0948	81.9931	164.0905 (98a)
Space heating requirement - total per year (kWh/year)	604.7735											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	156.3544	99.3902	63.5839	19.1018	3.1648	0.0000	0.0000	0.0000	0.0000	17.0948	81.9931	164.0905 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	604.7735											
Space heating per m2	(98c) / (4) = 11.8583 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	156.3544	99.3902	63.5839	19.1018	3.1648	0.0000	0.0000	0.0000	0.0000	17.0948	81.9931	164.0905 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	169.3981	107.6817	68.8883	20.6953	3.4288	0.0000	0.0000	0.0000	0.0000	18.5209	88.8333	177.7795 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)
Efficiency of water heater	83.5832	82.8825	81.9451	80.6633	79.9595	79.8000	79.8000	79.8000	79.8000	80.5708	82.4877	79.8000 (216)
Fuel for water heating, kWh/month	231.8037	206.8735	222.8340	200.5610	197.1255	179.0842	177.6359	184.1325	185.5158	203.5568	209.7901	229.1323 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												655.2259	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2428.0454	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												141.4370	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-840.2676	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2470.4407	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	655.2259	0.2100	137.5974	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2428.0454	0.2100	509.8895	(264)
Space and water heating			647.4870	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	141.4370	0.1443	20.4137	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832	
PV Unit electricity exported	-425.6145	0.1255	-53.4200	
Total			-108.9032	(269)
Total CO2, kg/year			570.9268	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	655.2259	1.1300	740.4053	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2428.0454	1.1300	2743.6913	(278)
Space and water heating			3484.0966	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	141.4370	1.5338	216.9408	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912	
PV Unit electricity exported	-425.6145	0.4607	-196.0808	
Total			-815.7720	(283)
Total Primary energy kWh/year			3015.3662	(286)
Target Primary Energy Rate (TPER)			59.1200	(287)

Full SAP Calculation Printout



Property Reference	Plot 13				Issued on Date	27/08/2025
Assessment Reference	Plot 13		Prop Type Ref			
Property	Flat 13, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	90 B	DER	2.91	TER	11.19	
Environmental	98 A	% DER < TER				73.99
CO ₂ Emissions (t/year)	0.14	DFEE	14.87	TFEE	19.59	
Compliance Check	See BREL	% DFEE < TFEE				24.12
% DPER < TPER	47.45	DPER	31.07	TPER	59.12	
Assessor Details	Daniel Smith				Assessor ID	CJ06-0001
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9400 (17)
Infiltration rate	0.1970 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1527 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1947	0.1908	0.1870	0.1679	0.1641	0.1450	0.1450	0.1412	0.1527	0.1641	0.1718	0.1794 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3347	0.3308	0.3270	0.3079	0.3041	0.2850	0.2850	0.2812	0.2927	0.3041	0.3118	0.3194 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
Heatloss Floor 1			27.0200	0.1400	3.7828	20.0000	540.4000 (28b)
External Wall	14.3400	5.9700	8.3700	0.1900	1.5903	150.0000	1255.5000 (29a)
Total net area of external elements Aum(A, m ²)			41.3600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		10.0010		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			39.4400	0.0000	0.0000	180.0000	7099.1998 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Party Ceiling 1			51.0000			40.0000	2040.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		15119.1797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.4545 (35)
List of Thermal Bridges							

6. Solar gains													
[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast					5.9700	36.7938	0.2400		0.0000		0.7700		40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392	(83)
Total gains	454.3515	480.9588	493.1317	490.2170	480.0497	456.8530	438.8499	431.2064	431.0355	427.6505	427.5546	437.8510	(84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	152.3814	153.2278	154.0837	158.5106	159.4267	164.1707	164.1707	165.1535	162.2396	159.4267	157.6050	155.8245	21.0000 (85)
alpha	11.1588	11.2152	11.2722	11.5674	11.6284	11.9447	11.9447	12.0102	11.8160	11.6284	11.5070	11.3883	
util living area	0.9236	0.8732	0.7874	0.6523	0.5102	0.3584	0.2565	0.2713	0.4144	0.6393	0.8397	0.9338	(86)
MIT	20.9175	20.9568	20.9859	20.9983	20.9999	21.0000	21.0000	21.0000	21.0000	20.9989	20.9768	20.9107	(87)
Th 2	20.4839	20.4866	20.4894	20.5030	20.5057	20.5194	20.5194	20.5221	20.5139	20.5057	20.5003	20.4948	(88)
util rest of house	0.9090	0.8539	0.7631	0.6261	0.4832	0.3315	0.2285	0.2431	0.3852	0.6094	0.8158	0.9207	(89)
MIT 2	20.3979	20.4436	20.4764	20.5016	20.5056	20.5194	20.5194	20.5221	20.5139	20.5049	20.4786	20.4007	(90)
Living area fraction										FLA = Living area / (4) =		0.4422	(91)
MIT	20.6277	20.6705	20.7017	20.7212	20.7242	20.7319	20.7319	20.7334	20.7288	20.7233	20.6989	20.6262	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.6277	20.6705	20.7017	20.7212	20.7242	20.7319	20.7319	20.7334	20.7288	20.7233	20.6989	20.6262	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9133	0.8610	0.7733	0.6376	0.4951	0.3434	0.2409	0.2556	0.3981	0.6226	0.8255	0.9243	(94)
Useful gains	414.9470	414.1087	381.3613	312.5688	237.6898	156.8639	105.7007	110.1964	171.5934	266.2626	352.9493	404.6889	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	450.0057	432.2483	387.0873	313.2063	237.7237	156.8642	105.7007	110.1964	171.5953	266.6773	362.3762	442.7177	(97)
Space heating kWh	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935	(98a)
Space heating requirement - total per year (kWh/year)												78.4072	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												78.4072	
Space heating per m2										(98c) / (4) =		1.5374	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												78.4072	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.8277	
Water heating fuel used												661.5151	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 123.8676 (230a)
 Total electricity for the above, kWh/year 123.8676 (231)
 Electricity for lighting (calculated in Appendix L) 127.2803 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 991.0701 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	78.4072	16.4900	12.9293 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	16.4900	109.0838 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258 (249)
Energy for lighting	127.2803	16.4900	20.9885 (250)
Additional standing charges			0.0000 (251)
Total energy cost			163.4275 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.3600 (256)
 Energy cost factor (ECF) [(255) x (256)] / [(4) + 45.0] = 0.6129 (257)
 SAP value 90.0657
 SAP rating (Section 12) 90 (258)
 SAP band B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	78.4072	0.1607	12.6015 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			105.9931 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			141.5455 (272)
CO2 emissions per m2			2.7800 (273)
EI value			98.0243
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	51.0000		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) = 120.8700 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9400 (17)
Infiltration rate	0.1970 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor												(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.1527 (21)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)	
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)	
Adj infilt rate													
	0.1641	0.1603	0.1641	0.1489	0.1527	0.1298	0.1260	0.1260	0.1298	0.1450	0.1450	0.1489 (22b)	
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000 (23a)	
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)	
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)	
Effective ac	0.3041	0.3003	0.3041	0.2889	0.2927	0.2698	0.2660	0.2660	0.2698	0.2850	0.2850	0.2889 (25)	

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Window			5.9700	0.7752	4.6279			(27)				
Heatloss Floor 1			27.0200	0.1400	3.7828	20.0000	540.4000	(28b)				
External Wall	14.3400	5.9700	8.3700	0.1900	1.5903	150.0000	1255.5000	(29a)				
Total net area of external elements Aum(A, m2)			41.3600					(31)				
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		10.0010			(33)				
Main dwelling												
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999	(32)				
Party Wall			39.4400	0.0000	0.0000	180.0000	7099.1998	(32)				
Party Floor 1			23.9800			40.0000	959.2000	(32d)				
Party Ceiling 1			51.0000			40.0000	2040.0000	(32b)				
Internal Wall 1			71.1200			9.0000	640.0800	(32c)				
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15119.1797	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							296.4545	(35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value		Total					
E2 Other lintels (including other steel lintels)				3.1800	0.0340		0.1081					
E3 Sill				3.1800	0.0260		0.0827					
E4 Jamb				7.5200	0.0300		0.2256					
E18 Party wall between dwellings				4.7400	0.0290		0.1375					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.6300	0.0000		0.0000					
E20 Exposed floor (normal)				3.2300	0.1690		0.5459					
E7 Party floor between dwellings (in blocks of flats)				8.8700	-0.0180		-0.1597					
P8 Party Wall - Exposed floor (inverted)				11.0300	0.2400		2.6472					
E21 Exposed floor (inverted)				8.3200	0.0750		0.6240					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.2113 (36)				
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	14.2123	(37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	12.1307	11.9784	12.1307	11.5217	11.6740	10.7605	10.6082	10.6082	10.7605	11.3695	11.3695	11.5217 (38)
Heat transfer coeff												
	26.3430	26.1907	26.3430	25.7340	25.8862	24.9728	24.8205	24.8205	24.9728	25.5817	25.5817	25.7340 (39)
Average = Sum(39)m / 12 =												25.5817
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.5165	0.5135	0.5165	0.5046	0.5076	0.4897	0.4867	0.4867	0.4897	0.5016	0.5016	0.5046 (40)
HLP (average)												0.5016
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Distribution loss (46)m = 0.15 x (45)m	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Store volume	Total = Sum(45)m =											1957.1409
a) If manufacturer declared loss factor is known (kWh/day):	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Temperature factor from Table 2b												201.0000 (47)
Enter (49) or (54) in (55)												1.6100 (48)
Total storage loss												0.5400 (49)
If cylinder contains dedicated solar storage												0.8694 (55)
Primary loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
Combi loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
PV diverter	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Heat gains from water heating, kWh/month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m =	Total per year (kWh/year) = Sum(64)m =											2274.4719 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)	

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
-----									-----					
Southeast					5.9700	32.4665	0.2400	0.0000			0.7700			35.8189 (77)
-----									-----					
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898			33.0020 (83)
Total gains	449.5773	474.4009	488.0041	486.1144	472.3749	452.1649	431.4055	423.7076	428.1584	425.1557	423.0233			436.1138 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	159.4267	160.3534	159.4267	163.1994	162.2396	168.1741	169.2056	169.2056	168.1741	164.1707	164.1707	163.1994	
alpha	11.6284	11.6902	11.6284	11.8800	11.8160	12.2116	12.2804	12.2804	12.2116	11.9447	11.9447	11.8800	
util living area	0.8844	0.8240	0.7386	0.5924	0.4493	0.2982	0.2186	0.2343	0.3733	0.5892	0.7867	0.8966	(86)
MIT	20.9567	20.9800	20.9937	20.9995	21.0000	21.0000	21.0000	21.0000	21.0000	20.9996	20.9900	20.9524	(87)
Th 2	20.5057	20.5084	20.5057	20.5166	20.5139	20.5303	20.5331	20.5331	20.5303	20.5194	20.5194	20.5166	(88)
util rest of house	0.8659	0.8022	0.7139	0.5670	0.4227	0.2723	0.1918	0.2070	0.3459	0.5605	0.7612	0.8794	(89)
MIT 2	20.4624	20.4894	20.5001	20.5163	20.5139	20.5303	20.5331	20.5331	20.5303	20.5191	20.5105	20.4686	(90)
Living area fraction	20.6810	20.7063	20.7184	20.7299	20.7288	20.7380	20.7395	20.7395	20.7380	20.7316	20.7225	20.6825	(91)
MIT	20.6810	20.7063	20.7184	20.7299	20.7288	20.7380	20.7395	20.7395	20.7380	20.7316	20.7225	20.6825	(92)
Temperature adjustment	20.6810	20.7063	20.7184	20.7299	20.7288	20.7380	20.7395	20.7395	20.7380	20.7316	20.7225	20.6825	(93)
adjusted MIT	20.6810	20.7063	20.7184	20.7299	20.7288	20.7380	20.7395	20.7395	20.7380	20.7316	20.7225	20.6825	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8726	0.8111	0.7246	0.5782	0.4345	0.2838	0.2036	0.2191	0.3580	0.5732	0.7721	0.8855	(94)
Useful gains	392.3159	384.7998	353.5993	281.0924	205.2410	128.3099	87.8528	92.8169	153.2823	243.6980	326.6190	386.1893	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	410.4486	393.0264	356.1135	281.2708	205.2472	128.3099	87.8528	92.8169	153.2826	243.8339	330.5808	406.1468	(97)
Space heating kWh	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(98a)
Space heating requirement - total per year (kWh/year)												38.8246	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												38.8246	
Space heating per m2										(98c) / (4) =		0.7613	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

0.0000 (213)

10a. Fuel costs - using BEDF prices (577)			
	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	38.8246	28.4300	11.0378 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	28.4300	188.0687 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156 (249)
Energy for lighting	127.2803	28.4300	36.1858 (250)
Additional standing charges			0.0000 (251)
Total energy cost			270.5079 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	38.8246	0.1611	6.2534 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			99.6451 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			135.1975 (272)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	38.8246	1.5961	61.9681 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1068.8209 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			1451.4344 (286)

Plot 13

Full SAP Calculation Printout



Current energy efficiency rating:
Current environmental impact rating:

B 90
A 98

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 90
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £271	Potential £271	Saving £0
Space heating	£46	£46	£0
Water heating	£188	£188	£0
Lighting	£36	£36	£0
Total cost of fuels	£271	£271	£0
Total cost of uses	£270	£270	£0
Delivered energy	19 kWh/m ²	19 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	28 kWh/m ²	28 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.9400 (17)
Infiltration rate		0.1970 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1527 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1947	0.1908	0.1870	0.1679	0.1641	0.1450	0.1450	0.1412	0.1527	0.1641	0.1718	0.1794 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3347	0.3308	0.3270	0.3079	0.3041	0.2850	0.2850	0.2812	0.2927	0.3041	0.3118	0.3194 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element													
Main dwelling													
Window													(27)
Heatloss Floor 1													(28b)
External Wall													(29a)
Total net area of external elements Aum(A, m2)													(31)
Fabric heat loss, W/K = Sum (A x U)													(33)
Main dwelling													
Corridor													(32)
Party Wall													(32)
Party Floor 1													(32d)
Party Ceiling 1													(32b)
Internal Wall 1													(32c)
Heat capacity Cm = Sum(A x k)													(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													(35)
List of Thermal Bridges													
K1 Element													
E2 Other lintels (including other steel lintels)													
E3 Sill													
E4 Jamb													
E18 Party wall between dwellings													
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)													
E20 Exposed floor (normal)													
E7 Party floor between dwellings (in blocks of flats)													
P8 Party Wall - Exposed floor (inverted)													
E21 Exposed floor (inverted)													
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													(36)
Point Thermal bridges													(36a) =
Total fabric heat loss													(33) + (36) + (36a) =
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m													(38)
Heat transfer coeff													(39)
Average = Sum(39)m / 12 =													
HLP													(40)
HLP (average)													(40)
Days in mont													

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													(42)
Hot water usage for mixer showers													(42a)
Hot water usage for baths													(42b)
Hot water usage for other uses													(42c)
Average daily hot water use (litres/day)													(43)
Daily hot water use													
Energy conte													(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													(46)
Water storage loss:													
Store volume													(47)
a) If manufacturer declared loss factor is known (kWh/day):													(48)
Temperature factor from Table 2b													(49)
Enter (49) or (54) in (55)													(55)
Total storage loss													
If cylinder contains dedicated solar storage													(56)
Primary loss													(57)
Combi loss													(61)
Total heat required for water heating calculated for each month													
WWHRS													(62)
PV diverter													(63a)
Solar input													(63c)
FGHRS													(63d)
Output from w/h													
Electric shower(s)													
Heat gains from water heating, kWh/month													(65)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
(66)m													(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													(69)
Pumps, fans													(70)
Losses e.g. evaporation (negative values) (Table 5)													(71)
Water heating gains (Table 5)													(72)
Total internal gains													(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
-----				5.9700	36.7938	0.2400	0.0000			0.7700			40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392	(83)
Total gains	454.3515	480.9588	493.1317	490.2170	480.0497	456.8530	438.8499	431.2064	431.0355	427.6505	427.5546	437.8510	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	152.3814	153.2278	154.0837	158.5106	159.4267	164.1707	164.1707	165.1535	162.2396	159.4267	157.6050	155.8245
alpha	11.1588	11.2152	11.2722	11.5674	11.6284	11.9447	11.9447	12.0102	11.8160	11.6284	11.5070	11.3883
util living area	0.9236	0.8732	0.7874	0.6523	0.5102	0.3584	0.2565	0.2713	0.4144	0.6393	0.8397	0.9338 (86)
MIT	20.9175	20.9568	20.9859	20.9983	20.9999	21.0000	21.0000	21.0000	21.0000	20.9989	20.9768	20.9107 (87)
Th 2	20.4839	20.4866	20.4894	20.5030	20.5057	20.5194	20.5194	20.5221	20.5139	20.5057	20.5003	20.4948 (88)
util rest of house	0.9090	0.8539	0.7631	0.6261	0.4832	0.3315	0.2285	0.2431	0.3852	0.6094	0.8158	0.9207 (89)
MIT 2	20.3979	20.4436	20.4764	20.5016	20.5056	20.5194	20.5194	20.5221	20.5139	20.5049	20.4786	20.4007 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.6277	20.6705	20.7017	20.7212	20.7242	20.7319	20.7319	20.7334	20.7288	20.7233	20.6989	20.6262 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.6277	20.6705	20.7017	20.7212	20.7242	20.7319	20.7319	20.7334	20.7288	20.7233	20.6989	20.6262 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9133	0.8610	0.7733	0.6376	0.4951	0.3434	0.2409	0.2556	0.3981	0.6226	0.8255	0.9243 (94)
Useful gains	414.9470	414.1087	381.3613	312.5688	237.6898	156.8639	105.7007	110.1964	171.5934	266.2626	352.9493	404.6889 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	450.0057	432.2483	387.0873	313.2063	237.7237	156.8642	105.7007	110.1964	171.5953	266.6773	362.3762	442.7177 (97)
Space heating kWh	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935 (98a)
Space heating requirement - total per year (kWh/year)	78.4072											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	78.4072											
Space heating per m ²	(98c) / (4) = 1.5374 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	26.0836	12.1898	4.2601	0.4590	0.0252	0.0000	0.0000	0.0000	0.0000	0.3085	6.7873	28.2935 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000 (213)											
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
(217)m	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												78.4072	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.8277	
Water heating fuel used												661.5151	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												123.8676	(230a)
Total electricity for the above, kWh/year												123.8676	(231)
Electricity for lighting (calculated in Appendix L)												127.2803	(232)

Energy saving/generation technologies (Appendices M ,N and Q)

PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												991.0701	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	78.4072	16.4900	12.9293	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	16.4900	109.0838	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258	(249)
Energy for lighting	127.2803	16.4900	20.9885	(250)
Additional standing charges			0.0000	(251)
Total energy cost			163.4275	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):			0.3600	(256)
Energy cost factor (ECF)			0.6129	(257)
SAP value			90.0657	
SAP rating (Section 12)			90	(258)
SAP band			B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	78.4072	0.1607	12.6015	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			105.9931	(265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820	(267)
Energy for lighting	127.2803	0.1443	18.3705	(268)
Total CO2, kg/year			141.5455	(272)
CO2 emissions per m2			2.7800	(273)
EI value			98.0243	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	51.0000	(1b)	x	2.3700 (2b) = 120.8700 (1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)
Dwelling volume				

2. Ventilation rate

			m3 per hour
Number of open chimneys	0 * 80 =		0.0000 (6a)

Full SAP Calculation Printout



Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		0.0000	Air changes per hour	0.0000 (8)
Pressure test				Yes	
Pressure Test Method				Blower Door	
Measured/design AP50				3.9400	(17)
Infiltration rate				0.1970	(18)
Number of sides sheltered				3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =			0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =			0.1527	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate												
	0.1641	0.1603	0.1641	0.1489	0.1527	0.1298	0.1260	0.1260	0.1298	0.1450	0.1450	0.1489
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3041	0.3003	0.3041	0.2889	0.2927	0.2698	0.2660	0.2660	0.2698	0.2850	0.2850	0.2889

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Window			5.9700	0.7752	4.6279			(27)
Heatloss Floor 1			27.0200	0.1400	3.7828	20.0000	540.4000	(28b)
External Wall	14.3400	5.9700	8.3700	0.1900	1.5903	150.0000	1255.5000	(29a)
Total net area of external elements Aum(A, m2)			41.3600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		10.0010			(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999	(32)
Party Wall			39.4400	0.0000	0.0000	180.0000	7099.1998	(32)
Party Floor 1			23.9800			40.0000	959.2000	(32d)
Party Ceiling 1			51.0000			40.0000	2040.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		15119.1797	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							296.4545	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081		
E3 Sill				3.1800	0.0260	0.0827		
E4 Jamb				7.5200	0.0300	0.2256		
E18 Party wall between dwellings				4.7400	0.0290	0.1375		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.6300	0.0000	0.0000		
E20 Exposed floor (normal)				3.2300	0.1690	0.5459		
E7 Party floor between dwellings (in blocks of flats)				8.8700	-0.0180	-0.1597		
P8 Party Wall - Exposed floor (inverted)				11.0300	0.2400	2.6472		
E21 Exposed floor (inverted)				8.3200	0.0750	0.6240		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.2113	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		14.2123	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Hot water usage for mixer showers												
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401
Average daily hot water use (litres/day)												
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074
Water storage loss:												
Store volume												
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
If cylinder contains dedicated solar storage												

Full SAP Calculation Printout



Primary loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Total per year (kWh/year) = Sum(64)m =												2274.4719 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
-----					-----					-----			
Southeast					5.9700	32.4665	0.2400	0.0000			0.7700	35.8189 (77)	
-----					-----					-----			
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)	
Total gains	449.5773	474.4009	488.0041	486.1144	472.3749	452.1649	431.4055	423.7076	428.1584	425.1557	423.0233	436.1138 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	159.4267	160.3534	159.4267	163.1994	162.2396	168.1741	169.2056	169.2056	168.1741	164.1707	164.1707	163.1994
alpha	11.6284	11.6902	11.6284	11.8800	11.8160	12.2116	12.2804	12.2804	12.2116	11.9447	11.9447	11.8800
util living area	0.8844	0.8240	0.7386	0.5924	0.4493	0.2982	0.2186	0.2343	0.3733	0.5892	0.7867	0.8966 (86)
MIT	20.9567	20.9800	20.9937	20.9995	21.0000	21.0000	21.0000	21.0000	21.0000	20.9996	20.9900	20.9524 (87)
Th 2	20.5057	20.5084	20.5057	20.5166	20.5139	20.5303	20.5331	20.5331	20.5303	20.5194	20.5194	20.5166 (88)
util rest of house	0.8659	0.8022	0.7139	0.5670	0.4227	0.2723	0.1918	0.2070	0.3459	0.5605	0.7612	0.8794 (89)
MIT 2	20.4624	20.4894	20.5001	20.5163	20.5139	20.5303	20.5331	20.5331	20.5303	20.5191	20.5105	20.4686 (90)
Living area fraction	fLA = Living area / (4) = 0.4422 (91)											
MIT	20.6810	20.7063	20.7184	20.7299	20.7288	20.7380	20.7395	20.7395	20.7380	20.7316	20.7225	20.6825 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.6810	20.7063	20.7184	20.7299	20.7288	20.7380	20.7395	20.7395	20.7380	20.7316	20.7225	20.6825 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8726	0.8111	0.7246	0.5782	0.4345	0.2838	0.2036	0.2191	0.3580	0.5732	0.7721	0.8855	(94)
Useful gains	392.3159	384.7998	353.5993	281.0924	205.2410	128.3099	87.8528	92.8169	153.2823	243.6980	326.6190	386.1893	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	410.4486	393.0264	356.1135	281.2708	205.2472	128.3099	87.8528	92.8169	153.2826	243.8339	330.5808	406.1468	(97)
Space heating kWh	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(98a)
Space heating requirement - total per year (kWh/year)												38.8246	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												38.8246	
Space heating per m2										(98c) / (4) =		0.7613	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Fraction of main heating from main system 2	0.0000 (203)
Fraction of total heating from main system 1	1.0000 (204)
Fraction of total heating from main system 2	0.0000 (205)

Full SAP Calculation Printout



Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	13.4907	5.5283	1.8706	0.1284	0.0046	0.0000	0.0000	0.0000	0.0000	0.1011	2.8525	14.8484	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													38.8246 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.8277
Water heating fuel used													661.5151 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													123.8676 (230a)
Total electricity for the above, kWh/year													123.8676 (231)
Electricity for lighting (calculated in Appendix L)													127.2803 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													951.4875 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	38.8246	28.4300	11.0378	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	28.4300	188.0687	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(249a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156	(247)
Energy for lighting	127.2803	28.4300	36.1858	(250)
Additional standing charges			0.0000	(251)
Total energy cost			270.5079	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	38.8246	0.1611	6.2534	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			99.6451	(265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820	(267)
Energy for lighting	127.2803	0.1443	18.3705	(268)
Total CO2, kg/year			135.1975	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	38.8246	1.5961	61.9681	(275)

Full SAP Calculation Printout



Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1068.8209 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			1451.4344 (286)

Full SAP Calculation Printout



Property Reference	Plot 14			Issued on Date	27/08/2025
Assessment Reference	Plot 14	Prop Type Ref			
Property	Flat 14, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.56	TER	9.62
Environmental	98 A	% DER < TER			73.39
CO ₂ Emissions (t/year)	0.13	DFEE	7.67	TFEE	10.57
Compliance Check	See BREL	% DFEE < TFEE			27.47
% DPER < TPER	45.64	DPER	27.53	TPER	50.65
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8400 (17)
Infiltration rate	0.1920 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1488 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1860	0.1823	0.1637	0.1600	0.1414	0.1414	0.1376	0.1488	0.1600	0.1674	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3297	0.3260	0.3223	0.3037	0.3000	0.2814	0.2814	0.2776	0.2888	0.3000	0.3074	0.3148 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15016.8797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							300.3376 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3389 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.8937	12.7482	12.6028	11.8754	11.7299	11.0026	11.0026	10.8571	11.2935	11.7299	12.0209	12.3118 (38)
Average = Sum(39)m / 12 =	19.4147	19.2693	19.1238	18.3965	18.2510	17.5236	17.5236	17.3782	17.8146	18.2510	18.5419	18.8329 (39)
												18.3601
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3883	0.3854	0.3825	0.3679	0.3650	0.3505	0.3505	0.3476	0.3563	0.3650	0.3708	0.3767 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]			Area	Solar flux	g	FF	Access	Gains				
			m2	Table 6a	or Table 6b	Specific data or Table 6c	factor Table 6d	W				
Southeast			5.9700	36.7938	0.2400	0.0000	0.7700	40.5930 (77)				
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	214.8550	216.4770	218.1237	226.7478	228.5551	238.0418	238.0418	240.0344	234.1541	228.5551	224.9689	221.4934	
alpha	15.3237	15.4318	15.5416	16.1165	16.2370	16.8695	16.8695	17.0023	16.6103	16.2370	15.9979	15.7662	
util living area	0.7844	0.6919	0.6080	0.4803	0.3703	0.2524	0.1809	0.1915	0.2961	0.4729	0.6503	0.7917 (86)	
MIT	20.9961	20.9993	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9962 (87)	
Th 2	20.6243	20.6270	20.6297	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6406	20.6352 (88)	
util rest of house	0.7678	0.6760	0.5925	0.4661	0.3562	0.2390	0.1669	0.1775	0.2813	0.4568	0.6336	0.7755 (89)	
MIT 2	20.6206	20.6264	20.6296	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6405	20.6315 (90)	
Living area fraction	fLA = Living area / (4) =												0.4466 (91)
MIT	20.7883	20.7929	20.7950	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8009	20.7944 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.7883	20.7929	20.7950	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8009	20.7944 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7751	0.6831	0.5994	0.4725	0.3625	0.2450	0.1731	0.1837	0.2879	0.4640	0.6411	0.7826 (94)
Useful gains	318.5510	305.9704	273.3361	218.9655	166.1595	108.8518	73.8045	76.6938	119.5123	186.2352	253.9672	310.9793 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.1160	306.2450	273.3746	218.9662	166.1595	108.8518	73.8045	76.6938	119.5123	186.2356	254.0418	312.5195 (97)
Space heating kWh	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (98a)
Space heating requirement - total per year (kWh/year)												2.5779
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2.5779
Space heating per m2	(98c) / (4) =											0.0516 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)	
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)	
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													2.5779 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													121.4388 (230a)
Total electricity for the above, kWh/year													121.4388 (231)
Electricity for lighting (calculated in Appendix L)													124.5474 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	904.1130 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2.5779	0.1624	0.4187 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.9659 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.7870 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2.5779	1.6009	4.1270 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1001.8912 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1376.6387 (286)
Dwelling Primary energy Rate (DPER)			27.5300 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type			5.9700	1.1450	6.8359		(27)					
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724		(29a)					
Total net area of external elements Aum(A, m2)			14.1500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		8.3083		(33)					
Main dwelling												
Corridor			33.8900	0.0000	0.0000		(32)					
Party Wall			19.7200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							310.3376 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590						
E3 Sill				3.1800	0.0500	0.1590						
E4 Jamb				7.5200	0.0500	0.3760						
E18 Party wall between dwellings				4.7400	0.0600	0.2844						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				45.2400	0.0000	0.0000						
E7 Party floor between dwellings (in blocks of flats)				11.9400	0.0700	0.8358						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.8142 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	10.1225 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960
Average = Sum(39)m / 12 =	33.0230	32.8930	32.7656	32.1670	32.0550	31.5337	31.5337	31.4372	31.7345	32.0550	32.2816	32.5184
												32.1665
HLP	0.6605	0.6579	0.6553	0.6433	0.6411	0.6307	0.6307	0.6287	0.6347	0.6411	0.6456	0.6504
HLP (average)												0.6433
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
Hot water usage for baths	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)										Total = Sum(45)m =		1637.0557	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



		m2				Table 6a	Specific data		Specific data		factor		W
						W/m2	or Table 6b		or Table 6c		Table 6d		
Southeast		5.9700				36.7938	0.6300		0.7000		0.7700		67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)	
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938 (84)	
7. Mean internal temperature (heating season)													
Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	130.5224	131.0383	131.5480	133.9958	134.4639	136.6869	136.6869	137.1066	135.8220	134.4639	133.5202	132.5477	
alpha	9.7015	9.7359	9.7699	9.9331	9.9643	10.1125	10.1125	10.1404	10.0548	9.9643	9.9013	9.8365	
util living area	0.9596	0.9066	0.8223	0.6677	0.5099	0.3556	0.2535	0.2723	0.4213	0.6743	0.8901	0.9670 (86)	
MIT	20.8123	20.9042	20.9643	20.9951	20.9997	21.0000	21.0000	21.0000	21.0000	20.9955	20.9339	20.7965 (87)	
Th 2	20.3759	20.3782	20.3805	20.3912	20.3932	20.4025	20.4025	20.4042	20.3989	20.3932	20.3891	20.3849 (88)	
util rest of house	0.9491	0.8877	0.7949	0.6355	0.4767	0.3224	0.2191	0.2371	0.3846	0.6366	0.8663	0.9581 (89)	
MIT 2	20.1741	20.2814	20.3474	20.3873	20.3929	20.4025	20.4025	20.4042	20.3989	20.3898	20.3259	20.1636 (90)	
Living area fraction	fLA = Living area / (4) = 0.4466 (91)												
MIT	20.4591	20.5595	20.6229	20.6587	20.6639	20.6693	20.6693	20.6703	20.6673	20.6603	20.5974	20.4462 (92)	
Temperature adjustment	0.0000												
adjusted MIT	20.4591	20.5595	20.6229	20.6587	20.6639	20.6693	20.6693	20.6703	20.6673	20.6603	20.5974	20.4462 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9506	0.8935	0.8059	0.6497	0.4915	0.3373	0.2345	0.2528	0.4010	0.6533	0.8748	0.9591 (94)	
Useful gains	450.8007	473.4376	447.6721	376.3200	287.2138	191.3861	128.3210	134.2456	208.3976	320.7897	407.7061	438.2914 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	533.6234	515.0893	462.7459	378.2433	287.3377	191.3883	128.3210	134.2456	208.4104	322.4844	435.7187	528.3022 (97)	
Space heating kWh	61.6201	27.9899	11.2149	1.3848	0.0922	0.0000	0.0000	0.0000	0.0000	1.2609	20.1691	66.9680 (98a)	
Space heating requirement - total per year (kWh/year)	190.6999												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)	0.0000												
Space heating kWh	61.6201	27.9899	11.2149	1.3848	0.0922	0.0000	0.0000	0.0000	0.0000	1.2609	20.1691	66.9680 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	190.6999												
Space heating per m2	(98c) / (4) = 3.8140 (99)												
9a. Energy requirements - Individual heating systems, including micro-CHP													
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	61.6201	27.9899	11.2149	1.3848	0.0922	0.0000	0.0000	0.0000	0.0000	1.2609	20.1691	66.9680 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	66.7607	30.3249	12.1505	1.5003	0.0999	0.0000	0.0000	0.0000	0.0000	1.3661	21.8517	72.5547 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)	
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)	
Efficiency of water heater	81.8116	80.9585	80.2739	79.8692	79.8048	79.8000	79.8000	79.8000	79.8000	79.8622	80.6586	79.8000 (216)	
(217)m	81.8116	80.9585	80.2739	79.8692	79.8048	79.8000	79.8000	79.8000	79.8000	79.8622	80.6586	81.9610 (217)	
Fuel for water heating, kWh/month	235.1474	210.3010	225.8944	201.1941	196.2115	177.9421	176.5248	182.9609	184.3137	203.9931	213.0692	232.3758 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)	
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)	
(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1	206.6088 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												
Efficiency of water heater	79.8000												

Full SAP Calculation Printout



Water heating fuel used	2439.9280 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2047.1239 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	206.6088	0.2100	43.3879 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2439.9280	0.2100	512.3849 (264)
Space and water heating			555.7727 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			480.9046 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	206.6088	1.1300	233.4680 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2439.9280	1.1300	2757.1186 (278)
Space and water heating			2990.5866 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2532.5702 (286)
Target Primary Energy Rate (TPER)			50.6500 (287)

Full SAP Calculation Printout



Property Reference	Plot 14	Issued on Date	27/08/2025
Assessment Reference	Plot 14	Prop Type Ref	
Property	Flat 14, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	91 B	DER	2.56
Environmental	98 A	% DER < TER	73.39
CO ₂ Emissions (t/year)	0.13	DFEE	7.67
Compliance Check	See BREL	% DFEE < TFEE	27.47
% DPER < TPER	45.64	DPER	27.53
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume			118.5000 (5)

2. Ventilation rate

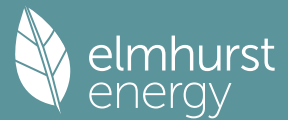
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8400 (17)
Infiltration rate	0.3608 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2796 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3565	0.3495	0.3425	0.3076	0.3006	0.2656	0.2656	0.2586	0.2796	0.3006	0.3146	0.3285 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5635	0.5611	0.5587	0.5473	0.5452	0.5353	0.5353	0.5334	0.5391	0.5452	0.5495	0.5540 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15516.8797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							310.3376 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2400	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.3389 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
22.0374	21.9409	21.8463	21.4021	21.3189	20.9320	20.9320	20.8604	21.0811	21.3189	21.4871	21.6629	(38)
(38)m												
Heat transfer coeff	28.5584	28.4619	28.3673	27.9231	27.8400	27.4531	27.4531	27.3814	27.6021	27.8400	28.0081	28.1839 (39)
Average = Sum(39)m / 12 =												27.9227
HLP	0.5712	0.5692	0.5673	0.5585	0.5568	0.5491	0.5491	0.5476	0.5520	0.5568	0.5602	0.5637 (40)
HLP (average)												0.5585
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Energy content (annual)												832.1197
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (64)
12Total per year (kWh/year)												707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												478.7637 (64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (73)

6. Solar gains

[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Southeast	5.9700	36.7938	0.2400	0.0000	0.7700	40.5930 (77)						
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	360.0081	398.2120	409.2103	423.6459	422.6872	412.9395	397.9965	387.1093	382.3458	363.7852	351.8865	347.3425 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	150.9273	151.4390	151.9439	154.3612	154.8221	157.0041	157.0041	157.4149	156.1564	154.8221	153.8926	152.9328
alpha	11.0618	11.0959	11.1296	11.2907	11.3215	11.4669	11.4669	11.4943	11.4104	11.3215	11.2595	11.1955

Full SAP Calculation Printout



util living area	0.9887	0.9662	0.9199	0.7841	0.6116	0.4255	0.3035	0.3254	0.4980	0.7829	0.9566	0.9915 (86)
MIT	20.7610	20.8548	20.9310	20.9888	20.9992	21.0000	21.0000	21.0000	20.9999	20.9906	20.8957	20.7447 (87)
Th 2	20.4560	20.4578	20.4595	20.4675	20.4690	20.4761	20.4761	20.4774	20.4734	20.4690	20.4660	20.4628 (88)
util rest of house	0.9851	0.9571	0.9017	0.7536	0.5771	0.3906	0.2674	0.2884	0.4601	0.7473	0.9438	0.9888 (89)
MIT 2	20.2452	20.3359	20.4061	20.4602	20.4686	20.4761	20.4761	20.4774	20.4733	20.4633	20.3824	20.2355 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	20.4756	20.5677	20.6405	20.6962	20.7056	20.7100	20.7101	20.7108	20.7085	20.6988	20.6116	20.4629 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.4756	20.5677	20.6405	20.6962	20.7056	20.7100	20.7101	20.7108	20.7085	20.6988	20.6116	20.4629 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9853	0.9591	0.9081	0.7669	0.5925	0.4062	0.2835	0.3049	0.4770	0.7629	0.9476	0.9888 (94)
Useful gains	354.7079	381.9340	371.6045	324.9089	250.4394	167.7362	112.8335	118.0350	182.3882	277.5459	333.4410	343.4384 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	461.9480	445.9315	401.1289	329.3876	250.7156	167.7395	112.8335	118.0351	182.4088	281.1504	378.4357	458.3524 (97)
Space heating kWh	79.7867	43.0063	21.9661	3.2247	0.2055	0.0000	0.0000	0.0000	0.0000	2.6818	32.3961	85.4960 (98a)
Space heating requirement - total per year (kWh/year)												268.7633
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	79.7867	43.0063	21.9661	3.2247	0.2055	0.0000	0.0000	0.0000	0.0000	2.6818	32.3961	85.4960 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												268.7633
Space heating per m2												(98c) / (4) = 5.3753 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	258.0589	203.1527	208.0988	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9992	0.9999	0.9998	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	257.8457	203.1324	208.0641	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	444.3213	428.8194	417.8150	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	134.2624	167.9112	156.0547	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	33.5656	41.9778	39.0137	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												114.5571 (107)
Energy for space heating												5.3753 (99)
Energy for space cooling												2.2911 (108)
Total												7.6664 (109)
Fabric Energy Efficiency (DFEE)												7.7 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

m3 per hour		
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1688 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4188	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3246 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724			(29a)
Total net area of external elements Aum(A, m2)			14.1500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	8.3083			(33)
Main dwelling								
Corridor			33.8900	0.0000	0.0000			(32)
Party Wall			19.7200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

310.3376 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	3.1800	0.0500	0.1590	
E4 Jamb	7.5200	0.0500	0.3760	
E18 Party wall between dwellings	4.7400	0.0600	0.2844	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.9400	0.0700	0.8358	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				1.8142 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	10.1225 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Heat transfer coeff	33.0230	32.8930	32.7656	32.1670	32.0550	31.5337	31.5337	31.4372	31.7345	32.0550	32.2816	32.5184	(39)
Average = Sum(39)m / 12 =													32.1665

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6605	0.6579	0.6553	0.6433	0.6411	0.6307	0.6307	0.6287	0.6347	0.6411	0.6456	0.6504	(40)
HLP (average)													0.6433
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

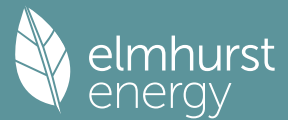
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476		(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383		(42c)
Average daily hot water use (litres/day)													50.1040 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859		(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)										Total = Sum(45)m =			832.1197
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(64)
12Total per year (kWh/year)													
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893	(64a)
													478.7637 (64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376		(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)

Full SAP Calculation Printout



Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W

Southeast					5.9700	36.7938		0.6300	0.7000	0.7700		67.1307 (77)

Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	384.1061	440.7145	468.6200	497.7593	506.0844	495.6347	477.7143	459.9616	446.7946	411.3050	381.1515	367.6136 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	130.5224	131.0383	131.5480	133.9958	134.4639	136.6869	136.6869	137.1066	135.8220	134.4639	133.5202	132.5477
alpha	9.7015	9.7359	9.7699	9.9331	9.9643	10.1125	10.1125	10.1404	10.0548	9.9643	9.9013	9.8365
util living area	0.9907	0.9674	0.9133	0.7661	0.5878	0.4072	0.2904	0.3144	0.4899	0.7895	0.9640	0.9933 (86)
MIT	20.6673	20.7990	20.9082	20.9846	20.9988	21.0000	21.0000	21.0000	20.9998	20.9831	20.8414	20.6468 (87)
Th 2	20.3759	20.3782	20.3805	20.3912	20.3932	20.4025	20.4025	20.4042	20.3989	20.3932	20.3891	20.3849 (88)
util rest of house	0.9876	0.9581	0.8930	0.7323	0.5500	0.3692	0.2510	0.2737	0.4473	0.7503	0.9523	0.9910 (89)
MIT 2	20.0810	20.2091	20.3097	20.3811	20.3925	20.4025	20.4025	20.4042	20.3988	20.3828	20.2603	20.0691 (90)
Living area fraction	20.3429	20.4725	20.5770	20.6506	20.6633	20.6693	20.6693	20.6703	20.6672	20.6509	20.5198	20.3271 (92)
MIT Temperature adjustment	20.3429	20.4725	20.5770	20.6506	20.6633	20.6693	20.6693	20.6703	20.6672	20.6509	20.5198	20.3271 (93)
adjusted MIT	20.3429	20.4725	20.5770	20.6506	20.6633	20.6693	20.6693	20.6703	20.6672	20.6509	20.5198	20.3271 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9874	0.9597	0.8998	0.7469	0.5669	0.3861	0.2686	0.2919	0.4663	0.7673	0.9550	0.9907 (94)
Ext temp.	379.2856	422.9462	421.6567	371.7689	286.8760	191.3801	128.3208	134.2453	208.3558	315.6049	364.0142	364.2039 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	529.7837	512.2279	461.2408	377.9820	287.3178	191.3879	128.3210	134.2456	208.4078	322.1816	433.2127	524.4275 (97)
Space heating requirement - total per year (kWh/year)	111.9706	59.9973	29.4506	4.4734	0.3287	0.0000	0.0000	0.0000	0.0000	4.8931	49.8230	119.2064 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating contribution - total per year (kWh/year)	111.9706	59.9973	29.4506	4.4734	0.3287	0.0000	0.0000	0.0000	0.0000	4.8931	49.8230	119.2064 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98d)
Space heating per m2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98e)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	296.4169	233.3495	238.9225	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9990	0.9998	0.9997	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	296.1245	233.3136	238.8594	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	543.7112	524.6170	505.5189	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	178.2624	216.7298	198.3946	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	44.5656	54.1824	49.5987	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	44.5656	54.1824	49.5987	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	44.5656	54.1824	49.5987	0.0000	0.0000	0.0000	0.0000 (108)
Energy for space heating	0.0000	0.0000	0.0000	0.0000	0.0000	44.5656	54.1824	49.5987	0.0000	0.0000	0.0000	0.0000 (109)
Energy for space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	44.5656	54.1824	49.5987	0.0000	0.0000	0.0000	0.0000 (110)
Total	0.0000	0.0000	0.0000	0.0000	0.0000	44.5656	54.1824	49.5987	0.0000	0.0000	0.0000	0.0000 (111)
Fabric Energy Efficiency (TFEE)	0.0000	0.0000	0.0000	0.0000	0.0000	44.5656	54.1824	49.5987	0.0000	0.0000	0.0000	0.0000 (112)

Full SAP Calculation Printout



Property Reference	Plot 14			Issued on Date	27/08/2025
Assessment Reference	Plot 14	Prop Type Ref			
Property	Flat 14, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.56	TER	9.62
Environmental	98 A	% DER < TER			73.39
CO ₂ Emissions (t/year)	0.13	DFEE	7.67	TFEE	10.57
Compliance Check	See BREL	% DFEE < TFEE			27.47
% DPER < TPER	45.64	DPER	27.53	TPER	50.65
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8400 (17)
Infiltration rate	0.1920 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1488 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1860	0.1823	0.1637	0.1600	0.1414	0.1414	0.1376	0.1488	0.1600	0.1674	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3297	0.3260	0.3223	0.3037	0.3000	0.2814	0.2814	0.2776	0.2888	0.3000	0.3074	0.3148 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15016.8797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							300.3376 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3389 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.8937	12.7482	12.6028	11.8754	11.7299	11.0026	11.0026	10.8571	11.2935	11.7299	12.0209	12.3118 (38)
Average = Sum(39)m / 12 =	19.4147	19.2693	19.1238	18.3965	18.2510	17.5236	17.5236	17.3782	17.8146	18.2510	18.5419	18.8329 (39)
												18.3601
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3883	0.3854	0.3825	0.3679	0.3650	0.3505	0.3505	0.3476	0.3563	0.3650	0.3708	0.3767 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Southeast	5.9700		36.7938		0.2400		0.0000		0.7700		40.5930 (77)	
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	214.8550	216.4770	218.1237	226.7478	228.5551	238.0418	238.0418	240.0344	234.1541	228.5551	224.9689	221.4934	
alpha	15.3237	15.4318	15.5416	16.1165	16.2370	16.8695	16.8695	17.0023	16.6103	16.2370	15.9979	15.7662	
util living area	0.7844	0.6919	0.6080	0.4803	0.3703	0.2524	0.1809	0.1915	0.2961	0.4729	0.6503	0.7917 (86)	
MIT	20.9961	20.9993	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9962 (87)	
Th 2	20.6243	20.6270	20.6297	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6406	20.6352 (88)	
util rest of house	0.7678	0.6760	0.5925	0.4661	0.3562	0.2390	0.1669	0.1775	0.2813	0.4568	0.6336	0.7755 (89)	
MIT 2	20.6206	20.6264	20.6296	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6405	20.6315 (90)	
Living area fraction	fLA = Living area / (4) =												0.4466 (91)
MIT	20.7883	20.7929	20.7950	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8009	20.7944 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.7883	20.7929	20.7950	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8009	20.7944 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7751	0.6831	0.5994	0.4725	0.3625	0.2450	0.1731	0.1837	0.2879	0.4640	0.6411	0.7826 (94)
Useful gains	318.5510	305.9704	273.3361	218.9655	166.1595	108.8518	73.8045	76.6938	119.5123	186.2352	253.9672	310.9793 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.1160	306.2450	273.3746	218.9662	166.1595	108.8518	73.8045	76.6938	119.5123	186.2356	254.0418	312.5195 (97)
Space heating kWh	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (98a)
Space heating requirement - total per year (kWh/year)												2.5779
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2.5779
Space heating per m2	(98c) / (4) =											0.0516 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	1.1643	0.1845	0.0287	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0537	1.1460 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2.5779 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)
Total electricity for the above, kWh/year												121.4388 (231)
Electricity for lighting (calculated in Appendix L)												124.5474 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	904.1130 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2.5779	0.1624	0.4187 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.9659 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.7870 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2.5779	1.6009	4.1270 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1001.8912 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1376.6387 (286)
Dwelling Primary energy Rate (DPER)			27.5300 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

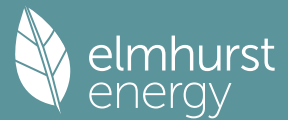
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type			5.9700	1.1450	6.8359		(27)					
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724		(29a)					
Total net area of external elements Aum(A, m2)			14.1500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		8.3083		(33)					
Main dwelling												
Corridor			33.8900	0.0000	0.0000		(32)					
Party Wall			19.7200	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							310.3376 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590						
E3 Sill				3.1800	0.0500	0.1590						
E4 Jamb				7.5200	0.0500	0.3760						
E18 Party wall between dwellings				4.7400	0.0600	0.2844						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				45.2400	0.0000	0.0000						
E7 Party floor between dwellings (in blocks of flats)				11.9400	0.0700	0.8358						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.8142 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	10.1225 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960
Average = Sum(39)m / 12 =	33.0230	32.8930	32.7656	32.1670	32.0550	31.5337	31.5337	31.4372	31.7345	32.0550	32.2816	32.5184
												32.1665
HLP	0.6605	0.6579	0.6553	0.6433	0.6411	0.6307	0.6307	0.6287	0.6347	0.6411	0.6456	0.6504
HLP (average)												0.6433
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
Hot water usage for baths	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)										Total = Sum(45)m =		1637.0557	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



		m2				Table 6a	Specific data		Specific data		factor		W
						W/m2	or Table 6b		or Table 6c		Table 6d		
Southeast		5.9700				36.7938	0.6300		0.7000		0.7700		67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)	
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938 (84)	
7. Mean internal temperature (heating season)													
Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	130.5224	131.0383	131.5480	133.9958	134.4639	136.6869	136.6869	137.1066	135.8220	134.4639	133.5202	132.5477	
alpha	9.7015	9.7359	9.7699	9.9331	9.9643	10.1125	10.1125	10.1404	10.0548	9.9643	9.9013	9.8365	
util living area	0.9596	0.9066	0.8223	0.6677	0.5099	0.3556	0.2535	0.2723	0.4213	0.6743	0.8901	0.9670 (86)	
MIT	20.8123	20.9042	20.9643	20.9951	20.9997	21.0000	21.0000	21.0000	21.0000	20.9955	20.9339	20.7965 (87)	
Th 2	20.3759	20.3782	20.3805	20.3912	20.3932	20.4025	20.4025	20.4042	20.3989	20.3932	20.3891	20.3849 (88)	
util rest of house	0.9491	0.8877	0.7949	0.6355	0.4767	0.3224	0.2191	0.2371	0.3846	0.6366	0.8663	0.9581 (89)	
MIT 2	20.1741	20.2814	20.3474	20.3873	20.3929	20.4025	20.4025	20.4042	20.3989	20.3898	20.3259	20.1636 (90)	
Living area fraction	fLA = Living area / (4) =												
MIT	20.4591	20.5595	20.6229	20.6587	20.6639	20.6693	20.6693	20.6703	20.6673	20.6603	20.5974	20.4462 (92)	
Temperature adjustment	0.0000												
adjusted MIT	20.4591	20.5595	20.6229	20.6587	20.6639	20.6693	20.6693	20.6703	20.6673	20.6603	20.5974	20.4462 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9506	0.8935	0.8059	0.6497	0.4915	0.3373	0.2345	0.2528	0.4010	0.6533	0.8748	0.9591 (94)	
Useful gains	450.8007	473.4376	447.6721	376.3200	287.2138	191.3861	128.3210	134.2456	208.3976	320.7897	407.7061	438.2914 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	533.6234	515.0893	462.7459	378.2433	287.3377	191.3883	128.3210	134.2456	208.4104	322.4844	435.7187	528.3022 (97)	
Space heating kWh	61.6201	27.9899	11.2149	1.3848	0.0922	0.0000	0.0000	0.0000	0.0000	1.2609	20.1691	66.9680 (98a)	
Space heating requirement - total per year (kWh/year)	190.6999												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)	0.0000												
Space heating kWh	61.6201	27.9899	11.2149	1.3848	0.0922	0.0000	0.0000	0.0000	0.0000	1.2609	20.1691	66.9680 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	190.6999												
Space heating per m2	(98c) / (4) = 3.8140 (99)												
9a. Energy requirements - Individual heating systems, including micro-CHP													
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	61.6201	27.9899	11.2149	1.3848	0.0922	0.0000	0.0000	0.0000	0.0000	1.2609	20.1691	66.9680 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	66.7607	30.3249	12.1505	1.5003	0.0999	0.0000	0.0000	0.0000	0.0000	1.3661	21.8517	72.5547 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)	
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)	
Efficiency of water heater	81.8116	80.9585	80.2739	79.8692	79.8048	79.8000	79.8000	79.8000	79.8000	79.8622	80.6586	79.8000 (216)	
(217)m	81.8116	80.9585	80.2739	79.8692	79.8048	79.8000	79.8000	79.8000	79.8000	79.8622	80.6586	81.9610 (217)	
Fuel for water heating, kWh/month	235.1474	210.3010	225.8944	201.1941	196.2115	177.9421	176.5248	182.9609	184.3137	203.9931	213.0692	232.3758 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)	
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)	
(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1	206.6088 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												
Efficiency of water heater	79.8000												

Full SAP Calculation Printout



Water heating fuel used	2439.9280 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2047.1239 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	206.6088	0.2100	43.3879 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2439.9280	0.2100	512.3849 (264)
Space and water heating			555.7727 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			480.9046 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	206.6088	1.1300	233.4680 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2439.9280	1.1300	2757.1186 (278)
Space and water heating			2990.5866 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2532.5702 (286)
Target Primary Energy Rate (TPER)			50.6500 (287)

Full SAP Calculation Printout



Property Reference	Plot 14			Issued on Date	27/08/2025
Assessment Reference	Plot 14	Prop Type Ref			
Property	Flat 14, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.56	TER	9.62
Environmental	98 A	% DER < TER			73.39
CO ₂ Emissions (t/year)	0.13	DFEE	7.67	TFEE	10.57
Compliance Check	See BREL	% DFEE < TFEE			27.47
% DPER < TPER	45.64	DPER	27.53	TPER	50.65
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8400 (17)
Infiltration rate	0.1920 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1488 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1860	0.1823	0.1637	0.1600	0.1414	0.1414	0.1376	0.1488	0.1600	0.1674	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3297	0.3260	0.3223	0.3037	0.3000	0.2814	0.2814	0.2776	0.2888	0.3000	0.3074	0.3148 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m ²)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15516.8797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							310.3376 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	45.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.9400	-0.0180	-0.2149	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3399 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.8937	12.7482	12.6028	11.8754	11.7299	11.0026	11.0026	10.8571	11.2935	11.7299	12.0209	12.3118 (38)
Average = Sum(39)m / 12 =	19.4147	19.2693	19.1238	18.3965	18.2510	17.5236	17.5236	17.3782	17.8146	18.2510	18.5419	18.8329 (39)
												18.3601
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3883	0.3854	0.3825	0.3679	0.3650	0.3505	0.3505	0.3476	0.3563	0.3650	0.3708	0.3767 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
								Total per year (kWh/year) = Sum(64)m =				2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Pumps, fans	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	222.0088	223.6848	225.3863	234.2976	236.1651	245.9676	245.9676	248.0265	241.9505	236.1651	232.4594	228.8682
alpha	15.8006	15.9123	16.0258	16.6198	16.7443	17.3978	17.3978	17.5351	17.1300	16.7443	16.4973	16.2579
util living area	0.7218	0.6528	0.5688	0.4590	0.3572	0.2480	0.1775	0.1873	0.2883	0.4491	0.6104	0.7309 (86)
MIT	20.9989	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9989 (87)
Th 2	20.6243	20.6270	20.6297	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6406	20.6352 (88)
util rest of house	0.7059	0.6377	0.5543	0.4455	0.3436	0.2348	0.1637	0.1736	0.2738	0.4338	0.5946	0.7154 (89)
MIT 2	20.6233	20.6268	20.6297	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6406	20.6341 (90)
Living area fraction									fLA = Living area / (4) =			0.4466 (91)
MIT	20.7910	20.7933	20.7951	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8011	20.7970 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7910	20.7933	20.7951	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8011	20.7970 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7130	0.6444	0.5608	0.4515	0.3497	0.2407	0.1699	0.1797	0.2803	0.4406	0.6017	0.7223 (94)
Useful gains	319.7211	306.1525	273.3646	218.9660	166.1595	108.8518	73.8045	76.6938	119.5123	186.2355	254.0209	312.1215 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.1690	306.2532	273.3759	218.9662	166.1595	108.8518	73.8045	76.6938	119.5123	186.2356	254.0441	312.5700 (97)
Space heating kWh	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (98a)
Space heating requirement - total per year (kWh/year)												0.7599
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.7599
Space heating per m2										(98c) / (4) =		0.0152 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)	
Efficiency of water heater												344.1753 (216)	
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)	
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													0.7599 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													121.4388 (230a)
Total electricity for the above, kWh/year													121.4388 (231)
Electricity for lighting (calculated in Appendix L)													124.5474 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	902.2950 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.7599	16.4900	0.1253 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			148.7885 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.5638 (257)
SAP value		90.8603
SAP rating (Section 12)		91 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.7599	0.1624	0.1234 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.6706 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.4917 (272)
CO2 emissions per m2			2.5500 (273)
EI value			98.2017
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

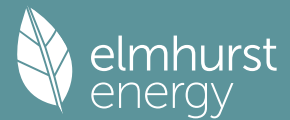
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8400 (17)
Infiltration rate	0.1920 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1488 (21)

Full SAP Calculation Printout



Wind speed	Jan 4.3000	Feb 4.2000	Mar 4.3000	Apr 3.9000	May 4.0000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.4000	Oct 3.8000	Nov 3.8000	Dec 3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1600	0.1562	0.1600	0.1451	0.1488	0.1265	0.1228	0.1228	0.1265	0.1414	0.1414	0.1451	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3000	0.2962	0.3000	0.2851	0.2888	0.2665	0.2628	0.2628	0.2665	0.2814	0.2814	0.2851	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
Total net area of external elements Aum(A, m2)			14.1500					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Main dwelling								
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999	(32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 15516.8797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								310.3376 (35)
List of Thermal Bridges								
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081	
E3 Sill					3.1800	0.0260	0.0827	
E4 Jamb					7.5200	0.0300	0.2256	
E18 Party wall between dwellings					4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					45.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)					11.9400	-0.0180	-0.2149	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								0.3389 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 11.7299	Feb 11.5845	Mar 11.7299	Apr 11.1481	May 11.2935	Jun 10.4207	Jul 10.2752	Aug 10.2752	Sep 10.4207	Oct 11.0026	Nov 11.0026	Dec 11.1481	(38)
Heat transfer coeff	18.2510	18.1055	18.2510	17.6691	17.8146	16.9417	16.7963	16.7963	16.9417	17.5236	17.5236	17.6691	(39)
Average = Sum(39)m / 12 =													17.5236

HLP	Jan 0.3650	Feb 0.3621	Mar 0.3650	Apr 0.3534	May 0.3563	Jun 0.3388	Jul 0.3359	Aug 0.3359	Sep 0.3388	Oct 0.3505	Nov 0.3505	Dec 0.3534	(40)
HLP (average)													0.3505
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

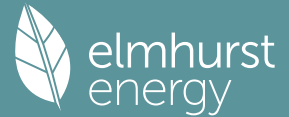
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Distribution loss (46)m = 0.15 x (45)m	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Water storage loss:										Total = Sum(45)m =		1938.9067	
Store volume	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
a) If manufacturer declared loss factor is known (kWh/day):													
Temperature factor from Table 2b													201.0000 (47)
Enter (49) or (54) in (55)													1.6100 (48)
Total storage loss													0.5400 (49)
If cylinder contains dedicated solar storage													0.8694 (55)
Primary loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
Combi loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
PV diverter	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Heat gains from water heating, kWh/month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =										Total per year (kWh/year) = Sum(64)m =		2256.2377	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Full SAP Calculation Printout



(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

Southeast					5.9700	32.4665	0.2400		0.0000		0.7700	35.8189 (77)	

Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)	
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	236.1651	238.0626	236.1651	243.9425	241.9505	254.4156	256.6190	256.6190	254.4156	245.9676	245.9676	243.9425		
alpha	16.7443	16.8708	16.7443	17.2628	17.1300	17.9610	18.1079	18.1079	17.9610	17.3978	17.3978	17.2628		
util living area	0.6539	0.5912	0.5222	0.4116	0.3125	0.2044	0.1495	0.1602	0.2560	0.4087	0.5538	0.6608	(86)	
MIT	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	(87)	
Th 2	20.6461	20.6488	20.6461	20.6570	20.6543	20.6707	20.6735	20.6735	20.6707	20.6598	20.6598	20.6570	(88)	
util rest of house	0.6394	0.5777	0.5088	0.3990	0.2993	0.1919	0.1366	0.1472	0.2428	0.3945	0.5396	0.6468	(89)	
MIT 2	20.6459	20.6488	20.6461	20.6570	20.6543	20.6707	20.6735	20.6735	20.6707	20.6598	20.6598	20.6569	(90)	
Living area fraction									fLA = Living area / (4) =			0.4466	(91)	
MIT	20.8040	20.8056	20.8041	20.8102	20.8087	20.8178	20.8193	20.8193	20.8178	20.8117	20.8117	20.8101	(92)	
Temperature adjustment												0.0000		
adjusted MIT	20.8040	20.8056	20.8041	20.8102	20.8087	20.8178	20.8193	20.8193	20.8178	20.8117	20.8117	20.8101	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.6458	0.5837	0.5148	0.4046	0.3052	0.1975	0.1424	0.1530	0.2487	0.4008	0.5459	0.6530	(94)	
Ext temp.	286.5457	273.4821	248.2871	194.5403	142.6712	88.3984	60.7908	64.1501	105.3401	168.4321	228.0096	281.0537	(95)	
Heat loss rate W	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)	
Space heating kWh	286.6131	273.4951	248.2889	194.5403	142.6712	88.3984	60.7908	64.1501	105.3401	168.4321	228.0123	281.1163	(97)	
Space heating requirement - total per year (kWh/year)	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(98a)	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98c)	
Space heating kWh	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												0.1087		
Space heating per m2												0.0022	(99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating efficiency (main heating system 1)	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(98)	
Space heating fuel (main heating system)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating efficiency (main heating system 2)	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(211)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)	
Fuel for water heating, kWh/month													(217)	

Full SAP Calculation Printout



66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	(232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											0.1087	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											344.1753	
Water heating fuel used											655.5490	(219)
Space cooling fuel											0.0000	(221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)											121.4388	(230a)
Total electricity for the above, kWh/year											121.4388	(231)
Electricity for lighting (calculated in Appendix L)											124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											0.0000	(233)
Wind generation											0.0000	(234)
Hydro-electric generation (Appendix N)											0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)											0.0000	(235)
Appendix Q - special features												
Energy saved or generated											-0.0000	(236)
Energy used											0.0000	(237)
Total delivered energy for all uses											901.6438	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.1087	28.4300	0.0309 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (241a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	124.5474	28.4300	35.4088 (250)
Additional standing charges			0.0000 (251)
Total energy cost			256.3373 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.1087	0.1624	0.0177 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.5649 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.3860 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	0.1087	1.6009	0.1741 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			997.9383 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1372.6858 (286)

SAP 10 EPC IMPROVEMENTS

Plot 14

Current energy efficiency rating: B 91
Current environmental impact rating: A 98

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Full SAP Calculation Printout



Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures
(none)

Typical annual savings	Energy efficiency	Environmental impact
Total Savings £0	0.00 kg/m²	

Potential energy efficiency rating: B 91
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£256	£256	£0
Space heating	£35	£35	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£256	£256	£0
Total cost of uses	£256	£256	£0
Delivered energy	18 kWh/m²	18 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	27 kWh/m²	27 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

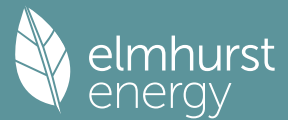
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.8400 (17)
Infiltration rate		0.1920 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1488 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1860	0.1823	0.1637	0.1600	0.1414	0.1414	0.1376	0.1488	0.1600	0.1674	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3297	0.3260	0.3223	0.3037	0.3000	0.2814	0.2814	0.2776	0.2888	0.3000	0.3074	0.3148 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
Total net area of external elements Aum(A, m2)			14.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		6.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)

Full SAP Calculation Printout



Party Wall	19.7200	0.0000	0.0000	180.0000	3549.5999 (32)									
Party Floor 1	50.0000			40.0000	2000.0000 (32d)									
Party Ceiling 1	50.0000			40.0000	2000.0000 (32b)									
Internal Wall 1	71.1200			9.0000	640.0800 (32c)									
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =	15516.8797 (34)									
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					310.3376 (35)									
List of Thermal Bridges														
K1 Element		Length	Psi-value	Total										
E2 Other lintels (including other steel lintels)		3.1800	0.0340	0.1081										
E3 Sill		3.1800	0.0260	0.0827										
E4 Jamb		7.5200	0.0300	0.2256										
E18 Party wall between dwellings		4.7400	0.0290	0.1375										
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)		45.2400	0.0000	0.0000										
E7 Party floor between dwellings (in blocks of flats)		11.9400	-0.0180	-0.2149										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)					0.3389 (36)									
Point Thermal bridges				(36a) =	0.0000									
Total fabric heat loss				(33) + (36) + (36a) =	6.5210 (37)									
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	12.8937	12.7482	12.6028	11.8754	11.7299	11.0026	11.0026	10.8571	11.2935	11.7299	12.0209	12.3118	(38)	
Heat transfer coeff	19.4147	19.2693	19.1238	18.3965	18.2510	17.5236	17.5236	17.3782	17.8146	18.2510	18.5419	18.8329	(39)	
Average = Sum(39)m / 12 =												18.3601		
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.3883	0.3854	0.3825	0.3679	0.3650	0.3505	0.3505	0.3476	0.3563	0.3650	0.3708	0.3767	(40)	
HLP (average)														0.3672
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use													
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte													
	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss													0.0000 (59)
Combi loss													0.0000 (61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS													0.0000 (63a)
PV diverter													0.0000 (63b)
Solar input													0.0000 (63c)
FGHRS													0.0000 (63d)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Pumps, fans	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Total internal gains	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	5.9700	36.7938	0.2400	0.0000	0.7700	40.5930	(77)

Full SAP Calculation Printout



Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	222.0088	223.6848	225.3863	234.2976	236.1651	245.9676	245.9676	248.0265	241.9505	236.1651	232.4594	228.8682
alpha	15.8006	15.9123	16.0258	16.6198	16.7443	17.3978	17.3978	17.5351	17.1300	16.7443	16.4973	16.2579
util living area												
	0.7218	0.6528	0.5688	0.4590	0.3572	0.2480	0.1775	0.1873	0.2883	0.4491	0.6104	0.7309 (86)
MIT	20.9989	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9989 (87)
Th 2	20.6243	20.6270	20.6297	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6406	20.6352 (88)
util rest of house												
	0.7059	0.6377	0.5543	0.4455	0.3436	0.2348	0.1637	0.1736	0.2738	0.4338	0.5946	0.7154 (89)
MIT 2	20.6233	20.6268	20.6297	20.6434	20.6461	20.6598	20.6598	20.6625	20.6543	20.6461	20.6406	20.6341 (90)
Living area fraction												
	0.7059	0.6377	0.5543	0.4455	0.3436	0.2348	0.1637	0.1736	0.2738	0.4338	0.5946	0.7154 (91)
MIT	20.7910	20.7933	20.7951	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8011	20.7970 (92)
Temperature adjustment												0.0000
adjusted MIT	20.7910	20.7933	20.7951	20.8026	20.8041	20.8117	20.8117	20.8132	20.8087	20.8041	20.8011	20.7970 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7130	0.6444	0.5608	0.4515	0.3497	0.2407	0.1699	0.1797	0.2803	0.4406	0.6017	0.7223 (94)
Useful gains	319.7211	306.1525	273.3646	218.9660	166.1595	108.8518	73.8045	76.6938	119.5123	186.2355	254.0209	312.1215 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
	320.1690	306.2532	273.3759	218.9662	166.1595	108.8518	73.8045	76.6938	119.5123	186.2356	254.0441	312.5700 (97)
Space heating kWh												
	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (98a)
Space heating requirement - total per year (kWh/year)												0.7599
Solar heating kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh												
	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.7599
Space heating per m2												(98c) / (4) = 0.0152 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	0.3332	0.0676	0.0084	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0167	0.3337 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												0.7599 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753

Full SAP Calculation Printout



Water heating fuel used	655.5490 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400) mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	902.2950 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.7599	16.4900	0.1253 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			148.7885 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 0.5638 (257)
SAP value	90.8603
SAP rating (Section 12)	91 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.7599	0.1624	0.1234 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.6706 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.4917 (272)
CO2 emissions per m2			2.5500 (273)
EI value			98.2017
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes

Full SAP Calculation Printout



Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
3.8400 (17)
0.1920 (18)
3 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor
(20) = 1 - [0.075 x (19)] = 0.7750 (20)
(21) = (18) x (20) = 0.1488 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1600	0.1562	0.1600	0.1451	0.1488	0.1265	0.1228	0.1228	0.1265	0.1414	0.1414	0.1451	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.3000	0.2962	0.3000	0.2851	0.2888	0.2665	0.2628	0.2628	0.2665	0.2814	0.2814	0.2851	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
Total net area of external elements Aum(A, m2)			14.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 6.1821			(33)
Main dwelling								
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999	(32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								(28)...(30) + (32) + (32a)...(32e) = 15516.8797 (34)
List of Thermal Bridges								310.3376 (35)
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081	
E3 Sill					3.1800	0.0260	0.0827	
E4 Jamb					7.5200	0.0300	0.2256	
E18 Party wall between dwellings					4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					45.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)					11.9400	-0.0180	-0.2149	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								0.3389 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 6.5210 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	11.7299	11.5845	11.7299	11.1481	11.2935	10.4207	10.2752	10.2752	10.4207	11.0026	11.0026	11.1481	(38)
Heat transfer coeff	18.2510	18.1055	18.2510	17.6691	17.8146	16.9417	16.7963	16.7963	16.9417	17.5236	17.5236	17.6691	(39)
Average = Sum(39)m / 12 =												17.5236	
HLP	0.3650	0.3621	0.3650	0.3534	0.3563	0.3388	0.3359	0.3359	0.3388	0.3505	0.3505	0.3534	(40)
HLP (average)												0.3505	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	71.9889	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)										Total = Sum(45)m =		1938.9067	
Distribution loss (46)m = 0.15 x (45)m													
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													

Full SAP Calculation Printout



66.8404 58.8737 61.8994 52.8272 50.1352 44.0026 42.5520 44.8842 46.0917 52.8051 57.8782 65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
<hr/>												
Southeast					5.9700	32.4665	0.2400	0.0000			0.7700	35.8189 (77)
<hr/>												
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	236.1651	238.0626	236.1651	243.9425	241.9505	254.4156	256.6190	256.6190	254.4156	245.9676	245.9676	243.9425	
alpha	16.7443	16.8708	16.7443	17.2628	17.1300	17.9610	18.1079	18.1079	17.9610	17.3978	17.3978	17.2628	
util living area	0.6539	0.5912	0.5222	0.4116	0.3125	0.2044	0.1495	0.1602	0.2560	0.4087	0.5538	0.6608	(86)
MIT	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	(87)
Th 2	20.6461	20.6488	20.6461	20.6570	20.6543	20.6707	20.6735	20.6735	20.6707	20.6598	20.6598	20.6570	(88)
util rest of house	0.6394	0.5777	0.5088	0.3990	0.2993	0.1919	0.1366	0.1472	0.2428	0.3945	0.5396	0.6468	(89)
MIT 2	20.6459	20.6488	20.6461	20.6570	20.6543	20.6707	20.6735	20.6735	20.6707	20.6598	20.6598	20.6569	(90)
Living area fraction									flA = Living area / (4) =			0.4466	(91)
MIT	20.8040	20.8056	20.8041	20.8102	20.8087	20.8178	20.8193	20.8193	20.8178	20.8117	20.8117	20.8101	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.8040	20.8056	20.8041	20.8102	20.8087	20.8178	20.8193	20.8193	20.8178	20.8117	20.8117	20.8101	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6458	0.5837	0.5148	0.4046	0.3052	0.1975	0.1424	0.1530	0.2487	0.4008	0.5459	0.6530	(94)
Useful gains	286.5457	273.4821	248.2871	194.5403	142.6712	88.3984	60.7908	64.1501	105.3401	168.4321	228.0096	281.0537	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	286.6131	273.4951	248.2889	194.5403	142.6712	88.3984	60.7908	64.1501	105.3401	168.4321	228.0123	281.1163	(97)
Space heating kWh	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(98a)
Space heating requirement - total per year (kWh/year)												0.1087	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.1087	
Space heating per m ²											(98c) / (4) =	0.0022	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	0.0502	0.0087	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0465	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													

Full SAP Calculation Printout



Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
													(213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												0.1087	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												901.6438	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	0.1087	28.4300	0.0309	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	124.5474	28.4300	35.4088	(250)
Additional standing charges			0.0000	(251)
Total energy cost			256.3373	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	0.1087	0.1624	0.0177	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			92.5649	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			127.3860	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	0.1087	1.6009	0.1741	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	1.5220	997.7642	(278)
Space and water heating			997.9383	(279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126	(281)
Energy for lighting	124.5474	1.5338	191.0349	(282)
Total Primary energy kWh/year			1372.6858	(286)

Full SAP Calculation Printout



Property Reference	Plot 15			Issued on Date	27/08/2025	
Assessment Reference	Plot 15		Prop Type Ref			
Property	Flat 15, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	91 B	DER	2.56	TER	9.60	
Environmental	98 A	% DER < TER				73.33
CO ₂ Emissions (t/year)	0.13	DFEE	7.69	TFEE	10.45	
Compliance Check	See BREL	% DFEE < TFEE				26.42
% DPER < TPER	45.51	DPER	27.53	TPER	50.53	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.8300	(17)
Infiltration rate	0.1915	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1484 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1892	0.1855	0.1818	0.1633	0.1595	0.1410	0.1410	0.1373	0.1484	0.1595	0.1670	0.1744 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3292	0.3255	0.3218	0.3033	0.2995	0.2810	0.2810	0.2773	0.2884	0.2995	0.3070	0.3144 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			13.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	15145.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		302.9116 (35)
List of Thermal Bridges		
K1 Element	Length	Psi-value
		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	46.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.4600	-0.0180	-0.2063	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.4922 (36)
Point Thermal Bridges			(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5660 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.8744	12.7293	12.5842	11.8587	11.7136	10.9882	10.9882	10.8431	11.2784	11.7136	12.0038	12.2940 (38)
Average = Sum(39)m / 12 =	19.4403	19.2952	19.1502	18.4247	18.2796	17.5541	17.5541	17.4091	17.8443	18.2796	18.5698	18.8600 (39)
												18.3884
HLP	0.3888	0.3859	0.3830	0.3685	0.3656	0.3511	0.3511	0.3482	0.3569	0.3656	0.3714	0.3772 (40)
HLP (average)												0.3678
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
12Total per year (kWh/year)													
Electric shower(s)													2256.2377 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains													
	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				5.9700	36.7938	0.2400	0.0000	0.7700	40.5930 (77)			
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
tau	216.4112	218.0385	219.6904	228.3406	230.1530	239.6645	239.6645	241.6620	235.7671	230.1530	226.5565	223.0706	
alpha	15.4274	15.5359	15.6460	16.2227	16.3435	16.9776	16.9776	17.1108	16.7178	16.3435	16.1038	15.8714	
util living area	0.7855	0.6928	0.6088	0.4810	0.3709	0.2529	0.1812	0.1918	0.2966	0.4736	0.6513	0.7928	(86)
MIT	20.9962	20.9993	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9962	(87)
Th 2	20.6238	20.6265	20.6292	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6401	20.6347	(88)
util rest of house	0.7689	0.6769	0.5933	0.4668	0.3567	0.2394	0.1671	0.1777	0.2818	0.4575	0.6345	0.7767	(89)
MIT 2	20.6202	20.6259	20.6291	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6399	20.6311	(90)
Living area fraction													
MIT	20.7900	20.7946	20.7966	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8025	20.7960	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.7900	20.7946	20.7966	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8025	20.7960	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7762	0.6841	0.6003	0.4733	0.3631	0.2455	0.1735	0.1841	0.2885	0.4648	0.6421	0.7838	(94)
Useful gains	319.0189	306.4209	273.7457	219.3305	166.4484	109.0668	73.9585	76.8551	119.7385	186.5555	254.3800	311.4682	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	320.5720	306.6903	273.7830	219.3311	166.4484	109.0668	73.9585	76.8551	119.7385	186.5559	254.4530	313.0009	(97)
Space heating kWh	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(98a)
Space heating requirement - total per year (kWh/year)												2.5579	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2.5579	
Space heating per m2										(98c) / (4) =		0.0512	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater													344.1753 (216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2.5579 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													121.4388 (230a)
Total electricity for the above, kWh/year													121.4388 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	904.0930	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2.5579	0.1624	0.4155	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(263)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			92.9627	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			127.7838	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2.5579	1.6010	4.0951	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(277)
Water heating (other fuel)	655.5490	1.5220	997.7642	(278)
Space and water heating			1001.8592	(279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126	(281)
Energy for lighting	124.5474	1.5338	191.0349	(282)
Total Primary energy kWh/year			1376.6067	(286)
Dwelling Primary energy Rate (DPER)			27.5300	(287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	2.3700	118.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(5)
Dwelling volume				(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1688 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4188	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)					
Total net area of external elements Aum(A, m2)			13.5800					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =			8.2057		(33)					
Main dwelling													
Corridor			34.1800	0.0000	0.0000			(32)					
Party Wall			20.6200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							312.9116	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E18 Party wall between dwellings				2.3700	0.0600		0.1422						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				46.2400	0.0000		0.0000						
E7 Party floor between dwellings (in blocks of flats)				11.4600	0.0700		0.8022						
E25 Staggered party wall between dwellings				2.3700	0.0600		0.1422						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.7806	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	9.9863	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	32.8868	32.7568	32.6294	32.0308	31.9188	31.3975	31.3975	31.3010	31.5983	31.9188	32.1454	32.3822	(39)
Average = Sum(39)m / 12 =												32.0303	
HLP	Jan 0.6577	Feb 0.6551	Mar 0.6526	Apr 0.6406	May 0.6384	Jun 0.6280	Jul 0.6280	Aug 0.6260	Sep 0.6320	Oct 0.6384	Nov 0.6429	Dec 0.6476	(40)
HLP (average)												0.6406	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers														
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	52.3556	(42a)	
Hot water usage for baths														
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)	
Hot water usage for other uses														
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)	
Average daily hot water use (litres/day)													98.5597	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	106.9415	(44)	
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Energy content (annual)										Total = Sum(45)m =	1637.0557			
Distribution loss (46)m = 0.15 x (45)m														
25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	25.1167	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	1962.4258	1962	(64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	140.7376	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)	
Water heating gains (Table 5)														
125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	124.9344	(72)	
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)	

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast	5.9700				36.7938		0.6300		0.7000		0.7700		67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)	
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938 (84)	

7. Mean internal temperature (heating season)													

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	132.1501	132.6745	133.1927	135.6817	136.1577	138.4184	138.4184	138.8454	137.5388	136.1577	135.1981	134.2092	
alpha	9.8100	9.8450	9.8795	10.0454	10.0772	10.2279	10.2279	10.2564	10.1693	10.0772	10.0132	9.9473	
util living area	0.9593	0.9057	0.8204	0.6652	0.5078	0.3541	0.2524	0.2711	0.4195	0.6718	0.8889	0.9668 (86)	
MIT	20.8178	20.9081	20.9663	20.9956	20.9997	21.0000	21.0000	21.0000	21.0000	20.9959	20.9369	20.8022 (87)	
Th 2	20.3783	20.3806	20.3829	20.3936	20.3956	20.4049	20.4049	20.4066	20.4013	20.3956	20.3915	20.3873 (88)	
util rest of house	0.9487	0.8866	0.7930	0.6332	0.4749	0.3212	0.2183	0.2362	0.3831	0.6343	0.8649	0.9579 (89)	
MIT 2	20.1828	20.2880	20.3519	20.3900	20.3954	20.4049	20.4049	20.4066	20.4013	20.3926	20.3314	20.1726 (90)	
Living area fraction	fLA = Living area / (4) =											0.4518 (91)	
MIT	20.4697	20.5682	20.6295	20.6636	20.6684	20.6738	20.6738	20.6747	20.6718	20.6652	20.6050	20.4570 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.4697	20.5682	20.6295	20.6636	20.6684	20.6738	20.6738	20.6747	20.6718	20.6652	20.6050	20.4570 (93)	

8. Space heating requirement													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9504	0.8927	0.8042	0.6475	0.4897	0.3361	0.2337	0.2520	0.3995	0.6511	0.8737	0.9590 (94)	
Useful gains	450.7287	472.9839	446.7193	375.0295	286.1511	190.6994	127.9063	133.8028	207.6460	319.7084	407.1815	438.2510 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	531.7695	513.2399	461.0364	376.7981	286.2612	190.7012	127.9063	133.8029	207.6570	321.2682	434.1229	526.4386 (97)	
Space heating kWh	60.2943	27.0521	10.6520	1.2734	0.0819	0.0000	0.0000	0.0000	0.0000	1.1605	19.3978	65.6116 (98a)	
Space heating requirement - total per year (kWh/year)												185.5236	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	60.2943	27.0521	10.6520	1.2734	0.0819	0.0000	0.0000	0.0000	0.0000	1.1605	19.3978	65.6116 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												185.5236	
Space heating per m2	(98c) / (4) =											3.7105 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP													

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)	
Fraction of space heat from main system(s)												1.0000 (202)	
Efficiency of main space heating system 1 (in %)												92.3000 (206)	
Efficiency of main space heating system 2 (in %)												0.0000 (207)	
Efficiency of secondary/supplementary heating system, %												0.0000 (208)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	60.2943	27.0521	10.6520	1.2734	0.0819	0.0000	0.0000	0.0000	0.0000	1.1605	19.3978	65.6116 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	65.3243	29.3088	11.5406	1.3797	0.0888	0.0000	0.0000	0.0000	0.0000	1.2573	21.0160	71.0852 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating													
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)	
Efficiency of water heater (217)m	81.7778	80.9245	80.2513	79.8636	79.8042	79.8000	79.8000	79.8000	79.8000	79.8572	80.6288	79.8000 (216)	
Fuel for water heating, kWh/month	235.2445	210.3893	225.9580	201.2080	196.2128	177.9421	176.5248	182.9609	184.3137	204.0056	213.1480	232.4706 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												201.0007 (211)	
Space heating fuel - main system 2												0.0000 (213)	

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2440.3783 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2041.9661 (238)

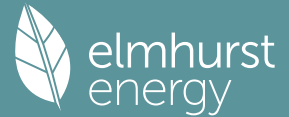
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	201.0007	0.2100	42.2101 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2440.3783	0.2100	512.4794 (264)
Space and water heating			554.6896 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			479.8214 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	201.0007	1.1300	227.1308 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2440.3783	1.1300	2757.6275 (278)
Space and water heating			2984.7583 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2526.7418 (286)
Target Primary Energy Rate (TPER)			50.5300 (287)

Full SAP Calculation Printout



Property Reference	Plot 15			Issued on Date	27/08/2025
Assessment Reference	Plot 15	Prop Type Ref			
Property	Flat 15, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.56	TER	9.60
Environmental	98 A	% DER < TER			73.33
CO ₂ Emissions (t/year)	0.13	DFEE	7.69	TFEE	10.45
Compliance Check	See BREL	% DFEE < TFEE			26.42
% DPER < TPER	45.51	DPER	27.53	TPER	50.53
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8300 (17)
Infiltration rate	0.3603 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2792 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3560	0.3490	0.3420	0.3071	0.3002	0.2653	0.2653	0.2583	0.2792	0.3002	0.3141	0.3281 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5634	0.5609	0.5585	0.5472	0.5450	0.5352	0.5352	0.5334	0.5390	0.5450	0.5493	0.5538 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			13.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15645.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							312.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E18 Party wall between dwellings	2.3700	0.0290	0.0687										
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	46.2400	0.0000	0.0000										
E7 Party floor between dwellings (in blocks of flats)	11.4600	-0.0180	-0.2063										
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.4922 (36)									
Point Thermal bridges				0.0000									
Total fabric heat loss		(33) + (36) + (36a) =		6.5660 (37)									
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.0305	21.9343	21.8399	21.3969	21.3140	20.9282	20.9282	20.8567	21.0768	21.3140	21.4817	21.6570	(38)
Average = Sum(39)m / 12 =	28.5964	28.5002	28.4059	27.9629	27.8800	27.4942	27.4942	27.4227	27.6428	27.8800	28.0477	28.2230	(39)
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	
HLP	0.5719	0.5700	0.5681	0.5593	0.5576	0.5499	0.5499	0.5485	0.5529	0.5576	0.5610	0.5645	(40)
HLP (average)												0.5592	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													(42a)
Hot water usage for baths													(42b)
Hot water usage for other uses													(42c)
Average daily hot water use (litres/day)													(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Distribution loss (46)m = 0.15 x (45)m													(46)
Water storage loss:													(47)
Total storage loss:													(48)
If cylinder contains dedicated solar storage													(49)
Primary loss													(50)
Combi loss													(51)
Total heat required for water heating calculated for each month													(52)
WWHRS	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(53a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(53b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(53c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(53d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(54)
12Total per year (kWh/year)													(55)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893	(56a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844	(56b)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542	(72)
Total internal gains	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034	(73)

6. Solar gains

[Jan]														
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.9700				36.7938		0.2400		0.0000		0.7700		40.5930 (77)	
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392	(83)	
Total gains	360.0081	398.2120	409.2103	423.6459	422.6872	412.9395	397.9965	387.1093	382.3458	363.7852	351.8865	347.3425	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	151.9768	152.4899	152.9962	155.4201	155.8821	158.0697	158.0697	158.4816	157.2199	155.8821	154.9502	153.9878	

Full SAP Calculation Printout



alpha	11.1318	11.1660	11.1997	11.3613	11.3921	11.5380	11.5380	11.5654	11.4813	11.3921	11.3300	11.2659
util living area	0.9890	0.9670	0.9210	0.7853	0.6125	0.4261	0.3040	0.3259	0.4988	0.7841	0.9575	0.9918 (86)
MIT	20.7618	20.8553	20.9313	20.9889	20.9992	21.0000	21.0000	21.0000	20.9999	20.9907	20.8960	20.7455 (87)
Th 2	20.4553	20.4571	20.4588	20.4668	20.4683	20.4753	20.4753	20.4766	20.4726	20.4683	20.4653	20.4621 (88)
util rest of house	0.9856	0.9579	0.9028	0.7547	0.5779	0.3912	0.2677	0.2888	0.4607	0.7484	0.9447	0.9891 (89)
MIT 2	20.2452	20.3356	20.4057	20.4595	20.4679	20.4753	20.4753	20.4766	20.4726	20.4627	20.3819	20.2356 (90)
Living area fraction									FLA = Living area / (4) =			0.4518 (91)
MIT	20.4786	20.5704	20.6432	20.6987	20.7080	20.7124	20.7124	20.7131	20.7108	20.7012	20.6142	20.4660 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4786	20.5704	20.6432	20.6987	20.7080	20.7124	20.7124	20.7131	20.7108	20.7012	20.6142	20.4660 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9857	0.9600	0.9093	0.7682	0.5935	0.4070	0.2841	0.3055	0.4779	0.7643	0.9486	0.9891 (94)
Useful gains	354.8689	382.2749	372.1045	325.4616	250.8711	168.0511	113.0660	118.2762	182.7222	278.0289	333.7920	343.5676 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	462.6510	446.6102	401.7491	329.9260	251.1422	168.0542	113.0661	118.2763	182.7421	281.6226	379.0422	459.0739 (97)
Space heating kWh	80.1899	43.2333	22.0556	3.2144	0.2017	0.0000	0.0000	0.0000	0.0000	2.6737	32.5801	85.9367 (98a)
Space heating requirement - total per year (kWh/year)												270.0854
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	80.1899	43.2333	22.0556	3.2144	0.2017	0.0000	0.0000	0.0000	0.0000	2.6737	32.5801	85.9367 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												270.0854
Space heating per m2										(98c) / (4) =		5.4017 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	258.4451	203.4568	208.4126	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9992	0.9999	0.9998	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	258.2366	203.4371	208.3790	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	444.3213	428.8194	417.8150	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	133.9810	167.6844	155.8204	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	33.4953	41.9211	38.9551	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												114.3715 (107)
Energy for space heating												5.4017 (99)
Energy for space cooling												2.2874 (108)
Total												7.6891 (109)
Fabric Energy Efficiency (DFEE)												7.7 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(23c)
													(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)
Total net area of external elements Aum(A, m2)			13.5800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =			8.2057		(33)
Main dwelling								
Corridor			34.1800	0.0000	0.0000			(32)
Party Wall			20.6200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

312.9116 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	3.1800	0.0500	0.1590	
E4 Jamb	7.5200	0.0500	0.3760	
E18 Party wall between dwellings	2.3700	0.0600	0.1422	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	46.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.4600	0.0700	0.8022	
E25 Staggered party wall between dwellings	2.3700	0.0600	0.1422	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

1.7806 (36)

Point Thermal bridges

(33a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 9.9863 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Heat transfer coeff	32.8868	32.7568	32.6294	32.0308	31.9188	31.3975	31.3975	31.3010	31.5983	31.9188	32.1454	32.3822	(39)
Average = Sum(39)m / 12 =													32.0303

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6577	0.6551	0.6526	0.6406	0.6384	0.6280	0.6280	0.6260	0.6320	0.6384	0.6429	0.6476	(40)
HLP (average)													0.6406
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													50.1040 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)													832.1197
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss

0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)

If cylinder contains dedicated solar storage

0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (57)

Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month

73.5866 64.3489 67.3161 57.5864 54.5493 47.8512 46.6610 49.4910 51.0427 58.4086 63.8117 72.6481 (62)

WWHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)

PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)

Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)

Output from w/h 73.5866 64.3489 67.3161 57.5864 54.5493 47.8512 46.6610 49.4910 51.0427 58.4086 63.8117 72.6481 (64)

Total per year (kWh/year) = Sum(64)m = 707.3017 (64)

Electric shower(s) 42.0893 37.5019 40.9507 39.0787 39.8120 37.9768 39.2427 39.8120 39.0787 40.9507 40.1807 42.0893 (64a)

Heat gains from water heating, kWh/month 28.9190 25.4627 27.0667 24.1663 23.5903 21.4570 21.4759 22.3258 22.5304 24.8398 25.9981 28.6844 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)

Full SAP Calculation Printout



Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)	
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)	
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)	
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d		Gains W
<hr/>												
Southeast				5.9700	36.7938	0.6300		0.7000		0.7700	67.1307 (77)	
<hr/>												
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	384.1061	440.7145	468.6200	497.7593	506.0844	495.6347	477.7143	459.9616	446.7946	411.3050	381.1515	367.6136 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	132.1501	132.6745	133.1927	135.6817	136.1577	138.4184	138.4184	138.8454	137.5388	136.1577	135.1981	134.2092
alpha	9.8100	9.8450	9.8795	10.0454	10.0772	10.2279	10.2279	10.2564	10.1693	10.0772	10.0132	9.9473
util living area	0.9908	0.9673	0.9124	0.7637	0.5854	0.4054	0.2892	0.3130	0.4878	0.7873	0.9638	0.9933 (86)
MIT	20.6741	20.8045	20.9118	20.9856	20.9989	21.0000	21.0000	21.0000	20.9999	20.9842	20.8460	20.6537 (87)
Th 2	20.3783	20.3806	20.3829	20.3936	20.3956	20.4049	20.4049	20.4066	20.4013	20.3956	20.3915	20.3873 (88)
util rest of house	0.9877	0.9579	0.8919	0.7300	0.5478	0.3677	0.2501	0.2727	0.4456	0.7481	0.9519	0.9911 (89)
MIT 2	20.0896	20.2164	20.3152	20.3843	20.3950	20.4049	20.4049	20.4066	20.4013	20.3859	20.2667	20.0778 (90)
Living area fraction									FLA = Living area / (4) =			0.4518 (91)
MIT	20.3537	20.4821	20.5847	20.6560	20.6678	20.6738	20.6738	20.6747	20.6717	20.6562	20.5284	20.3380 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3537	20.4821	20.5847	20.6560	20.6678	20.6738	20.6738	20.6747	20.6717	20.6562	20.5284	20.3380 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9876	0.9596	0.8990	0.7448	0.5648	0.3847	0.2677	0.2909	0.4647	0.7653	0.9549	0.9908 (94)
Useful gains	379.3337	422.9132	421.2819	370.7284	285.8438	190.6941	127.9061	133.8025	207.6088	314.7923	363.9567	364.2468 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	527.9540	510.4207	459.5765	376.5532	286.2432	190.7009	127.9063	133.8028	207.6548	320.9835	431.6626	522.5854 (97)
Space heating kWh	110.5735	58.8050	28.4911	4.1938	0.2972	0.0000	0.0000	0.0000	0.0000	4.6063	48.7483	117.8039 (98a)
Space heating requirement - total per year (kWh/year)												373.5191
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	110.5735	58.8050	28.4911	4.1938	0.2972	0.0000	0.0000	0.0000	0.0000	4.6063	48.7483	117.8039 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												373.5191
Space heating per m ²										(98c) / (4) =		7.4704 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	295.1366	232.3416	237.8874	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9991	0.9999	0.9998	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	294.8756	232.3104	237.8321	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	543.7112	524.6170	505.5189	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	179.1616	217.4762	199.1590	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									FC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	44.7904	54.3690	49.7897	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												148.9492 (107)
Energy for space heating												7.4704 (99)
Energy for space cooling												2.9790 (108)
Total												10.4494 (109)
Fabric Energy Efficiency (TFEE)												10.4 (109)

Full SAP Calculation Printout



Property Reference	Plot 15	Issued on Date	27/08/2025
Assessment Reference	Plot 15	Prop Type Ref	
Property	Flat 15, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	91 B	DER	2.56
Environmental	98 A	% DER < TER	73.33
CO ₂ Emissions (t/year)	0.13	DFEE	7.69
Compliance Check	See BREL	% DFEE < TFEE	26.42
% DPER < TPER	45.51	DPER	27.53
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.8300	(17)
Infiltration rate	0.1915	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1484 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1892	0.1855	0.1818	0.1633	0.1595	0.1410	0.1410	0.1373	0.1484	0.1595	0.1670	0.1744 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3292	0.3255	0.3218	0.3033	0.2995	0.2810	0.2810	0.2773	0.2884	0.2995	0.3070	0.3144 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			13.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			30.0000	1500.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	15145.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		302.9116 (35)
List of Thermal Bridges		
K1 Element	Length	Psi-value
		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	46.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.4600	-0.0180	-0.2063	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.4922 (36)
Point Thermal Bridges			(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5660 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	12.8744	12.7293	12.5842	11.8587	11.7136	10.9882	10.9882	10.8431	11.2784	11.7136	12.0038	12.2940	(38)
Average = Sum(39)m / 12 =	19.4403	19.2952	19.1502	18.4247	18.2796	17.5541	17.5541	17.4091	17.8443	18.2796	18.5698	18.8600	(39)
												18.3884	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.3888	0.3859	0.3830	0.3685	0.3656	0.3511	0.3511	0.3482	0.3569	0.3656	0.3714	0.3772	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths												
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses												
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												
Electric shower(s)												2256.2377 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	216.4112	218.0385	219.6904	228.3406	230.1530	239.6645	239.6645	241.6620	235.7671	230.1530	226.5565	223.0706	21.0000 (85)
alpha	15.4274	15.5359	15.6460	16.2227	16.3435	16.9776	16.9776	17.1108	16.7178	16.3435	16.1038	15.8714	
util living area	0.7855	0.6928	0.6088	0.4810	0.3709	0.2529	0.1812	0.1918	0.2966	0.4736	0.6513	0.7928	(86)
MIT	20.9962	20.9993	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9962	(87)
Th 2	20.6238	20.6265	20.6292	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6401	20.6347	(88)
util rest of house	0.7689	0.6769	0.5933	0.4668	0.3567	0.2394	0.1671	0.1777	0.2818	0.4575	0.6345	0.7767	(89)
MIT 2	20.6202	20.6259	20.6291	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6399	20.6311	(90)
Living area fraction													
MIT	20.7900	20.7946	20.7966	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8025	20.7960	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.7900	20.7946	20.7966	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8025	20.7960	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7762	0.6841	0.6003	0.4733	0.3631	0.2455	0.1735	0.1841	0.2885	0.4648	0.6421	0.7838	(94)
Useful gains	319.0189	306.4209	273.7457	219.3305	166.4484	109.0668	73.9585	76.8551	119.7385	186.5555	254.3800	311.4682	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	320.5720	306.6903	273.7830	219.3311	166.4484	109.0668	73.9585	76.8551	119.7385	186.5559	254.4530	313.0009	(97)
Space heating kWh	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(98a)
Space heating requirement - total per year (kWh/year)												2.5579	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2.5579	
Space heating per m2										(98c) / (4) =		0.0512	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Fraction of main heating from main system 2													1.0000 (202)
Fraction of total heating from main system 1													0.0000 (203)
Fraction of total heating from main system 2													1.0000 (204)
Efficiency of main space heating system 1 (in %)													0.0000 (205)
Efficiency of main space heating system 2 (in %)													100.0000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	1.1555	0.1811	0.0278	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0525	1.1403	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater													344.1753 (216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2.5579 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

mechanical ventilation fans (SFP = 0.8400)

Total electricity for the above, kWh/year

121.4388 (230a)

121.4388 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	904.0930	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2.5579	0.1624	0.4155 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.9627 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.7838 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2.5579	1.6010	4.0951 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1001.8592 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1376.6067 (286)
Dwelling Primary energy Rate (DPER)			27.5300 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)					
Total net area of external elements Aum(A, m2)			13.5800					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =			8.2057		(33)					
Main dwelling													
Corridor			34.1800	0.0000	0.0000			(32)					
Party Wall			20.6200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							312.9116	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E18 Party wall between dwellings				2.3700	0.0600		0.1422						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				46.2400	0.0000		0.0000						
E7 Party floor between dwellings (in blocks of flats)				11.4600	0.0700		0.8022						
E25 Staggered party wall between dwellings				2.3700	0.0600		0.1422						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								1.7806 (36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	9.9863	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	32.8868	32.7568	32.6294	32.0308	31.9188	31.3975	31.3975	31.3010	31.5983	31.9188	32.1454	32.3822	(39)
Average = Sum(39)m / 12 =												32.0303	
HLP	Jan 0.6577	Feb 0.6551	Mar 0.6526	Apr 0.6406	May 0.6384	Jun 0.6280	Jul 0.6280	Aug 0.6260	Sep 0.6320	Oct 0.6384	Nov 0.6429	Dec 0.6476	(40)
HLP (average)												0.6406	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	52.3556	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													98.5597 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)										Total = Sum(45)m =	1637.0557		
Distribution loss (46)m = 0.15 x (45)m													
25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	25.1167	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	1962.4258	1962	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.9700				36.7938		0.6300		0.7000		0.7700		67.1307 (77)	
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499	(83)	
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938	(84)	
7. Mean internal temperature (heating season)														
Temperature during heating periods in the living area from Table 9, Th1 (C)														
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	132.1501	132.6745	133.1927	135.6817	136.1577	138.4184	138.4184	138.8454	137.5388	136.1577	135.1981	134.2092		
alpha	9.8100	9.8450	9.8795	10.0454	10.0772	10.2279	10.2279	10.2564	10.1693	10.0772	10.0132	9.9473		
util living area	0.9593	0.9057	0.8204	0.6652	0.5078	0.3541	0.2524	0.2711	0.4195	0.6718	0.8889	0.9668	(86)	
MIT	20.8178	20.9081	20.9663	20.9956	20.9997	21.0000	21.0000	21.0000	21.0000	20.9959	20.9369	20.8022	(87)	
Th 2	20.3783	20.3806	20.3829	20.3936	20.3956	20.4049	20.4049	20.4066	20.4013	20.3956	20.3915	20.3873	(88)	
util rest of house	0.9487	0.8866	0.7930	0.6332	0.4749	0.3212	0.2183	0.2362	0.3831	0.6343	0.8649	0.9579	(89)	
MIT 2	20.1828	20.2880	20.3519	20.3900	20.3954	20.4049	20.4049	20.4066	20.4013	20.3926	20.3314	20.1726	(90)	
Living area fraction	fLA = Living area / (4) =												0.4518 (91)	
MIT	20.4697	20.5682	20.6295	20.6636	20.6684	20.6738	20.6738	20.6747	20.6718	20.6652	20.6050	20.4570	(92)	
Temperature adjustment													0.0000	
adjusted MIT	20.4697	20.5682	20.6295	20.6636	20.6684	20.6738	20.6738	20.6747	20.6718	20.6652	20.6050	20.4570	(93)	
8. Space heating requirement														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9504	0.8927	0.8042	0.6475	0.4897	0.3361	0.2337	0.2520	0.3995	0.6511	0.8737	0.9590	(94)	
Useful gains	450.7287	472.9839	446.7193	375.0295	286.1511	190.6994	127.9063	133.8028	207.6460	319.7084	407.1815	438.2510	(95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Heat loss rate W	531.7695	513.2399	461.0364	376.7981	286.2612	190.7012	127.9063	133.8029	207.6570	321.2682	434.1229	526.4386	(97)	
Space heating kWh	60.2943	27.0521	10.6520	1.2734	0.0819	0.0000	0.0000	0.0000	0.0000	1.1605	19.3978	65.6116	(98a)	
Space heating requirement - total per year (kWh/year)													185.5236	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)													0.0000	
Space heating kWh	60.2943	27.0521	10.6520	1.2734	0.0819	0.0000	0.0000	0.0000	0.0000	1.1605	19.3978	65.6116	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													185.5236	
Space heating per m2	(98c) / (4) =												3.7105 (99)	
9a. Energy requirements - Individual heating systems, including micro-CHP														
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)		
Fraction of space heat from main system(s)												1.0000 (202)		
Efficiency of main space heating system 1 (in %)												92.3000 (206)		
Efficiency of main space heating system 2 (in %)												0.0000 (207)		
Efficiency of secondary/supplementary heating system, %												0.0000 (208)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	60.2943	27.0521	10.6520	1.2734	0.0819	0.0000	0.0000	0.0000	0.0000	1.1605	19.3978	65.6116	(98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating fuel (main heating system)	65.3243	29.3088	11.5406	1.3797	0.0888	0.0000	0.0000	0.0000	0.0000	1.2573	21.0160	71.0852	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
Efficiency of water heater	81.7778	80.9245	80.2513	79.8636	79.8042	79.8000	79.8000	79.8000	79.8000	79.8572	80.6288	79.8000	(216)	
Fuel for water heating, kWh/month	235.2445	210.3893	225.9580	201.2080	196.2128	177.9421	176.5248	182.9609	184.3137	204.0056	213.1480	232.4706	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													201.0007 (211)	
Space heating fuel - main system 2													0.0000 (213)	

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2440.3783 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2041.9661 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	201.0007	0.2100	42.2101 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2440.3783	0.2100	512.4794 (264)
Space and water heating			554.6896 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			479.8214 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	201.0007	1.1300	227.1308 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2440.3783	1.1300	2757.6275 (278)
Space and water heating			2984.7583 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2526.7418 (286)
Target Primary Energy Rate (TPER)			50.5300 (287)

Full SAP Calculation Printout



Property Reference	Plot 15	Issued on Date	27/08/2025
Assessment Reference	Plot 15	Prop Type Ref	
Property	Flat 15, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	91 B	DER	2.56
Environmental	98 A	% DER < TER	73.33
CO ₂ Emissions (t/year)	0.13	DFEE	7.69
Compliance Check	See BREL	% DFEE < TFEE	26.42
% DPER < TPER	45.51	DPER	27.53
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8300 (17)
Infiltration rate	0.1915 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1484 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1892	0.1855	0.1818	0.1633	0.1595	0.1410	0.1410	0.1373	0.1484	0.1595	0.1670	0.1744 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3292	0.3255	0.3218	0.3033	0.2995	0.2810	0.2810	0.2773	0.2884	0.2995	0.3070	0.3144 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			13.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	6.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1			50.0000			40.0000	2000.0000 (32b)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15645.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							312.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	46.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.4600	-0.0180	-0.2063	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.4922 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		6.5660 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.8744	12.7293	12.5842	11.8587	11.7136	10.9882	10.9882	10.8431	11.2784	11.7136	12.0038	12.2940 (38)
Average = Sum(39)m / 12 =	19.4403	19.2952	19.1502	18.4247	18.2796	17.5541	17.5541	17.4091	17.8443	18.2796	18.5698	18.8600 (39)
												18.3884
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3888	0.3859	0.3830	0.3685	0.3656	0.3511	0.3511	0.3482	0.3569	0.3656	0.3714	0.3772 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
													2256.2377 (64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Pumps, fans	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Total internal gains	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]												Gains
				Area	Solar flux		g		FF	Access		W
				m2	Table 6a		Specific data		Specific data	factor		
					W/m2		or Table 6b		or Table 6c	Table 6d		
Southeast				5.9700	36.7938		0.2400		0.0000	0.7700		40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	223.5555	225.2366	226.9431	235.8788	237.7510	247.5766	247.5766	249.6399	243.5505	237.7510	234.0358	230.4349	
alpha	15.9037	16.0158	16.1295	16.7253	16.8501	17.5051	17.5051	17.6427	17.2367	16.8501	16.6024	16.3623	
util living area	0.7228	0.6536	0.5696	0.4597	0.3578	0.2484	0.1778	0.1876	0.2887	0.4498	0.6113	0.7320 (86)	
MIT	20.9989	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9989 (87)	
Th 2	20.6238	20.6265	20.6292	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6401	20.6347 (88)	
util rest of house	0.7068	0.6386	0.5551	0.4462	0.3442	0.2352	0.1640	0.1738	0.2742	0.4344	0.5955	0.7164 (89)	
MIT 2	20.6228	20.6263	20.6292	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6401	20.6337 (90)	
Living area fraction	fLA = Living area / (4) =												0.4518 (91)
MIT	20.7927	20.7950	20.7967	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8026	20.7987 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.7927	20.7950	20.7967	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8026	20.7987 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7140	0.6454	0.5616	0.4523	0.3503	0.2411	0.1702	0.1801	0.2808	0.4414	0.6027	0.7234 (94)
Useful gains	320.1828	306.6000	273.7733	219.3309	166.4484	109.0668	73.9585	76.8551	119.7385	186.5558	254.4327	312.6073 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	320.6244	306.6983	273.7843	219.3311	166.4484	109.0668	73.9585	76.8551	119.7385	186.5559	254.4553	313.0508 (97)
Space heating kWh	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299 (98a)
Space heating requirement - total per year (kWh/year)												0.7492
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.7492
Space heating per m2	(98c) / (4) =											0.0150 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												0.7492 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)
Total electricity for the above, kWh/year												121.4388 (231)
Electricity for lighting (calculated in Appendix L)												124.5474 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	902.2843 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.7492	16.4900	0.1235 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			148.7867 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.5638 (257)
SAP value		90.8604
SAP rating (Section 12)		91 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.7492	0.1624	0.1216 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.6689 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.4900 (272)
CO2 emissions per m2			2.5500 (273)
EI value			98.2017
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8300 (17)
Infiltration rate	0.1915 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1484 (21)

Full SAP Calculation Printout



Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1595	0.1558	0.1595	0.1447	0.1484	0.1262	0.1224	0.1224	0.1262	0.1410	0.1410	0.1447	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.2995	0.2958	0.2995	0.2847	0.2884	0.2662	0.2624	0.2624	0.2662	0.2810	0.2810	0.2847	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000	(29a)
Total net area of external elements Aum(A, m2)			13.5800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		6.0738			(33)
Main dwelling								
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001	(32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Party Ceiling 1			50.0000			40.0000	2000.0000	(32b)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 15645.5802 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 312.9116 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	46.2400	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	11.4600	-0.0180	-0.2063	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) (36a) = 0.4922 (36)

Point Thermal bridges (33) + (36) + (36a) = 6.5660 (37)

Total fabric heat loss

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	11.7136	11.5686	11.7136	11.1333	11.2784	10.4078	10.2627	10.2627	10.4078	10.9882	10.9882	11.1333	(38)
Average = Sum(39)m / 12 =	18.2796	18.1345	18.2796	17.6992	17.8443	16.9738	16.8287	16.8287	16.9738	17.5541	17.5541	17.6992	(39)
												17.5541	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.3656	0.3627	0.3656	0.3540	0.3569	0.3395	0.3366	0.3366	0.3395	0.3511	0.3511	0.3540	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
Hot water usage for baths	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
												116.7306	(43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1938.9067	
Water storage loss:	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)

Store volume 201.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.8694 (55)

Total storage loss

26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
								Total per year (kWh/year) = Sum(64)m =				2256.2377	(64)

Electric shower(s) 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

5. Internal gains (see Table 5 and 5a)

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
-----					5.9700	32.4665	0.2400	0.0000			0.7700	35.8189 (77)	

Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020	(83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	237.7510	239.6533	237.7510	245.5470	243.5505	256.0417	258.2492	258.2492	256.0417	247.5766	247.5766	245.5470		
alpha	16.8501	16.9769	16.8501	17.3698	17.2367	18.0694	18.2166	18.2166	18.0694	17.5051	17.5051	17.3698		
util living area	0.6549	0.5922	0.5230	0.4123	0.3130	0.2048	0.1498	0.1605	0.2565	0.4094	0.5548	0.6619	(86)	
MIT	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	(87)	
Th 2	20.6455	20.6483	20.6455	20.6565	20.6537	20.6701	20.6729	20.6729	20.6701	20.6592	20.6592	20.6565	(88)	
util rest of house	0.6404	0.5786	0.5096	0.3996	0.2998	0.1923	0.1369	0.1474	0.2433	0.3952	0.5405	0.6479	(89)	
MIT 2	20.6454	20.6482	20.6455	20.6565	20.6537	20.6701	20.6729	20.6729	20.6701	20.6592	20.6592	20.6563	(90)	
Living area fraction									fLA = Living area / (4) =			0.4518	(91)	
MIT	20.8055	20.8072	20.8057	20.8117	20.8102	20.8192	20.8207	20.8207	20.8192	20.8132	20.8132	20.8115	(92)	
Temperature adjustment												0.0000		
adjusted MIT	20.8055	20.8072	20.8057	20.8117	20.8102	20.8192	20.8207	20.8207	20.8192	20.8132	20.8132	20.8115	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.6469	0.5847	0.5156	0.4053	0.3058	0.1979	0.1427	0.1533	0.2492	0.4016	0.5469	0.6542	(94)	
Useful gains	287.0248	273.9483	248.7048	194.8981	142.9362	88.5889	60.9310	64.2968	105.5627	168.7509	228.4322	281.5603	(95)	
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)	
Heat loss rate W	287.0909	273.9608	248.7065	194.8981	142.9362	88.5889	60.9310	64.2968	105.5627	168.7509	228.4349	281.6219	(97)	
Space heating kWh	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(98a)	
Space heating requirement - total per year (kWh/year)												0.1067		
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)												0.0000		
Space heating kWh	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												0.1067		
Space heating per m2										(98c) / (4) =		0.0021	(99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2												0.0000	(213)	
Water heating														
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
Efficiency of water heater												344.1753	(216)	

Full SAP Calculation Printout



(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												0.1067	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												901.6418	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.1067	28.4300	0.0303 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	124.5474	28.4300	35.4088 (250)
Additional standing charges			0.0000 (251)
Total energy cost			256.3368 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.1067	0.1624	0.0173 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.5646 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.3857 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	0.1067	1.6009	0.1708 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			997.9349 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1372.6824 (286)

SAP 10 EPC IMPROVEMENTS

Plot 15

Current energy efficiency rating: B 91
Current environmental impact rating: A 98

N Solar water heating Not applicable

Full SAP Calculation Printout



U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 91
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £256	Potential £256	Saving £0
Space heating	£35	£35	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£256	£256	£0
Total cost of uses	£256	£256	£0
Delivered energy	18 kWh/m ²	18 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	27 kWh/m ²	27 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

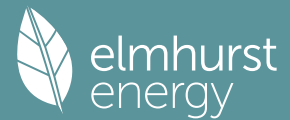
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour
Pressure test	0.0000 / (5) = 0.0000 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	3.8300 (17)
Number of sides sheltered	0.1915 (18)
	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1484 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1892	0.1855	0.1818	0.1633	0.1595	0.1410	0.1410	0.1373	0.1484	0.1595	0.1670	0.1744 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												72.0000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3292	0.3255	0.3218	0.3033	0.2995	0.2810	0.2810	0.2773	0.2884	0.2995	0.3070	0.3144 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
Total net area of external elements Aum(A, m ²)			13.5800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 6.0738		(33)

Full SAP Calculation Printout



Main dwelling					
Corridor	34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall	20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1	50.0000			40.0000	2000.0000 (32d)
Party Ceiling 1	50.0000			40.0000	2000.0000 (32b)
Internal Wall 1	71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	2.3700	0.0290	0.0687
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	46.2400	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	11.4600	-0.0180	-0.2063
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.8744	12.7293	12.5842	11.8587	11.7136	10.9882	10.9882	10.8431	11.2784	11.7136	12.0038	12.2940 (38)
Average = Sum(39)m / 12 =	19.4403	19.2952	19.1502	18.4247	18.2796	17.5541	17.5541	17.4091	17.8443	18.2796	18.5698	18.8600 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.3888	0.3859	0.3830	0.3685	0.3656	0.3511	0.3511	0.3482	0.3569	0.3656	0.3714	0.3772 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
Hot water usage for baths	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
-------	------------	------------------------	--------------------	---------------------	------------------	------------

Full SAP Calculation Printout



				W/m2		or Table 6b		or Table 6c		Table 6d				
Southeast		5.9700		36.7938		0.2400		0.0000		0.7700		40.5930 (77)		
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392	(83)	
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198	(84)	
7. Mean internal temperature (heating season)														
Temperature during heating periods in the living area from Table 9, Th1 (C)														
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	223.5555	225.2366	226.9431	235.8788	237.7510	247.5766	247.5766	249.6399	243.5505	237.7510	234.0358	230.4349		
alpha	15.9037	16.0158	16.1295	16.7253	16.8501	17.5051	17.5051	17.6427	17.2367	16.8501	16.6024	16.3623		
util living area	0.7228	0.6536	0.5696	0.4597	0.3578	0.2484	0.1778	0.1876	0.2887	0.4498	0.6113	0.7320	(86)	
MIT	20.9989	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9989	(87)	
Th 2	20.6238	20.6265	20.6292	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6401	20.6347	(88)	
util rest of house	0.7068	0.6386	0.5551	0.4462	0.3442	0.2352	0.1640	0.1738	0.2742	0.4344	0.5955	0.7164	(89)	
MIT 2	20.6228	20.6263	20.6292	20.6428	20.6455	20.6592	20.6592	20.6619	20.6537	20.6455	20.6401	20.6337	(90)	
Living area fraction	20.7927	20.7950	20.7967	20.8042	20.8057	20.8132	20.8132	20.8147	fLA = Living area / (4) =			0.4518	(91)	
MIT	20.7927	20.7950	20.7967	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8026	20.7987	(92)	
Temperature adjustment												0.0000		
adjusted MIT	20.7927	20.7950	20.7967	20.8042	20.8057	20.8132	20.8132	20.8147	20.8102	20.8057	20.8026	20.7987	(93)	
8. Space heating requirement														
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.7140	0.6454	0.5616	0.4523	0.3503	0.2411	0.1702	0.1801	0.2808	0.4414	0.6027	0.7234	(94)	
Ext temp.	320.1828	306.6000	273.7733	219.3309	166.4484	109.0668	73.9585	76.8551	119.7385	186.5558	254.4327	312.6073	(95)	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Space heating kWh	320.6244	306.6983	273.7843	219.3311	166.4484	109.0668	73.9585	76.8551	119.7385	186.5559	254.4553	313.0508	(97)	
Space heating requirement - total per year (kWh/year)	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299	(98a)	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Space heating kWh	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299		
Space heating per m2											(98c) / (4) =		0.0150	(99)
9a. Energy requirements - Individual heating systems, including micro-CHP														
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	0.3285	0.0661	0.0081	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0163	0.3299	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Water heating														
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)	
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year													0.7492	(211)
Space heating fuel - main system 1														

Full SAP Calculation Printout



Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	344.1753	
Water heating fuel used	655.5490	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	121.4388	(230a)
Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	902.2843	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.7492	16.4900	0.1235 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			148.7867 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.5638 (257)
SAP value		90.8604
SAP rating (Section 12)		91 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.7492	0.1624	0.1216 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.6689 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.4900 (272)
CO2 emissions per m2			2.5500 (273)
EI value			98.2017
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

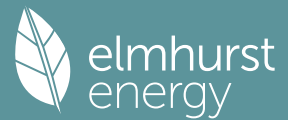
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =										Air changes per hour		0.0000 (8)	
Pressure test										Blower Door		Yes	
Pressure Test Method												3.8300 (17)	
Measured/design AP50												0.1915 (18)	
Infiltration rate												3 (19)	
Number of sides sheltered													
Shelter factor										(20) = 1 - [0.075 x (19)] =		0.7750 (20)	
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =		0.1484 (21)	

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Balanced mechanical ventilation with heat recovery	0.1595	0.1558	0.1595	0.1447	0.1484	0.1262	0.1224	0.1224	0.1262	0.1410	0.1410	0.1447	(22b)
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.2995	0.2958	0.2995	0.2847	0.2884	0.2662	0.2624	0.2624	0.2662	0.2810	0.2810	0.2847	(25)

3. Heat losses and heat loss parameter													

Element				Gross	Openings	NetArea	U-value	A x U		K-value	A x K		
Main dwelling				m2	m2	m2	W/m2K	W/K		kJ/m2K	kJ/K		
Window						5.9700	0.7752	4.6279					
External Wall				13.5800	5.9700	7.6100	0.1900	1.4459		150.0000	1141.5000 (27)		
Total net area of external elements Aum(A, m2)				13.5800							3711.6002 (29a)		
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =			6.0738				2000.0000 (31)		
Main dwelling											2000.0000 (33)		
Corridor				34.1800			0.0000	0.0000		180.0000	6152.4001 (32)		
Party Wall				20.6200			0.0000	0.0000		180.0000	3711.6002 (32)		
Party Floor 1				50.0000						40.0000	2000.0000 (32d)		
Party Ceiling 1				50.0000						40.0000	2000.0000 (32b)		
Internal Wall 1				71.1200						9.0000	640.0800 (32c)		
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =				15645.5802 (34)		
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											312.9116 (35)		
List of Thermal Bridges													
K1 Element							Length	Psi-value			Total		
E2 Other lintels (including other steel lintels)							3.1800	0.0340			0.1081		
E3 Sill							3.1800	0.0260			0.0827		
E4 Jamb							7.5200	0.0300			0.2256		
E18 Party wall between dwellings							2.3700	0.0290			0.0687		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							46.2400	0.0000			0.0000		
E7 Party floor between dwellings (in blocks of flats)							11.4600	-0.0180			-0.2063		
E25 Staggered party wall between dwellings							2.3700	0.0900			0.2133		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											0.4922 (36)		
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss									(33) + (36) + (36a) =		6.5660 (37)		

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	11.7136	11.5686	11.7136	11.1333	11.2784	10.4078	10.2627	10.2627	10.4078	10.9882	10.9882	11.1333	(38)
Average = Sum(39)m / 12 =	18.2796	18.1345	18.2796	17.6992	17.8443	16.9738	16.8287	16.8287	16.9738	17.5541	17.5541	17.6992	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.3656	0.3627	0.3656	0.3540	0.3569	0.3395	0.3366	0.3366	0.3395	0.3511	0.3511	0.3540	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													71.9889 (42a)
Hot water usage for baths													22.6476 (42b)
Hot water usage for other uses													31.9383 (42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m =
Water storage loss:	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Total per year (kWh/year) = Sum(64)m =													2256.2377 (64)

Full SAP Calculation Printout



Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
-----					5.9700	32.4665	0.2400	0.0000			0.7700	35.8189 (77)	

Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020	(83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	237.7510	239.6533	237.7510	245.5470	243.5505	256.0417	258.2492	258.2492	256.0417	247.5766	247.5766	245.5470
alpha	16.8501	16.9769	16.8501	17.3698	17.2367	18.0694	18.2166	18.2166	18.0694	17.5051	17.5051	17.3698
util living area	0.6549	0.5922	0.5230	0.4123	0.3130	0.2048	0.1498	0.1605	0.2565	0.4094	0.5548	0.6619 (86)
MIT	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998 (87)
Th 2	20.6455	20.6483	20.6455	20.6565	20.6537	20.6701	20.6729	20.6729	20.6701	20.6592	20.6592	20.6565 (88)
util rest of house	0.6404	0.5786	0.5096	0.3996	0.2998	0.1923	0.1369	0.1474	0.2433	0.3952	0.5405	0.6479 (89)
MIT 2	20.6454	20.6482	20.6455	20.6565	20.6537	20.6701	20.6729	20.6729	20.6701	20.6592	20.6592	20.6563 (90)
Living area fraction									FLA = Living area / (4) =			0.4518 (91)
MIT	20.8055	20.8072	20.8057	20.8117	20.8102	20.8192	20.8207	20.8207	20.8192	20.8132	20.8132	20.8115 (92)
Temperature adjustment												0.0000
adjusted MIT	20.8055	20.8072	20.8057	20.8117	20.8102	20.8192	20.8207	20.8207	20.8192	20.8132	20.8132	20.8115 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6469	0.5847	0.5156	0.4053	0.3058	0.1979	0.1427	0.1533	0.2492	0.4016	0.5469	0.6542	(94)
Useful gains	287.0248	273.9483	248.7048	194.8981	142.9362	88.5889	60.9310	64.2968	105.5627	168.7509	228.4322	281.5603	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	287.0909	273.9608	248.7065	194.8981	142.9362	88.5889	60.9310	64.2968	105.5627	168.7509	228.4349	281.6219	(97)
Space heating kWh	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(98a)
Space heating requirement - total per year (kWh/year)												0.1067	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												0.1067	
Space heating per m2											(98c) / (4) =	0.0021	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

												0.0000 (201)	
Fraction of space heat from secondary/supplementary system (Table 11)													
Fraction of space heat from main system(s)												1.0000 (202)	
Fraction of main heating from main system 2												0.0000 (203)	
Fraction of total heating from main system 1												1.0000 (204)	
Fraction of total heating from main system 2												0.0000 (205)	
Efficiency of main space heating system 1 (in %)												100.0000 (206)	
Efficiency of main space heating system 2 (in %)												0.0000 (207)	
Efficiency of secondary/supplementary heating system, %												0.0000 (208)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	0.0492	0.0085	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0458	(211)
Space heating efficiency (main heating system 2)													

Full SAP Calculation Printout



Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													(213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												0.1067	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												901.6418	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	0.1067	28.4300	0.0303 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	124.5474	28.4300	35.4088 (250)
Additional standing charges			0.0000 (251)
Total energy cost			256.3368 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	0.1067	0.1624	0.0173 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			92.5646 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			127.3857 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	0.1067	1.6009	0.1708 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			997.9349 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1372.6824 (286)

Full SAP Calculation Printout



Property Reference	Plot 16			Issued on Date	27/08/2025
Assessment Reference	Plot 16	Prop Type Ref			
Property	Flat 16, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.49	TER	9.20
Environmental	98 A	% DER < TER			72.93
CO ₂ Emissions (t/year)	0.15	DFEE	11.20	TFEE	15.37
Compliance Check	See BREL	% DFEE < TFEE			27.10
% DPER < TPER	44.67	DPER	26.66	TPER	48.18
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

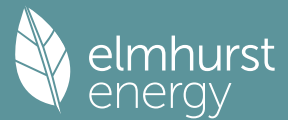
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7800 (17)
Infiltration rate	0.1890 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1606 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2048	0.2008	0.1968	0.1767	0.1727	0.1526	0.1526	0.1486	0.1606	0.1727	0.1807	0.1888 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3448	0.3408	0.3368	0.3167	0.3127	0.2926	0.2926	0.2886	0.3006	0.3127	0.3207	0.3288 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
Total net area of external elements Aum(A, m ²)			36.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.0038		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			30.0000	1860.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16849.8796 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							271.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						4.7700	0.0340	0.1622				
E3 Sill						4.7700	0.0260	0.1240				
E4 Jamb						10.8200	0.0300	0.3246				
E18 Party wall between dwellings						4.7400	0.0290	0.1375				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						15.4600	0.0000	0.0000				
E7 Party floor between dwellings (in blocks of flats)						30.9600	-0.0180	-0.5573				
E16 Corner (normal)						2.3700	0.0490	0.1161				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											0.3071	(36)
Point Thermal Bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	12.3109 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.7208	16.5261	16.3313	15.3576	15.1628	14.1891	14.1891	13.9943	14.5786	15.1628	15.5523	15.9418 (38)
Average = Sum(39)m / 12 =	29.0317	28.8369	28.6422	27.6684	27.4737	26.5000	26.5000	26.3052	26.8895	27.4737	27.8632	28.2527 (39)
												27.6198
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.4683	0.4651	0.4620	0.4463	0.4431	0.4274	0.4274	0.4243	0.4337	0.4431	0.4494	0.4557 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31
												0.4455
												31
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m												2153.9058
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)												2471 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)												
	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains												
	430.7076	440.7252	420.5228	403.0119	380.5447	365.1370	349.6164	351.2521	363.3156	377.6397	403.9136	421.4465 (73)
6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	8.6000											58.4757 (77)
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	489.1834	540.3310	556.8078	571.8755	569.6861	552.9106	530.6502	517.1578	510.8834	487.7253	473.9540	471.4895 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	161.2211	162.3099	163.4135	169.1646	170.3637	176.6238	176.6238	177.9314	174.0653	170.3637	167.9822	165.6664	21.0000 (85)
alpha	11.7481	11.8207	11.8942	12.2776	12.3576	12.7749	12.7749	12.8621	12.6044	12.3576	12.1988	12.0444	
util living area	0.9174	0.8358	0.7399	0.5851	0.4485	0.3067	0.2197	0.2340	0.3632	0.5855	0.8035	0.9264	(86)
MIT	20.9340	20.9768	20.9939	20.9996	21.0000	21.0000	21.0000	21.0000	21.0000	20.9997	20.9881	20.9305	(87)
Th 2	20.5500	20.5529	20.5558	20.5703	20.5732	20.5878	20.5878	20.5907	20.5820	20.5732	20.5674	20.5616	(88)
util rest of house	0.9038	0.8172	0.7187	0.5644	0.4279	0.2870	0.1991	0.2132	0.3412	0.5616	0.7817	0.9139	(89)
MIT 2	20.4804	20.5298	20.5502	20.5700	20.5732	20.5878	20.5878	20.5907	20.5820	20.5730	20.5562	20.4878	(90)
Living area fraction										fLA = Living area / (4) =		0.3531	(91)
MIT	20.6405	20.6876	20.7069	20.7217	20.7239	20.7333	20.7333	20.7352	20.7296	20.7237	20.7087	20.6441	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.6405	20.6876	20.7069	20.7217	20.7239	20.7333	20.7333	20.7352	20.7296	20.7237	20.7087	20.6441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9066	0.8229	0.7260	0.5717	0.4352	0.2940	0.2064	0.2205	0.3489	0.5700	0.7889	0.9163	(94)
Useful gains	443.5173	444.6203	404.2412	326.9415	247.9152	162.5331	109.5332	114.0390	178.2651	278.0187	373.9179	432.0493	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	474.3936	455.2659	406.9158	327.0885	247.9200	162.5332	109.5332	114.0390	178.2653	278.1345	379.1823	464.5897	(97)
Space heating kWh	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(98a)
Space heating requirement - total per year (kWh/year)												60.3116	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												60.3116	
Space heating per m2										(98c) / (4) =		0.9728	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												60.3116	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)
Total electricity for the above, kWh/year													150.5841 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1082.6948	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	60.3116	0.1615	9.7394 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			112.3528 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			154.1871 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.4900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	60.3116	1.5976	96.3523 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1202.4618 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			1652.8678 (286)
Dwelling Primary energy Rate (DPER)			26.6600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3861 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3282 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4184	0.4102	0.4020	0.3610	0.3528	0.3118	0.3118	0.3036	0.3282	0.3528	0.3692	0.3856 (22b)
Effective ac	0.5875	0.5841	0.5808	0.5652	0.5622	0.5486	0.5486	0.5461	0.5539	0.5622	0.5682	0.5744 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
TER Opening Type			8.6000	1.1450	9.8473		(27)
External Wall	36.6900	8.6000	28.0900	0.1800	5.0562		(29a)
Total net area of external elements Aum(A, m ²)			36.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.9035		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000		(32)
Party Wall			18.3200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 281.7723 (35)

List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0500	0.2385	
E3 Sill				4.7700	0.0500	0.2385	
E4 Jamb				10.8200	0.0500	0.5410	
E18 Party wall between dwellings				4.7400	0.0600	0.2844	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				15.4600	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)				30.9600	0.0700	2.1672	
E16 Corner (normal)				2.3700	0.0900	0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.6829 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 18.5864 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	28.4904	28.3255	28.1639	27.4050	27.2630	26.6019	26.6019	26.4795	26.8566	27.2630	27.5502	27.8505
Average = Sum(39)m / 12 =	47.0768	46.9119	46.7504	45.9914	45.8494	45.1884	45.1884	45.0660	45.4430	45.8494	46.1367	46.4370
												45.9907

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7593	0.7566	0.7540	0.7418	0.7395	0.7288	0.7288	0.7269	0.7330	0.7395	0.7441	0.7490
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0376 (42)

Hot water usage for mixer showers 58.3831 57.5057 56.2272 53.7810 51.9757 49.9625 48.8182 50.0871 51.4780 53.6395 56.1383 58.1594 (42a)

Hot water usage for baths 25.2299 24.8552 24.3275 23.3546 22.6261 21.8183 21.3820 21.9060 22.4765 23.3408 24.3338 25.1446 (42b)

Hot water usage for other uses 35.4969 34.2061 32.9153 31.6245 30.3337 29.0429 29.0429 30.3337 31.6245 32.9153 34.2061 35.4969 (42c)

Average daily hot water use (litres/day) 109.4892 (43)

Daily hot water use 119.1099 116.5670 113.4700 108.7601 104.9355 100.8238 99.2431 102.3267 105.5789 109.8956 114.6781 118.8009 (44)

Energy conte 188.6409 165.9898 174.3992 148.8871 141.2634 123.9746 120.0260 126.7019 130.1894 149.1274 163.3800 186.0135 (45)

Energy content (annual) 188.6409 165.9898 174.3992 148.8871 141.2634 123.9746 120.0260 126.7019 130.1894 149.1274 163.3800 186.0135 (45)

Distribution loss (46)m = 0.15 x (45)m 28.2961 24.8985 26.1599 22.3331 21.1895 18.5962 18.0039 19.0053 19.5284 22.3691 24.5070 27.9020 (46)

Water storage loss: 150.0000 (47)

Store volume 1.3938 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Enter (49) or (54) in (55) 0.7527 (55)

Total storage loss 23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (56)

If cylinder contains dedicated solar storage 23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (57)

Primary loss 23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month 235.2358 208.0755 220.9941 193.9790 187.8583 169.0664 166.6209 173.2968 175.2812 195.7223 208.4719 232.6084 (62)

WWHRS -26.6903 -23.6051 -24.7179 -20.4674 -19.0749 -16.3225 -15.2998 -16.2698 -16.8879 -19.9090 -22.5545 -26.1961 (63a)

PV diverter -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 (63b)

Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)

Output from w/h 208.5455 184.4704 196.2761 173.5115 168.7834 152.7439 151.3211 157.0270 158.3933 175.8133 185.9174 206.4123 (64)

12Total per year (kWh/year) 2119.2152 (64)

Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 99.9990 88.8602 95.2636 85.5784 84.2460 77.2950 77.1846 79.4043 79.3614 86.8608 90.3973 99.1254 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 (66)

(66)m 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 96.4916 106.8300 96.4916 99.7080 96.4916 99.7080 96.4916 96.4916 99.7080 96.4916 99.7080 96.4916 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 177.9613 179.8080 175.1544 165.2475 152.7418 140.9882 133.1361 131.2894 135.9430 145.8499 158.3556 170.1092 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 (69)

Pumps, fans 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 (70)

Losses e.g. evaporation (negative values) (Table 5) -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 (71)

Water heating gains (Table 5) 134.4073 132.2324 128.0425 118.8589 113.2339 107.3542 103.7427 106.7262 110.2242 116.7483 125.5519 133.2331 (72)

Total internal gains 465.4239 475.4341 456.2523 440.3782 419.0310 401.6141 386.9341 388.0709 399.4389 415.6535 440.1792 456.3976 (73)

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	8.6000				36.7938		0.6300		0.7000		0.7700		96.7042 (77)	
Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586	(83)	
Total gains	562.1281	640.1571	681.6335	719.6364	731.8235	712.1447	686.3187	662.4375	643.4791	597.7076	556.0085	539.1562	(84)	
7. Mean internal temperature (heating season)														
Temperature during heating periods in the living area from Table 9, Th1 (C)														
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	103.0815	103.4437	103.8012	105.5142	105.8410	107.3892	107.3892	107.6809	106.7875	105.8410	105.1820	104.5017		
alpha	7.8721	7.8962	7.9201	8.0343	8.0561	8.1593	8.1593	8.1787	8.1192	8.0561	8.0121	7.9668		
util living area	0.9786	0.9464	0.8854	0.7487	0.5795	0.4060	0.2897	0.3129	0.4866	0.7678	0.9414	0.9831	(86)	
MIT	20.6034	20.7489	20.8750	20.9701	20.9961	20.9998	21.0000	21.0000	20.9992	20.9698	20.8015	20.5791	(87)	
Th 2	20.2887	20.2911	20.2933	20.3041	20.3061	20.3154	20.3154	20.3172	20.3118	20.3061	20.3020	20.2978	(88)	
util rest of house	0.9725	0.9333	0.8617	0.7123	0.5375	0.3626	0.2446	0.2665	0.4384	0.7256	0.9251	0.9782	(89)	
MIT 2	19.8447	20.0224	20.1694	20.2784	20.3033	20.3153	20.3154	20.3172	20.3114	20.2815	20.0973	19.8224	(90)	
Living area fraction	fLA = Living area / (4) =												0.3531 (91)	
MIT	20.1126	20.2789	20.4185	20.5226	20.5479	20.5570	20.5571	20.5582	20.5542	20.5245	20.3459	20.0896	(92)	
Temperature adjustment													0.0000	
adjusted MIT	20.1126	20.2789	20.4185	20.5226	20.5479	20.5570	20.5571	20.5582	20.5542	20.5245	20.3459	20.0896	(93)	
8. Space heating requirement														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9707	0.9330	0.8662	0.7240	0.5522	0.3779	0.2605	0.2829	0.4554	0.7392	0.9262	0.9765	(94)	
Useful gains	545.6811	597.2962	590.4314	521.0059	404.1054	269.1273	178.8134	187.3905	293.0287	441.8482	514.9945	526.4722	(95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Heat loss rate W	744.4044	721.4544	650.6958	534.5397	405.6724	269.1871	178.8157	187.3949	293.2997	455.0332	611.1215	737.8647	(97)	
Space heating kWh	147.8501	83.4343	44.8367	9.7444	1.1658	0.0000	0.0000	0.0000	0.0000	9.8097	69.2115	157.2760	(98a)	
Space heating requirement - total per year (kWh/year)													523.3285	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)													0.0000	
Space heating kWh	147.8501	83.4343	44.8367	9.7444	1.1658	0.0000	0.0000	0.0000	0.0000	9.8097	69.2115	157.2760	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													523.3285	
Space heating per m2	(98c) / (4) =												8.4408 (99)	
9a. Energy requirements - Individual heating systems, including micro-CHP														
Fraction of space heat from secondary/supplementary system (Table 11)														
Fraction of space heat from main system(s)														
Efficiency of main space heating system 1 (in %)														
Efficiency of main space heating system 2 (in %)														
Efficiency of secondary/supplementary heating system, %														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	147.8501	83.4343	44.8367	9.7444	1.1658	0.0000	0.0000	0.0000	0.0000	9.8097	69.2115	157.2760	(98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating fuel (main heating system)	160.1843	90.3947	48.5771	10.5573	1.2631	0.0000	0.0000	0.0000	0.0000	10.6280	74.9853	170.3966	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)	
Efficiency of water heater	83.3025	82.4009	81.3329	80.2324	79.8555	79.8000	79.8000	79.8000	79.8000	80.2297	82.0561	79.8000	(216)	
Fuel for water heating, kWh/month	250.3472	223.8694	241.3245	216.2612	211.3610	191.4084	189.6254	196.7757	198.4878	219.1373	226.5735	247.3251	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-9.0502	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													566.9864 (211)	
Space heating fuel - main system 2													0.0000 (213)	

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2612.4965 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	161.8073 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2405.7885 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	566.9864	0.2100	119.0672 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2612.4965	0.2100	548.6243 (264)
Space and water heating			667.6914 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	161.8073	0.1443	23.3538 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	0.1339	-66.4499
PV Unit electricity exported	-525.1326	0.1255	-65.9198
Total			-132.3697 (269)
Total CO2, kg/year			570.6048 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	566.9864	1.1300	640.6947 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2612.4965	1.1300	2952.1211 (278)
Space and water heating			3592.8158 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			2987.2033 (286)
Target Primary Energy Rate (TPER)			48.1800 (287)

Full SAP Calculation Printout



Property Reference	Plot 16			Issued on Date	27/08/2025
Assessment Reference	Plot 16	Prop Type Ref			
Property	Flat 16, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.49	TER	9.20
Environmental	98 A	% DER < TER			72.93
CO ₂ Emissions (t/year)	0.15	DFEE	11.20	TFEE	15.37
Compliance Check	See BREL	% DFEE < TFEE			27.10
% DPER < TPER	44.67	DPER	26.66	TPER	48.18
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7800 (17)
Infiltration rate	0.3251 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2763 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3523	0.3454	0.3385	0.3040	0.2971	0.2625	0.2625	0.2556	0.2763	0.2971	0.3109	0.3247 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5621	0.5597	0.5573	0.5462	0.5441	0.5345	0.5345	0.5327	0.5382	0.5441	0.5483	0.5527 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
Total net area of external elements Aum(A, m ²)			36.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.0038		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			40.0000	2480.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17469.8796 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							281.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				10.8200	0.0300	0.3246	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375									
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.4600	0.0000	0.0000									
E7 Party floor between dwellings (in blocks of flats)	30.9600	-0.0180	-0.5573									
E16 Corner (normal)	2.3700	0.0490	0.1161									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.3071 (36)								
Point Thermal bridges				0.0000								
Total fabric heat loss		(33) + (36) + (36a) =		12.3109 (37)								
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	27.2549	27.1381	27.0235	26.4854	26.3847	25.9161	25.9161	25.8293	26.0966	26.3847	26.5884	26.8013 (38)
Average = Sum(39)m / 12 =	39.5658	39.4489	39.3344	38.7963	38.6956	38.2269	38.2269	38.1402	38.4075	38.6956	38.8993	39.1122 (39)
												38.7958
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6382	0.6363	0.6344	0.6257	0.6241	0.6166	0.6166	0.6152	0.6195	0.6241	0.6274	0.6308 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												25.2299 (42b)
Hot water usage for other uses												35.4969 (42c)
Average daily hot water use (litres/day)												55.6619 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414 (44)
Energy content (annual)	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499 (45)
Distribution loss (46)m = 0.15 x (45)m												924.4260
Water storage loss:												0.0000 (46)
Total storage loss:												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (64)
12Total per year (kWh/year)												785.7621 (64)
Electric shower(s)	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551 (64a)
Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
Total internal gains	374.0866	385.4940	368.5137	358.7915	340.9103	330.3519	318.1474	317.5698	326.9630	335.8843	354.7262	365.8842 (73)

6. Solar gains

[Jan]												Gains
				Area	Solar flux		g		FF		Access	Gains
				m2	Table 6a	Specific data	Specific data	Specific data	Specific data	factor		W
					W/m2	or Table 6b	or Table 6b	or Table 6c	or Table 6c	Table 6d		
Southeast				8.6000	36.7938		0.2400		0.0000	0.7700		58.4757 (77)
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	432.5624	485.0997	504.7987	527.6552	530.0516	518.1255	499.1812	483.4755	474.5308	445.9699	424.7666	415.9272 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	122.6499	123.0133	123.3716	125.0827	125.4081	126.9456	126.9456	127.2345	126.3490	125.4081	124.7515	124.0724

Full SAP Calculation Printout



alpha	9.1767	9.2009	9.2248	9.3388	9.3605	9.4630	9.4630	9.4823	9.4233	9.3605	9.3168	9.2715
util living area	0.9928	0.9789	0.9477	0.8427	0.6730	0.4720	0.3369	0.3629	0.5575	0.8510	0.9753	0.9947 (86)
MIT	20.6030	20.7248	20.8421	20.9574	20.9946	20.9998	21.0000	21.0000	20.9992	20.9605	20.7826	20.5817 (87)
Th 2	20.3958	20.3975	20.3991	20.4069	20.4083	20.4151	20.4151	20.4164	20.4125	20.4083	20.4054	20.4023 (88)
util rest of house	0.9906	0.9729	0.9341	0.8128	0.6324	0.4290	0.2922	0.3168	0.5105	0.8165	0.9673	0.9930 (89)
MIT 2	20.0381	20.1580	20.2700	20.3767	20.4053	20.4150	20.4151	20.4164	20.4121	20.3819	20.2219	20.0230 (90)
Living area fraction	20.2376	20.3581	20.4720	20.5817	20.6133	20.6215	20.6216	20.6224	20.6194	20.5862	20.4198	0.3531 (91)
MIT	20.2376	20.3581	20.4720	20.5817	20.6133	20.6215	20.6216	20.6224	20.6194	20.5862	20.4198	20.2202 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2376	20.3581	20.4720	20.5817	20.6133	20.6215	20.6216	20.6224	20.6194	20.5862	20.4198	20.2202 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9899	0.9724	0.9359	0.8220	0.6466	0.4441	0.3080	0.3331	0.5271	0.8274	0.9675	0.9924 (94)
Useful gains	428.1938	471.7155	472.4571	433.7108	342.7236	230.1245	153.7325	161.0407	250.1070	368.9814	410.9688	412.7494 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	630.5827	609.8070	549.5792	453.2072	344.9071	230.1838	153.7340	161.0439	250.3936	386.4210	518.1324	626.5864 (97)
Space heating kWh	150.5773	92.7975	57.3789	14.0374	1.6245	0.0000	0.0000	0.0000	0.0000	12.9750	77.1578	159.0947 (98a)
Space heating requirement - total per year (kWh/year)												565.6431
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	150.5773	92.7975	57.3789	14.0374	1.6245	0.0000	0.0000	0.0000	0.0000	12.9750	77.1578	159.0947 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												565.6431
Space heating per m2										(98c) / (4) =		9.1233 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	359.3333	282.8794	289.8652	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9947	0.9990	0.9984	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	357.4271	282.5906	289.4027	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	561.7220	541.7854	525.4332	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	147.0924	192.8410	175.6067	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			0.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	36.7731	48.2102	43.9017	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												128.8850 (107)
Energy for space heating												9.1233 (99)
Energy for space cooling												2.0788 (108)
Total												11.2021 (109)
Fabric Energy Efficiency (DFEE)												11.2 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3861 (18)
Number of sides sheltered	2 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3282 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4184	0.4102	0.4020	0.3610	0.3528	0.3118	0.3118	0.3036	0.3282	0.3528	0.3692	0.3856	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5875	0.5841	0.5808	0.5652	0.5622	0.5486	0.5486	0.5461	0.5539	0.5622	0.5682	0.5744	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
TER Opening Type			8.6000	1.1450	9.8473			(27)
External Wall	36.6900	8.6000	28.0900	0.1800	5.0562			(29a)
Total net area of external elements Aum(A, m ²)			36.6900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.9035			(33)
Main dwelling								
Corridor			22.9700	0.0000	0.0000			(32)
Party Wall			18.3200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 281.7723 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385	
E3 Sill	4.7700	0.0500	0.2385	
E4 Jamb	10.8200	0.0500	0.5410	
E18 Party wall between dwellings	4.7400	0.0600	0.2844	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.4600	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	30.9600	0.0700	2.1672	
E16 Corner (normal)	2.3700	0.0900	0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	18.5864	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.4904	28.3255	28.1639	27.4050	27.2630	26.6019	26.6019	26.4795	26.8566	27.2630	27.5502	27.8505	(38)
Heat transfer coeff	47.0768	46.9119	46.7504	45.9914	45.8494	45.1884	45.1884	45.0660	45.4430	45.8494	46.1367	46.4370	(39)
Average = Sum(39)m / 12 =												45.9907	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7593	0.7566	0.7540	0.7418	0.7395	0.7288	0.7288	0.7269	0.7330	0.7395	0.7441	0.7490	(40)
HLP (average)												0.7418	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)												55.6619	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414	(44)
Energy conte	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499	(45)
Energy content (annual)										Total = Sum(45)m =		924.4260	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
--------------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

If cylinder contains dedicated solar storage

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074	(62)

WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		785.7621	(64)
Electric shower(s)	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 531.8370 (64a)

Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656	(65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092	(68)

Full SAP Calculation Printout



Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
	371.1971	382.2948	365.6242	355.8056	338.0207	327.3660	315.2579	314.6802	323.9771	332.9947	351.7403	362.9947 (73)

6. Solar gains

[Jan]												Gains W
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	
Southeast					8.6000	36.7938	0.6300		0.7000		0.7700	96.7042 (77)
Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586 (83)
Total gains	467.9013	547.0178	591.0054	635.0639	650.8132	637.8966	614.6425	589.0468	568.0173	515.0488	467.5697	445.7533 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	103.0815	103.4437	103.8012	105.5142	105.8410	107.3892	107.3892	107.6809	106.7875	105.8410	105.1820	104.5017
alpha	7.8721	7.8962	7.9201	8.0343	8.0561	8.1593	8.1593	8.1787	8.1192	8.0561	8.0121	7.9668
util living area	0.9931	0.9771	0.9387	0.8224	0.6475	0.4530	0.3235	0.3519	0.5500	0.8523	0.9771	0.9950 (86)
MIT	20.4600	20.6290	20.7930	20.9424	20.9916	20.9996	21.0000	21.0000	20.9981	20.9362	20.6894	20.4335 (87)
Th 2	20.2887	20.2911	20.2933	20.3041	20.3061	20.3154	20.3154	20.3172	20.3118	20.3061	20.3020	20.2978 (88)
util rest of house	0.9909	0.9704	0.9226	0.7883	0.6020	0.4047	0.2732	0.2997	0.4961	0.8147	0.9692	0.9934 (89)
MIT 2	19.8032	19.9698	20.1259	20.2638	20.3014	20.3153	20.3154	20.3171	20.3110	20.2632	20.0394	19.7850 (90)
Living area fraction	20.0351	20.2025	20.3614	20.5034	20.5451	20.5569	20.5571	20.5582	20.5536	20.5008	20.2689	20.0139 (92)
MIT	20.0351	20.2025	20.3614	20.5034	20.5451	20.5569	20.5571	20.5582	20.5536	20.5008	20.2689	20.0139 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0351	20.2025	20.3614	20.5034	20.5451	20.5569	20.5571	20.5582	20.5536	20.5008	20.2689	20.0139 (93)

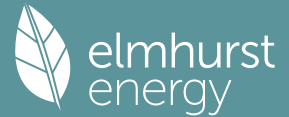
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9899	0.9695	0.9243	0.7985	0.6179	0.4218	0.2909	0.3181	0.5151	0.8259	0.9688	0.9926 (94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	740.7569	717.8702	648.0267	533.6564	405.5408	269.1812	178.8154	187.3943	293.2701	453.9480	607.5685	734.3517 (97)
Space heating kWh	206.5102	126.0424	75.7201	19.1388	2.5524	0.0000	0.0000	0.0000	0.0000	21.2622	111.3040	217.1875 (98a)
Space heating requirement - total per year (kWh/year)												779.7176
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	206.5102	126.0424	75.7201	19.1388	2.5524	0.0000	0.0000	0.0000	0.0000	21.2622	111.3040	217.1875 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												779.7176
Space heating per m ²										(98c) / (4) =		12.5761 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	424.7707	334.3940	342.5013	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9936	0.9984	0.9975	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	422.0381	333.8732	341.6574	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	704.9514	679.8443	651.8505	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	203.6975	257.4025	230.7837	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.9244	64.3506	57.6959	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												172.9709 (107)
Energy for space heating												12.5761 (99)
Energy for space cooling												2.7899 (108)
Total												15.3659 (109)
Fabric Energy Efficiency (TFEE)												15.4 (109)

Full SAP Calculation Printout



Property Reference	Plot 16			Issued on Date	27/08/2025
Assessment Reference	Plot 16	Prop Type Ref			
Property	Flat 16, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	91 B	DER	2.49	TER	9.20
Environmental	98 A	% DER < TER			72.93
CO ₂ Emissions (t/year)	0.15	DFEE	11.20	TFEE	15.37
Compliance Check	See BREL	% DFEE < TFEE			27.10
% DPER < TPER	44.67	DPER	26.66	TPER	48.18
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7800 (17)
Infiltration rate	0.1890 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1606 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2048	0.2008	0.1968	0.1767	0.1727	0.1526	0.1526	0.1486	0.1606	0.1727	0.1807	0.1888 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3448	0.3408	0.3368	0.3167	0.3127	0.2926	0.2926	0.2886	0.3006	0.3127	0.3207	0.3288 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
Total net area of external elements Aum(A, m ²)			36.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.0038		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			30.0000	1860.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16849.8796 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							271.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						4.7700	0.0340	0.1622				
E3 Sill						4.7700	0.0260	0.1240				
E4 Jamb						10.8200	0.0300	0.3246				
E18 Party wall between dwellings						4.7400	0.0290	0.1375				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						15.4600	0.0000	0.0000				
E7 Party floor between dwellings (in blocks of flats)						30.9600	-0.0180	-0.5573				
E16 Corner (normal)						2.3700	0.0490	0.1161				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											0.3071	(36)
Point Thermal Bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	12.3109 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.7208	16.5261	16.3313	15.3576	15.1628	14.1891	14.1891	13.9943	14.5786	15.1628	15.5523	15.9418 (38)
Average = Sum(39)m / 12 =	29.0317	28.8369	28.6422	27.6684	27.4737	26.5000	26.5000	26.3052	26.8895	27.4737	27.8632	28.2527 (39)
												27.6198
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.4683	0.4651	0.4620	0.4463	0.4431	0.4274	0.4274	0.4243	0.4337	0.4431	0.4494	0.4557 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31
												0.4455
												31
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m												2153.9058
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)												2471 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)												
	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains												
	430.7076	440.7252	420.5228	403.0119	380.5447	365.1370	349.6164	351.2521	363.3156	377.6397	403.9136	421.4465 (73)
6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	8.6000											58.4757 (77)
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	489.1834	540.3310	556.8078	571.8755	569.6861	552.9106	530.6502	517.1578	510.8834	487.7253	473.9540	471.4895 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	161.2211	162.3099	163.4135	169.1646	170.3637	176.6238	176.6238	177.9314	174.0653	170.3637	167.9822	165.6664	
alpha	11.7481	11.8207	11.8942	12.2776	12.3576	12.7749	12.7749	12.8621	12.6044	12.3576	12.1988	12.0444	
util living area	0.9174	0.8358	0.7399	0.5851	0.4485	0.3067	0.2197	0.2340	0.3632	0.5855	0.8035	0.9264	(86)
MIT	20.9340	20.9768	20.9939	20.9996	21.0000	21.0000	21.0000	21.0000	21.0000	20.9997	20.9881	20.9305	(87)
Th 2	20.5500	20.5529	20.5558	20.5703	20.5732	20.5878	20.5878	20.5907	20.5820	20.5732	20.5674	20.5616	(88)
util rest of house	0.9038	0.8172	0.7187	0.5644	0.4279	0.2870	0.1991	0.2132	0.3412	0.5616	0.7817	0.9139	(89)
MIT 2	20.4804	20.5298	20.5502	20.5700	20.5732	20.5878	20.5878	20.5907	20.5820	20.5730	20.5562	20.4878	(90)
Living area fraction										fLA = Living area / (4) =		0.3531	(91)
MIT	20.6405	20.6876	20.7069	20.7217	20.7239	20.7333	20.7333	20.7352	20.7296	20.7237	20.7087	20.6441	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.6405	20.6876	20.7069	20.7217	20.7239	20.7333	20.7333	20.7352	20.7296	20.7237	20.7087	20.6441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9066	0.8229	0.7260	0.5717	0.4352	0.2940	0.2064	0.2205	0.3489	0.5700	0.7889	0.9163	(94)
Useful gains	443.5173	444.6203	404.2412	326.9415	247.9152	162.5331	109.5332	114.0390	178.2651	278.0187	373.9179	432.0493	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	474.3936	455.2659	406.9158	327.0885	247.9200	162.5332	109.5332	114.0390	178.2653	278.1345	379.1823	464.5897	(97)
Space heating kWh	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(98a)
Space heating requirement - total per year (kWh/year)												60.3116	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												60.3116	
Space heating per m2										(98c) / (4) =		0.9728	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	22.9720	7.1538	1.9899	0.1059	0.0036	0.0000	0.0000	0.0000	0.0000	0.0861	3.7904	24.2100	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												60.3116	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)
Total electricity for the above, kWh/year													150.5841 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1082.6948	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	60.3116	0.1615	9.7394	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(263)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			112.3528	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	145.1281	0.1443	20.9465	(268)
Total CO2, kg/year			154.1871	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.4900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	60.3116	1.5976	96.3523	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(277)
Water heating (other fuel)	726.6710	1.5222	1106.1095	(278)
Space and water heating			1202.4618	(279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036	(281)
Energy for lighting	145.1281	1.5338	222.6023	(282)
Total Primary energy kWh/year			1652.8678	(286)
Dwelling Primary energy Rate (DPER)			26.6600	(287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.0000	2.3700	146.9400	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000			(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour	
Pressure test	20.0000 / (5) =	0.1361 (8)
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate	5.0000	(17)
Number of sides sheltered	0.3861	(18)
	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3282 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4184	0.4102	0.4020	0.3610	0.3528	0.3118	0.3118	0.3036	0.3282	0.3528	0.3692	0.3856	(22b)
Effective ac	0.5875	0.5841	0.5808	0.5652	0.5622	0.5486	0.5486	0.5461	0.5539	0.5622	0.5682	0.5744	(25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
TER Opening Type			8.6000	1.1450	9.8473		(27)
External Wall	36.6900	8.6000	28.0900	0.1800	5.0562		(29a)
Total net area of external elements Aum(A, m ²)			36.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.9035		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000		(32)
Party Wall			18.3200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 281.7723 (35)

List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0500	0.2385	
E3 Sill				4.7700	0.0500	0.2385	
E4 Jamb				10.8200	0.0500	0.5410	
E18 Party wall between dwellings				4.7400	0.0600	0.2844	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				15.4600	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)				30.9600	0.0700	2.1672	
E16 Corner (normal)				2.3700	0.0900	0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.6829 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 18.5864 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	28.4904	28.3255	28.1639	27.4050	27.2630	26.6019	26.6019	26.4795	26.8566	27.2630	27.5502	27.8505
Average = Sum(39)m / 12 =	47.0768	46.9119	46.7504	45.9914	45.8494	45.1884	45.1884	45.0660	45.4430	45.8494	46.1367	46.4370

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7593	0.7566	0.7540	0.7418	0.7395	0.7288	0.7288	0.7269	0.7330	0.7395	0.7441	0.7490
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0376 (42)

Hot water usage for mixer showers 58.3831 57.5057 56.2272 53.7810 51.9757 49.9625 48.8182 50.0871 51.4780 53.6395 56.1383 58.1594 (42a)

Hot water usage for baths 25.2299 24.8552 24.3275 23.3546 22.6261 21.8183 21.3820 21.9060 22.4765 23.3408 24.3338 25.1446 (42b)

Hot water usage for other uses 35.4969 34.2061 32.9153 31.6245 30.3337 29.0429 29.0429 30.3337 31.6245 32.9153 34.2061 35.4969 (42c)

Average daily hot water use (litres/day) 109.4892 (43)

Daily hot water use 119.1099 116.5670 113.4700 108.7601 104.9355 100.8238 99.2431 102.3267 105.5789 109.8956 114.6781 118.8009 (44)

Energy conte 188.6409 165.9898 174.3992 148.8871 141.2634 123.9746 120.0260 126.7019 130.1894 149.1274 163.3800 186.0135 (45)

Energy content (annual) Total = Sum(45)m = 1818.5931

Distribution loss (46)m = 0.15 x (45)m 28.2961 24.8985 26.1599 22.3331 21.1895 18.5962 18.0039 19.0053 19.5284 22.3691 24.5070 27.9020 (46)

Water storage loss: 150.0000 (47)

Store volume 1.3938 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 0.7527 (55)

Enter (49) or (54) in (55) 0.7527 (55)

Total storage loss 23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (56)

If cylinder contains dedicated solar storage 23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (57)

Primary loss 23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month 235.2358 208.0755 220.9941 193.9790 187.8583 169.0664 166.6209 173.2968 175.2812 195.7223 208.4719 232.6084 (62)

WWHRS -26.6903 -23.6051 -24.7179 -20.4674 -19.0749 -16.3225 -15.2998 -16.2698 -16.8879 -19.9090 -22.5545 -26.1961 (63a)

PV diverter -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 (63b)

Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)

Output from w/h 208.5455 184.4704 196.2761 173.5115 168.7834 152.7439 151.3211 157.0270 158.3933 175.8133 185.9174 206.4123 (64)

12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 2119.2152 (64)

Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 99.9990 88.8602 95.2636 85.5784 84.2460 77.2950 77.1846 79.4043 79.3614 86.8608 90.3973 99.1254 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

(66)m 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 101.8790 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 96.4916 106.8300 96.4916 99.7080 96.4916 96.4916 99.7080 96.4916 99.7080 96.4916 99.7080 96.4916 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 177.9613 179.8080 175.1544 165.2475 152.7418 140.9882 133.1361 131.2894 135.9430 145.8499 158.3556 170.1092 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 33.1879 (69)

Pumps, fans 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 (70)

Losses e.g. evaporation (negative values) (Table 5) -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 -81.5032 (71)

Water heating gains (Table 5) 134.4073 132.2324 128.0425 118.8589 113.2339 107.3542 103.7427 106.7262 110.2242 116.7483 125.5519 133.2331 (72)

Total internal gains 465.4239 475.4341 456.2523 440.3782 419.0310 401.6141 386.9341 388.0709 399.4389 415.6535 440.1792 456.3976 (73)

6. Solar gains

Full SAP Calculation Printout



[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
Southeast				8.6000	36.7938		0.6300		0.7000	0.7700	96.7042 (77)	
Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586 (83)
Total gains	562.1281	640.1571	681.6335	719.6364	731.8235	712.1447	686.3187	662.4375	643.4791	597.7076	556.0085	539.1562 (84)

7. Mean internal temperature (heating season)												

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	103.0815	103.4437	103.8012	105.5142	105.8410	107.3892	107.3892	107.6809	106.7875	105.8410	105.1820	104.5017
alpha	7.8721	7.8962	7.9201	8.0343	8.0561	8.1593	8.1593	8.1787	8.1192	8.0561	8.0121	7.9668
util living area												
	0.9786	0.9464	0.8854	0.7487	0.5795	0.4060	0.2897	0.3129	0.4866	0.7678	0.9414	0.9831 (86)
MIT	20.6034	20.7489	20.8750	20.9701	20.9961	20.9998	21.0000	21.0000	20.9992	20.9698	20.8015	20.5791 (87)
Th 2	20.2887	20.2911	20.2933	20.3041	20.3061	20.3154	20.3154	20.3172	20.3118	20.3061	20.3020	20.2978 (88)
util rest of house												
	0.9725	0.9333	0.8617	0.7123	0.5375	0.3626	0.2446	0.2665	0.4384	0.7256	0.9251	0.9782 (89)
MIT 2	19.8447	20.0224	20.1694	20.2784	20.3033	20.3153	20.3154	20.3172	20.3114	20.2815	20.0973	19.8224 (90)
Living area fraction												
									fLA = Living area / (4) =			0.3531 (91)
MIT	20.1126	20.2789	20.4185	20.5226	20.5479	20.5570	20.5571	20.5582	20.5542	20.5245	20.3459	20.0896 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1126	20.2789	20.4185	20.5226	20.5479	20.5570	20.5571	20.5582	20.5542	20.5245	20.3459	20.0896 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9707	0.9330	0.8662	0.7240	0.5522	0.3779	0.2605	0.2829	0.4554	0.7392	0.9262	0.9765 (94)
Useful gains	545.6811	597.2962	590.4314	521.0059	404.1054	269.1273	178.8134	187.3905	293.0287	441.8482	514.9945	526.4722 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
	744.4044	721.4544	650.6958	534.5397	405.6724	269.1871	178.8157	187.3949	293.2997	455.0332	611.1215	737.8647 (97)
Space heating kWh												
	147.8501	83.4343	44.8367	9.7444	1.1658	0.0000	0.0000	0.0000	0.0000	9.8097	69.2115	157.2760 (98a)
Space heating requirement - total per year (kWh/year)												523.3285
Solar heating kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh												
	147.8501	83.4343	44.8367	9.7444	1.1658	0.0000	0.0000	0.0000	0.0000	9.8097	69.2115	157.2760 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												523.3285
Space heating per m2										(98c) / (4) =		8.4408 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP												

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement												
	147.8501	83.4343	44.8367	9.7444	1.1658	0.0000	0.0000	0.0000	0.0000	9.8097	69.2115	157.2760 (98)
Space heating efficiency (main heating system 1)												
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)												
	160.1843	90.3947	48.5771	10.5573	1.2631	0.0000	0.0000	0.0000	0.0000	10.6280	74.9853	170.3966 (211)
Space heating efficiency (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement												
	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Efficiency of water heater												
(217)m	83.3025	82.4009	81.3329	80.2324	79.8555	79.8000	79.8000	79.8000	79.8000	80.2297	82.0561	79.8000 (216)
Fuel for water heating, kWh/month												
	250.3472	223.8694	241.3245	216.2612	211.3610	191.4084	189.6254	196.7757	198.4878	219.1373	226.5735	247.3251 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-9.0502	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												566.9864 (211)
Space heating fuel - main system 2												0.0000 (213)

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2612.4965 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	161.8073 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2405.7885 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	566.9864	0.2100	119.0672 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2612.4965	0.2100	548.6243 (264)
Space and water heating			667.6914 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	161.8073	0.1443	23.3538 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	0.1339	-66.4499
PV Unit electricity exported	-525.1326	0.1255	-65.9198
Total			-132.3697 (269)
Total CO2, kg/year			570.6048 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	566.9864	1.1300	640.6947 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2612.4965	1.1300	2952.1211 (278)
Space and water heating			3592.8158 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			2987.2033 (286)
Target Primary Energy Rate (TPER)			48.1800 (287)

Full SAP Calculation Printout



Property Reference	Plot 16	Issued on Date	27/08/2025
Assessment Reference	Plot 16	Prop Type Ref	
Property	Flat 16, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	91 B	DER	2.49
Environmental	98 A	% DER < TER	72.93
CO ₂ Emissions (t/year)	0.15	DFEE	11.20
Compliance Check	See BREL	% DFEE < TFEE	27.10
% DPER < TPER	44.67	DPER	26.66
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7800 (17)
Infiltration rate	0.1890 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1606 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2048	0.2008	0.1968	0.1767	0.1727	0.1526	0.1526	0.1486	0.1606	0.1727	0.1807	0.1888 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3448	0.3408	0.3368	0.3167	0.3127	0.2926	0.2926	0.2886	0.3006	0.3127	0.3207	0.3288 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
Total net area of external elements Aum(A, m ²)			36.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.0038		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1			62.0000			40.0000	2480.0000 (32b)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17469.8796 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							281.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622	
E3 Sill	4.7700	0.0260	0.1240	
E4 Jamb	10.8200	0.0300	0.3246	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.4600	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	30.9600	-0.0180	-0.5573	
E16 Corner (normal)	2.3700	0.0490	0.1161	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.3071	(36)
Point Thermal bridges			0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	12.3109	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.7208	16.5261	16.3313	15.3576	15.1628	14.1891	14.1891	13.9943	14.5786	15.1628	15.5523	15.9418 (38)
Average = Sum(39)m / 12 =	29.0317	28.8369	28.6422	27.6684	27.4737	26.5000	26.5000	26.3052	26.8895	27.4737	27.8632	28.2527 (39)
												27.6198
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.4683	0.4651	0.4620	0.4463	0.4431	0.4274	0.4274	0.4243	0.4337	0.4431	0.4494	0.4557 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	(42a)
Hot water usage for baths													
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses													
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)													129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)
Energy content	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Energy content (annual)										Total = Sum(45)m =		2153.9058	
Distribution loss (46)m = 0.15 x (45)m													
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains

[Jan]													
	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	W/m2	Specific data	factor	W							
				or Table 6b	Table 6c								
Southeast	8.6000	36.7938	0.2400	0.0000	0.7700	58.4757 (77)							
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)	
Total gains	534.4501	573.5623	594.9874	598.2578	590.3849	563.1996	540.9554	528.8506	524.9630	513.6023	505.5145	513.4598 (84)	

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	167.1533	168.2822	169.4264	175.3891	176.6324	183.1227	183.1227	184.4785	180.4702	176.6324	174.1632	171.7622
alpha	12.1436	12.2188	12.2951	12.6926	12.7755	13.2082	13.2082	13.2986	13.0313	12.7755	12.6109	12.4508
util living area	0.8714	0.7970	0.6955	0.5594	0.4328	0.3011	0.2155	0.2288	0.3534	0.5562	0.7597	0.8842 (86)
MIT	20.9662	20.9874	20.9973	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9943	20.9633 (87)
Th 2	20.5500	20.5529	20.5558	20.5703	20.5732	20.5878	20.5878	20.5907	20.5820	20.5732	20.5674	20.5616 (88)
util rest of house	0.8545	0.7776	0.6748	0.5396	0.4129	0.2817	0.1954	0.2084	0.3320	0.5334	0.7378	0.8682 (89)
MIT 2	20.5157	20.5407	20.5534	20.5702	20.5732	20.5878	20.5878	20.5907	20.5820	20.5731	20.5622	20.5241 (90)
Living area fraction									fLA = Living area / (4) =			0.3531 (91)
MIT	20.6748	20.6984	20.7101	20.7219	20.7239	20.7333	20.7333	20.7352	20.7296	20.7238	20.7147	20.6792 (92)
Temperature adjustment												0.0000
adjusted MIT	20.6748	20.6984	20.7101	20.7219	20.7239	20.7333	20.7333	20.7352	20.7296	20.7238	20.7147	20.6792 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8593	0.7840	0.6820	0.5466	0.4199	0.2886	0.2025	0.2156	0.3396	0.5414	0.7453	0.8726 (94)
Useful gains	459.2541	449.6770	405.7938	327.0236	247.9180	162.5331	109.5332	114.0390	178.2653	278.0880	376.7645	448.0485 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	475.3872	455.5776	407.0086	327.0932	247.9202	162.5332	109.5332	114.0390	178.2654	278.1384	379.3501	465.5809 (97)
Space heating kWh	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441 (98a)
Space heating requirement - total per year (kWh/year)												31.8671
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												31.8671
Space heating per m2										(98c) / (4) =		0.5140 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater												340.0764 (216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												31.8671 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764
Water heating fuel used												726.6710 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												150.5841 (230a)
Total electricity for the above, kWh/year												150.5841 (231)
Electricity for lighting (calculated in Appendix L)												145.1281 (232)

Full SAP Calculation Printout



Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1054.2503 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	31.8671	16.4900	5.2549 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	16.4900	119.8280 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313 (249)
Energy for lighting	145.1281	16.4900	23.9316 (250)
Additional standing charges			0.0000 (251)
Total energy cost			173.8459 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.5849 (257)
SAP value		90.5187
SAP rating (Section 12)		91 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	31.8671	0.1616	5.1490 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			107.7624 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			149.5967 (272)
CO2 emissions per m2			2.4100 (273)
EI value			98.1265
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7800 (17)
Infiltration rate	0.1890 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1606 (21)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1727	0.1687	0.1727	0.1566	0.1606	0.1366	0.1325	0.1325	0.1366	0.1526	0.1526	0.1566	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3127	0.3087	0.3127	0.2966	0.3006	0.2766	0.2725	0.2725	0.2766	0.2926	0.2926	0.2966	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
Window			8.6000	0.7752	6.6667			(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998	(29a)
Total net area of external elements Aum(A, m ²)			36.6900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.0038			(33)
Main dwelling								
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999	(32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999	(32)
Party Floor 1			62.0000			40.0000	2480.0000	(32d)
Party Ceiling 1			62.0000			40.0000	2480.0000	(32b)
Internal Wall 1			96.0200			9.0000	864.1800	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 17469.8796 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								281.7723 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340		0.1622	
E3 Sill				4.7700	0.0260		0.1240	
E4 Jamb				10.8200	0.0300		0.3246	
E18 Party wall between dwellings				4.7400	0.0290		0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				15.4600	0.0000		0.0000	
E7 Party floor between dwellings (in blocks of flats)				30.9600	-0.0180		-0.5573	
E16 Corner (normal)				2.3700	0.0490		0.1161	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								0.3071 (36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	12.3109 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	15.1628	14.9681	15.1628	14.3838	14.5786	13.4101	13.2153	13.2153	13.4101	14.1891	14.1891	14.3838	(38)
Average = Sum(39)m / 12 =	27.4737	27.2790	27.4737	26.6947	26.8895	25.7210	25.5262	25.5262	25.7210	26.5000	26.5000	26.6947	(39)
												26.5000	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.4431	0.4400	0.4431	0.4306	0.4337	0.4149	0.4117	0.4117	0.4149	0.4274	0.4274	0.4306	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	(42a)
Hot water usage for baths													
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses													
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)													129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Energy content (annual)													Total = Sum(45)m = 2153.9058
Distribution loss (46)m = 0.15 x (45)m													
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040	(65)

5. Internal gains (see Table 5 and 5a)

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924	(72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168	(73)

6. Solar gains

[Jan]														
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	8.6000				32.4665		0.2400		0.0000		0.7700		51.5984 (77)	
Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405	(83)	
Total gains	527.5728	564.1154	587.6009	592.3479	579.3292	556.4463	530.2314	518.0483	520.8185	510.0085	498.9869	510.9573	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	176.6324	177.8934	176.6324	181.7868	180.4702	188.6689	190.1083	190.1083	188.6689	183.1227	183.1227	181.7868		
alpha	12.7755	12.8596	12.7755	13.1191	13.0313	13.5779	13.6739	13.6739	13.5779	13.2082	13.2082	13.1191		
util living area	0.8142	0.7358	0.6444	0.5047	0.3806	0.2496	0.1829	0.1971	0.3161	0.5092	0.6991	0.8260	(86)	
MIT	20.9870	20.9959	20.9991	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9983	20.9862	(87)	
Th 2	20.5732	20.5761	20.5732	20.5849	20.5820	20.5995	20.6024	20.6024	20.5995	20.5878	20.5878	20.5849	(88)	
util rest of house	0.7953	0.7164	0.6247	0.4860	0.3612	0.2311	0.1638	0.1775	0.2963	0.4878	0.6778	0.8079	(89)	
MIT 2	20.5607	20.5723	20.5725	20.5849	20.5820	20.5995	20.6024	20.6024	20.5995	20.5878	20.5863	20.5714	(90)	
Living area fraction	20.7112	20.7219	20.7231	20.7314	20.7296	20.7409	20.7428	20.7428	20.7409	20.7333	20.7318	20.7178	(92)	
MIT	20.7112	20.7219	20.7231	20.7314	20.7296	20.7409	20.7428	20.7428	20.7409	20.7333	20.7318	20.7178	(93)	
Temperature adjustment												0.0000		
adjusted MIT	20.7112	20.7219	20.7231	20.7314	20.7296	20.7409	20.7428	20.7428	20.7409	20.7333	20.7318	20.7178		

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.8015	0.7231	0.6316	0.4926	0.3680	0.2376	0.1706	0.1844	0.3033	0.4953	0.6853	0.8138	(94)
Useful gains	422.8550	407.9206	371.1378	291.7974	213.2213	132.2287	90.4339	95.5392	157.9497	252.6204	341.9368	415.8086	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	428.8973	409.7816	371.5294	291.8111	213.2216	132.2287	90.4339	95.5392	157.9497	252.6323	342.6909	422.2528	(97)
Space heating kWh	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(98a)
Space heating requirement - total per year (kWh/year)												11.3938	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												11.3938	
Space heating per m2										(98c) / (4) =		0.1838	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2												0.0000	(213)	
Water heating														
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)	
Efficiency of water heater												340.0764	(216)	

Full SAP Calculation Printout



(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.3768	12.7893	12.3768	12.7893	12.3768	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												11.3938	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												150.5841	(230a)
Total electricity for the above, kWh/year												150.5841	(231)
Electricity for lighting (calculated in Appendix L)												145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1033.7771	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	11.3938	28.4300	3.2393 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	28.4300	206.5926 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111 (249)
Energy for lighting	145.1281	28.4300	41.2599 (250)
Additional standing charges			0.0000 (251)
Total energy cost			293.9028 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	11.3938	0.1618	1.8436 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			104.4570 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			146.2913 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	11.3938	1.5987	18.2158 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1124.3253 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			1574.7313 (286)

SAP 10 EPC IMPROVEMENTS

Plot 16

Current energy efficiency rating: B 91
Current environmental impact rating: A 98

N Solar water heating

Not applicable

Full SAP Calculation Printout



U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 91
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £294	Potential £294	Saving £0
Space heating	£46	£46	£0
Water heating	£207	£207	£0
Lighting	£41	£41	£0
Total cost of fuels	£294	£294	£0
Total cost of uses	£294	£294	£0
Delivered energy	17 kWh/m²	17 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	2 kg/m²	2 kg/m²	0 kg/m²
Primary energy	25 kWh/m²	25 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7800 (17)
Infiltration rate	0.1890 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1606 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2048	0.2008	0.1968	0.1767	0.1727	0.1526	0.1526	0.1486	0.1606	0.1727	0.1807	0.1888 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												72.0000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3448	0.3408	0.3368	0.3167	0.3127	0.2926	0.2926	0.2886	0.3006	0.3127	0.3207	0.3288 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
Total net area of external elements Aum(A, m2)			36.6900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	12.0038	(33)

Full SAP Calculation Printout



Main dwelling					
Corridor	22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall	18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1	62.0000			40.0000	2480.0000 (32d)
Party Ceiling 1	62.0000			40.0000	2480.0000 (32b)
Internal Wall 1	96.0200			9.0000	864.1800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
(28)...(30) + (32) + (32a)...(32e) = 17469.8796 (34)
281.7723 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E18 Party wall between dwellings	4.7400	0.0290	0.1375
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.4600	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	30.9600	-0.0180	-0.5573
E16 Corner (normal)	2.3700	0.0490	0.1161

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss
(33) + (36) + (36a) = 12.3109 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m
Heat transfer coeff
Average = Sum(39)m / 12 =

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.4683	0.4651	0.4620	0.4463	0.4431	0.4274	0.4274	0.4243	0.4337	0.4431	0.4494	0.4557 (40)
HLP (average)												0.4455
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													129.6745 (43)
Daily hot water use													
Energy conte													
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS													
PV diverter													
Solar input													
FGHRS													
Output from w/h													
Electric shower(s)													
Heat gains from water heating, kWh/month													

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m													
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
Pumps, fans													
Losses e.g. evaporation (negative values) (Table 5)													
Water heating gains (Table 5)													
Total internal gains													

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
-------	------------	------------------------	--------------------	---------------------	------------------	------------

Full SAP Calculation Printout



				W/m2		or Table 6b		or Table 6c		Table 6d			
Southeast		8.6000		36.7938		0.2400		0.0000		0.7700		58.4757 (77)	
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430	(83)
Total gains	534.4501	573.5623	594.9874	598.2578	590.3849	563.1996	540.9554	528.8506	524.9630	513.6023	505.5145	513.4598	(84)
7. Mean internal temperature (heating season)													
Temperature during heating periods in the living area from Table 9, Th1 (C)													
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	167.1533	168.2822	169.4264	175.3891	176.6324	183.1227	183.1227	184.4785	180.4702	176.6324	174.1632	171.7622	
alpha	12.1436	12.2188	12.2951	12.6926	12.7755	13.2082	13.2082	13.2986	13.0313	12.7755	12.6109	12.4508	
util living area	0.8714	0.7970	0.6955	0.5594	0.4328	0.3011	0.2155	0.2288	0.3534	0.5562	0.7597	0.8842	(86)
MIT	20.9662	20.9874	20.9973	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9943	20.9633	(87)
Th 2	20.5500	20.5529	20.5558	20.5703	20.5732	20.5878	20.5878	20.5907	20.5820	20.5732	20.5674	20.5616	(88)
util rest of house	0.8545	0.7776	0.6748	0.5396	0.4129	0.2817	0.1954	0.2084	0.3320	0.5334	0.7378	0.8682	(89)
MIT 2	20.5157	20.5407	20.5534	20.5702	20.5732	20.5878	20.5878	20.5907	20.5820	20.5731	20.5622	20.5241	(90)
Living area fraction	20.6748	20.6984	20.7101	20.7219	20.7239	20.7333	20.7333	20.7352	fLA = Living area / (4) =			0.3531	(91)
MIT	20.6748	20.6984	20.7101	20.7219	20.7239	20.7333	20.7333	20.7352	20.7296	20.7238	20.7147	20.6792	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.6748	20.6984	20.7101	20.7219	20.7239	20.7333	20.7333	20.7352	20.7296	20.7238	20.7147	20.6792	(93)
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8593	0.7840	0.6820	0.5466	0.4199	0.2886	0.2025	0.2156	0.3396	0.5414	0.7453	0.8726	(94)
Useful gains	459.2541	449.6770	405.7938	327.0236	247.9180	162.5331	109.5332	114.0390	178.2653	278.0880	376.7645	448.0485	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	475.3872	455.5776	407.0086	327.0932	247.9202	162.5332	109.5332	114.0390	178.2654	278.1384	379.3501	465.5809	(97)
Space heating kWh	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441	(98a)
Space heating requirement - total per year (kWh/year)												31.8671	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												31.8671	
Space heating per m2										(98c) / (4) =		0.5140	(99)
9a. Energy requirements - Individual heating systems, including micro-CHP													
Fraction of space heat from secondary/supplementary system (Table 11)													
Fraction of space heat from main system(s)													
Fraction of main heating from main system 2													
Fraction of total heating from main system 1													
Fraction of total heating from main system 2													
Efficiency of main space heating system 1 (in %)													
Efficiency of main space heating system 2 (in %)													
Efficiency of secondary/supplementary heating system, %													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	12.0030	3.9652	0.9038	0.0501	0.0016	0.0000	0.0000	0.0000	0.0000	0.0375	1.8616	13.0441	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement													
Efficiency of water heater	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													
31.8671 (211)													

Full SAP Calculation Printout



Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	340.0764	
Water heating fuel used	726.6710	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	150.5841	(230a)
Total electricity for the above, kWh/year	150.5841	(231)
Electricity for lighting (calculated in Appendix L)	145.1281	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1054.2503	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	31.8671	16.4900	5.2549 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	16.4900	119.8280 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313 (249)
Energy for lighting	145.1281	16.4900	23.9316 (250)
Additional standing charges			0.0000 (251)
Total energy cost			173.8459 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.5849 (257)
SAP value		90.5187
SAP rating (Section 12)		91 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	31.8671	0.1616	5.1490 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			107.7624 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			149.5967 (272)
CO2 emissions per m2			2.4100 (273)
EI value			98.1265
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											
Pressure test	0.0000 / (5) =											
Pressure Test Method	Yes											
Measured/design AP50	Blower Door											
Infiltration rate	3.7800 (17)											
Number of sides sheltered	0.1890 (18)											
	2 (19)											
Shelter factor	(20) = 1 - [0.075 x (19)] =											
Infiltration rate adjusted to include shelter factor	0.8500 (20)											
	(21) = (18) x (20) =											
	0.1606 (21)											
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
	0.1727	0.1687	0.1727	0.1566	0.1606	0.1366	0.1325	0.1325	0.1366	0.1526	0.1526	0.1566
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23a)											
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.5000 (23b)											
	72.0000 (23c)											
Effective ac	0.3127	0.3087	0.3127	0.2966	0.3006	0.2766	0.2725	0.2725	0.2766	0.2926	0.2926	0.2966
	(25)											

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
Window			8.6000	0.7752	6.6667			(27)					
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998	(29a)					
Total net area of external elements Aum(A, m2)			36.6900					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.0038			(33)					
Main dwelling													
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999	(32)					
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999	(32)					
Party Floor 1			62.0000			40.0000	2480.0000	(32d)					
Party Ceiling 1			62.0000			40.0000	2480.0000	(32b)					
Internal Wall 1			96.0200			9.0000	864.1800	(32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		17469.8796	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							281.7723	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622							
E3 Sill				4.7700	0.0260	0.1240							
E4 Jamb				10.8200	0.0300	0.3246							
E18 Party wall between dwellings				4.7400	0.0290	0.1375							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				15.4600	0.0000	0.0000							
E7 Party floor between dwellings (in blocks of flats)				30.9600	-0.0180	-0.5573							
E16 Corner (normal)				2.3700	0.0490	0.1161							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							0.3071	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	12.3109	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 15.1628	Feb 14.9681	Mar 15.1628	Apr 14.3838	May 14.5786	Jun 13.4101	Jul 13.2153	Aug 13.2153	Sep 13.4101	Oct 14.1891	Nov 14.1891	Dec 14.3838	(38)
Heat transfer coeff	27.4737	27.2790	27.4737	26.6947	26.8895	25.7210	25.5262	25.5262	25.7210	26.5000	26.5000	26.6947	(39)
Average = Sum(39)m / 12 =												26.5000	
HLP	Jan 0.4431	Feb 0.4400	Mar 0.4431	Apr 0.4306	May 0.4337	Jun 0.4149	Jul 0.4117	Aug 0.4117	Sep 0.4149	Oct 0.4274	Nov 0.4274	Dec 0.4306	(40)
HLP (average)												0.4274	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.0376 (42)											
Hot water usage for mixer showers												
Hot water usage for baths	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692
Hot water usage for other uses	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446
Average daily hot water use (litres/day)	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969
	129.6745 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243
Water storage loss:												
Store volume	201.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.8694 (55)											
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137
Total per year (kWh/year) = Sum(64)m =	2471.2368 (64)											

Full SAP Calculation Printout



Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924	(72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168	(73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d		Gains W
<hr/>												
Southeast				8.6000	32.4665	0.2400	0.0000			0.7700		51.5984 (77)
<hr/>												
Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405 (83)
Total gains	527.5728	564.1154	587.6009	592.3479	579.3292	556.4463	530.2314	518.0483	520.8185	510.0085	498.9869	510.9573 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	176.6324	177.8934	176.6324	181.7868	180.4702	188.6689	190.1083	190.1083	188.6689	183.1227	183.1227	181.7868	
alpha	12.7755	12.8596	12.7755	13.1191	13.0313	13.5779	13.6739	13.6739	13.5779	13.2082	13.2082	13.1191	
util living area	0.8142	0.7358	0.6444	0.5047	0.3806	0.2496	0.1829	0.1971	0.3161	0.5092	0.6991	0.8260	(86)
MIT	20.9870	20.9959	20.9991	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9983	20.9862	(87)
Th 2	20.5732	20.5761	20.5732	20.5849	20.5820	20.5995	20.6024	20.6024	20.5995	20.5878	20.5878	20.5849	(88)
util rest of house	0.7953	0.7164	0.6247	0.4860	0.3612	0.2311	0.1638	0.1775	0.2963	0.4878	0.6778	0.8079	(89)
MIT 2	20.5607	20.5723	20.5725	20.5849	20.5820	20.5995	20.6024	20.6024	20.5995	20.5878	20.5863	20.5714	(90)
Living area fraction	20.7112	20.7219	20.7231	20.7314	20.7296	20.7409	20.7428	20.7428	20.7409	20.7333	20.7318	20.7178	(92)
MIT	20.7112	20.7219	20.7231	20.7314	20.7296	20.7409	20.7428	20.7428	20.7409	20.7333	20.7318	20.7178	(93)
Temperature adjustment												0.0000	
adjusted MIT	20.7112	20.7219	20.7231	20.7314	20.7296	20.7409	20.7428	20.7428	20.7409	20.7333	20.7318	20.7178	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8015	0.7231	0.6316	0.4926	0.3680	0.2376	0.1706	0.1844	0.3033	0.4953	0.6853	0.8138	(94)
Useful gains	422.8550	407.9206	371.1378	291.7974	213.2213	132.2287	90.4339	95.5392	157.9497	252.6204	341.9368	415.8086	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	428.8973	409.7816	371.5294	291.8111	213.2216	132.2287	90.4339	95.5392	157.9497	252.6323	342.6909	422.2528	(97)
Space heating kWh	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(98a)
Space heating requirement - total per year (kWh/year)												11.3938	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												11.3938	
Space heating per m ²										(98c) / (4) =		0.1838	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	4.4955	1.2506	0.2913	0.0099	0.0002	0.0000	0.0000	0.0000	0.0000	0.0089	0.5430	4.7945	(211)
Space heating efficiency (main heating system 2)													

Full SAP Calculation Printout



Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													(213)
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater													(216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												11.3938	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												150.5841	(230a)
Total electricity for the above, kWh/year												150.5841	(231)
Electricity for lighting (calculated in Appendix L)												145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1033.7771	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	11.3938	28.4300	3.2393 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	28.4300	206.5926 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111 (249)
Energy for lighting	145.1281	28.4300	41.2599 (250)
Additional standing charges			0.0000 (251)
Total energy cost			293.9028 (255)

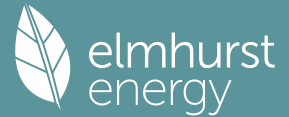
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	11.3938	0.1618	1.8436 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			104.4570 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			146.2913 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	11.3938	1.5987	18.2158 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1124.3253 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			1574.7313 (286)

Full SAP Calculation Printout



Property Reference	Plot 17			Issued on Date	27/08/2025
Assessment Reference	Plot 17	Prop Type Ref			
Property	Flat 17, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	4.06	TER	12.81
Environmental	97 A	% DER < TER			68.31
CO ₂ Emissions (t/year)	0.17	DFEE	24.92	TFEE	27.05
Compliance Check	See BREL	% DFEE < TFEE			7.85
% DPER < TPER	37.11	DPER	42.67	TPER	67.84
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling				
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(4)
Dwelling volume			118.5000 (5)	(3a)+(3b)+(3c)+(3d)+(3e)...(3n)

2. Ventilation rate

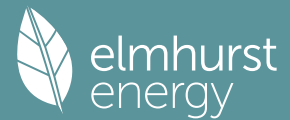
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.2000	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1550 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.3376	0.3338	0.3299	0.3105	0.3066	0.2873	0.2873	0.2834	0.2950	0.3066	0.3144	0.3221	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements A _{um} (A, m ²)			83.4900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	15.8567			(33)
Main dwelling								
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999	(32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall			71.1200			9.0000	640.0800	(32c)
Heat capacity C _m = Sum(A x k)								
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							13242.6802	(34)
List of Thermal Bridges							264.8536	(35)
K1 Element				Length	Psi-value		Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543	
E16 Corner (normal)	2.3700	0.0490	0.1161	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000	
E14 Flat roof	14.1300	0.1600	2.2608	
P4 Party wall - Roof (insulation at ceiling level)	14.1200	0.1280	1.8074	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.4838 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 20.3405 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.2028	13.0513	12.8998	12.1421	11.9906	11.2329	11.2329	11.0814	11.5360	11.9906	12.2936	12.5967 (38)
Average = Sum(39)m / 12 =	33.5433	33.3918	33.2403	32.4826	32.3311	31.5734	31.5734	31.4219	31.8765	32.3311	32.6342	32.9372 (39)
												32.4447
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6709	0.6678	0.6648	0.6497	0.6466	0.6315	0.6315	0.6284	0.6375	0.6466	0.6527	0.6587 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.6489
												31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
												2256.2377 (64)
12Total per year (kWh/year)												2256.2377 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
			Area	Solar flux	g	FF	Access	Gains				
			m2	Table 6a	Specific data	Specific data	factor	W				
				W/m2	or Table 6b	or Table 6c	Table 6d					
Northwest			5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)				
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	109.6648	110.1624	110.6646	113.2459	113.7766	116.5069	116.5069	117.0688	115.3992	113.7766	112.7200	111.6829
alpha	8.3110	8.3442	8.3776	8.5497	8.5851	8.7671	8.7671	8.8046	8.6933	8.5851	8.5147	8.4455
util living area	0.9862	0.9753	0.9525	0.8617	0.6923	0.4792	0.3463	0.3780	0.5945	0.8684	0.9658	0.9881 (86)
MIT	20.5920	20.6794	20.7892	20.9325	20.9899	20.9996	21.0000	21.0000	20.9977	20.9391	20.7695	20.5858 (87)
Th 2	20.3666	20.3693	20.3720	20.3855	20.3882	20.4018	20.4018	20.4045	20.3963	20.3882	20.3828	20.3774 (88)
util rest of house	0.9824	0.9688	0.9402	0.8335	0.6504	0.4346	0.2992	0.3290	0.5437	0.8360	0.9558	0.9848 (89)
MIT 2	19.8998	20.0107	20.1470	20.3221	20.3806	20.4016	20.4018	20.4045	20.3950	20.3337	20.1345	19.9012 (90)
Living area fraction									fLA = Living area / (4) =			0.4692 (91)
MIT	20.2246	20.3244	20.4483	20.6085	20.6665	20.6822	20.6824	20.6839	20.6778	20.6177	20.4325	20.2224 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2246	20.3244	20.4483	20.6085	20.6665	20.6822	20.6824	20.6839	20.6778	20.6177	20.4325	20.2224 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9814	0.9682	0.9418	0.8442	0.6697	0.4555	0.3213	0.3520	0.5675	0.8487	0.9567	0.9838 (94)
Useful gains	375.7053	391.2914	383.3846	355.5642	286.5086	191.9284	128.8925	134.5984	208.9992	302.0852	347.4925	366.7471 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	534.1650	515.0493	463.6470	380.3242	289.8967	192.0350	128.8967	134.6073	209.6770	323.8844	435.0941	527.7340 (97)
Space heating kWh	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743 (98a)
Space heating requirement - total per year (kWh/year)												480.1885
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												480.1885
Space heating per m2										(98c) / (4) =		9.6038 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												480.1885 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 121.4388 (230a)
Total electricity for the above, kWh/year 121.4388 (231)
Electricity for lighting (calculated in Appendix L) 124.5474 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
PV generation 0.0000 (233)
Wind generation 0.0000 (234)
Hydro-electric generation (Appendix N) 0.0000 (235a)
Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
Appendix Q - special features
Energy saved or generated -0.0000 (236)
Energy used 0.0000 (237)
Total delivered energy for all uses 1381.7236 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	480.1885	0.1578	75.7946 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			168.3419 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			203.1630 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	480.1885	1.5843	760.7847 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1758.5488 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			2133.2963 (286)
Dwelling Primary energy Rate (DPER)			42.6700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

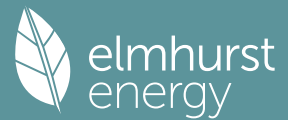
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1688 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
5.0000 (17)
0.4188 (18)
3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359		(27)						
External Wall	33.4900	5.9700	27.5200	0.1800	4.9536		(29a)						
External Roof 1	50.0000		50.0000	0.1100	5.5000		(30)						
Total net area of external elements Aum(A, m2)			83.4900				(31)						
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		17.2895		(33)						
Main dwelling													
Corridor			16.6400	0.0000	0.0000		(32)						
Party Wall			16.8300	0.0000	0.0000		(32)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							264.8536 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590							
E3 Sill				3.1800	0.0500	0.1590							
E4 Jamb				7.5200	0.0500	0.3760							
E18 Party wall between dwellings				4.7400	0.0600	0.2844							
E7 Party floor between dwellings (in blocks of flats)				14.1300	0.0700	0.9891							
E16 Corner (normal)				2.3700	0.0900	0.2133							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1200	0.0000	0.0000							
E14 Flat roof				14.1300	0.0800	1.1304							
P4 Party wall - Roof (insulation at ceiling level)				14.1200	0.1200	1.6944							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						(36a) =	5.0056 (36)						
Point Thermal bridges						(33) + (36) + (36a) =	0.0000						
Total fabric heat loss							22.2951 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	45.1956	45.0656	44.9382	44.3396	44.2276	43.7063	43.7063	43.6098	43.9071	44.2276	44.4542	44.6910	(39)
Average = Sum(39)m / 12 =												44.3391	
HLP	Jan 0.9039	Feb 0.9013	Mar 0.8988	Apr 0.8868	May 0.8846	Jun 0.8741	Jul 0.8741	Aug 0.8722	Sep 0.8781	Oct 0.8846	Nov 0.8891	Dec 0.8938	(40)
HLP (average)												0.8868	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	52.3556	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													98.5597 (43)
Daily hot water use	Jan 107.2197	Feb 104.9310	Mar 102.1434	Apr 97.9036	May 94.4609	Jun 90.7597	Jul 89.3366	Aug 92.1121	Sep 95.0395	Oct 98.9252	Nov 103.2304	Dec 106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)										Total = Sum(45)m =		1637.0557	
Distribution loss (46)m = 0.15 x (45)m													
25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	25.1167	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)
Electric shower(s)												1962	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 84.5050	Feb 84.5050	Mar 84.5050	Apr 84.5050	May 84.5050	Jun 84.5050	Jul 84.5050	Aug 84.5050	Sep 84.5050	Oct 84.5050	Nov 84.5050	Dec 84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
<hr/>														
Northwest					5.9700	11.2829	0.6300	0.7000			0.7700			20.5858 (81)
<hr/>														
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114	(83)	
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	473.0747	442.3087	415.8430	411.5583	416.3553	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	81.3911	81.6259	81.8574	82.9624	83.1725	84.1646	84.1646	84.3509	83.7796	83.1725	82.7486	82.3101
alpha	6.4261	6.4417	6.4572	6.5308	6.5448	6.6110	6.6110	6.6234	6.5853	6.5448	6.5166	6.4873
util living area	0.9886	0.9804	0.9613	0.8887	0.7332	0.5245	0.3799	0.4232	0.6660	0.9069	0.9752	0.9902 (86)
MIT	20.2898	20.4069	20.5815	20.8199	20.9572	20.9958	20.9996	20.9992	20.9820	20.8222	20.5354	20.2744 (87)
Th 2	20.1642	20.1664	20.1686	20.1787	20.1807	20.1895	20.1895	20.1912	20.1861	20.1807	20.1768	20.1728 (88)
util rest of house	0.9851	0.9746	0.9497	0.8592	0.6803	0.4598	0.3102	0.3493	0.5953	0.8755	0.9668	0.9872 (89)
MIT 2	19.3525	19.5012	19.7191	20.0066	20.1479	20.1874	20.1894	20.1909	20.1753	20.0163	19.6718	19.3399 (90)
Living area fraction	19.7923	19.9262	20.1237	20.3882	20.5276	20.5667	20.5695	20.5701	20.5538	20.3944	20.0770	19.7784 (92)
MIT	19.7923	19.9262	20.1237	20.3882	20.5276	20.5667	20.5695	20.5701	20.5538	20.3944	20.0770	19.7784 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7923	19.9262	20.1237	20.3882	20.5276	20.5667	20.5695	20.5701	20.5538	20.3944	20.0770	19.7784 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9832	0.9726	0.9490	0.8673	0.7034	0.4901	0.3429	0.3840	0.6280	0.8845	0.9655	0.9854 (94)
Useful gains	420.4913	444.8792	450.3190	441.7160	375.4787	259.5517	173.3972	181.6597	277.7513	367.8108	397.3768	410.2666 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	700.1824	677.1638	612.2257	509.3835	390.4246	260.7815	173.4940	181.8589	283.3684	433.1830	576.8840	696.2132 (97)
Space heating kWh	208.0902	156.0953	120.4586	48.7206	11.1197	0.0000	0.0000	0.0000	0.0000	48.6370	129.2452	212.7442 (98a)
Space heating requirement - total per year (kWh/year)												935.1107
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	208.0902	156.0953	120.4586	48.7206	11.1197	0.0000	0.0000	0.0000	0.0000	48.6370	129.2452	212.7442 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												935.1107
Space heating per m2										(98c) / (4) =		18.7022 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	208.0902	156.0953	120.4586	48.7206	11.1197	0.0000	0.0000	0.0000	0.0000	48.6370	129.2452	212.7442	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	225.4498	169.1173	130.5076	52.7850	12.0474	0.0000	0.0000	0.0000	0.0000	52.6944	140.0273	230.4921	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
Efficiency of water heater	84.2362	83.8655	83.1643	81.7271	80.3399	79.8000	79.8000	79.8000	79.8000	81.7038	83.4295	79.8000	(216)
Fuel for water heating, kWh/month	228.3790	203.0113	218.0433	196.6202	194.9046	177.9421	176.5248	182.9609	184.3137	199.3949	205.9927	225.9054	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1013.1211	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2393.9929	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												138.3788	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-823.7918	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2807.7010	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1013.1211	0.2100	212.7554 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2393.9929	0.2100	502.7385 (264)
Space and water heating			715.4939 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			640.6258 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.8100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1013.1211	1.1300	1144.8268 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2393.9929	1.1300	2705.2119 (278)
Space and water heating			3850.0387 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			3392.0223 (286)
Target Primary Energy Rate (TPER)			67.8400 (287)

Full SAP Calculation Printout



Property Reference	Plot 17			Issued on Date	27/08/2025
Assessment Reference	Plot 17	Prop Type Ref			
Property	Flat 17, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	4.06	TER	12.81
Environmental	97 A	% DER < TER			68.31
CO ₂ Emissions (t/year)	0.17	DFEE	24.92	TFEE	27.05
Compliance Check	See BREL	% DFEE < TFEE			7.85
% DPER < TPER	37.11	DPER	42.67	TPER	67.84
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume			118.5000 (4)
			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

2. Ventilation rate

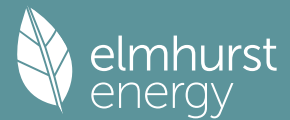
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3688 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2858 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3644	0.3573	0.3501	0.3144	0.3072	0.2715	0.2715	0.2644	0.2858	0.3072	0.3215	0.3358 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5664	0.5638	0.5613	0.5494	0.5472	0.5369	0.5369	0.5349	0.5408	0.5472	0.5517	0.5564 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m ²)			83.4900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 15.8567		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999 (32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) = 13242.6802	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K						264.8536	(35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375									
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543									
E16 Corner (normal)	2.3700	0.0490	0.1161									
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000									
E14 Flat roof	14.1300	0.1600	2.2608									
P4 Party wall - Roof (insulation at ceiling level)	14.1200	0.1280	1.8074									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.4838 (36)								
Point Thermal bridges				0.0000								
Total fabric heat loss		(33) + (36) + (36a) =		20.3405 (37)								
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 22.1488	Feb 22.0480	Mar 21.9491	Apr 21.4850	May 21.3981	Jun 20.9939	Jul 20.9939	Aug 20.9190	Sep 21.1496	Oct 21.3981	Nov 21.5738	Dec 21.7575 (38)
Heat transfer coeff	42.4893	42.3885	42.2897	41.8255	41.7387	41.3344	41.3344	41.2595	41.4901	41.7387	41.9143	42.0980 (39)
Average = Sum(39)m / 12 =												41.8251
HLP	Jan 0.8498	Feb 0.8478	Mar 0.8458	Apr 0.8365	May 0.8348	Jun 0.8267	Jul 0.8267	Aug 0.8252	Sep 0.8298	Oct 0.8348	Nov 0.8383	Dec 0.8420 (40)
HLP (average)												0.8365
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.7244 (42b)
Hot water usage for other uses												31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
Daily hot water use	Jan 54.6627	Feb 53.1639	Mar 51.5272	Apr 49.4895	May 47.6720	Jun 45.7830	Jul 45.3900	Aug 47.0234	Sep 48.6986	Oct 50.6385	Nov 52.6942	Dec 54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss	(46)m = 0.15 x (45)m											832.1197
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (47)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (48)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (49)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (50)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (51)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (52)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (53)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (54)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (55)
12Total per year (kWh/year)												707.3017 (56)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (57)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (58)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (59)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	84.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (60)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (61)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (62)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (64)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (65)
Total internal gains	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (66)

6. Solar gains												
[Jan]												
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700							12.4480 (67)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (68)
Total gains	331.8630	354.4053	360.2546	381.3959	392.1659	390.0297	372.8334	352.0659	335.5333	318.3307	318.9282	322.7690 (69)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (70)
Utilisation factor for gains for living area, nil,m (see Table 9a)												

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	86.5753	86.7812	86.9840	87.9493	88.1322	88.9942	88.9942	89.1557	88.6602	88.1322	87.7628	87.3800
alpha	6.7717	6.7854	6.7989	6.8633	6.8755	6.9329	6.9329	6.9437	6.9107	6.8755	6.8509	6.8253
util living area	0.9969	0.9943	0.9887	0.9604	0.8685	0.6628	0.4861	0.5357	0.7947	0.9654	0.9926	0.9974 (86)
MIT	20.1817	20.2866	20.4443	20.6972	20.8969	20.9869	20.9986	20.9974	20.9575	20.7253	20.4240	20.1663 (87)
Th 2	20.2104	20.2121	20.2138	20.2218	20.2233	20.2303	20.2303	20.2316	20.2276	20.2233	20.2203	20.2171 (88)
util rest of house	0.9959	0.9925	0.9848	0.9461	0.8267	0.5899	0.4020	0.4481	0.7273	0.9501	0.9898	0.9966 (89)
MIT 2	19.4638	19.5695	19.7269	19.9777	20.1550	20.2245	20.2299	20.2308	20.2055	20.0083	19.7131	19.4541 (90)
Living area fraction	19.8007	19.9060	20.0635	20.3153	20.5031	20.5822	20.5906	20.5905	20.5583	20.3447	20.0466	19.7883 (92)
MIT	19.8007	19.9060	20.0635	20.3153	20.5031	20.5822	20.5906	20.5905	20.5583	20.3447	20.0466	19.7883 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8007	19.9060	20.0635	20.3153	20.5031	20.5822	20.5906	20.5905	20.5583	20.3447	20.0466	19.7883 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9952	0.9915	0.9838	0.9481	0.8428	0.6239	0.4416	0.4893	0.7577	0.9528	0.9890	0.9960 (94)
Useful gains	330.2674	351.4078	354.4280	361.5866	330.5362	243.3233	164.6254	172.2646	254.2334	303.3207	315.4266	321.4712 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	658.6121	636.0797	573.5965	477.4501	367.4292	247.2708	164.9482	172.8978	267.9560	406.7323	542.6501	656.2358 (97)
Space heating kWh	244.2884	191.2995	163.0614	83.4217	27.4484	0.0000	0.0000	0.0000	0.0000	76.9382	163.6010	249.0649 (98a)
Space heating requirement - total per year (kWh/year)												1199.1235
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	244.2884	191.2995	163.0614	83.4217	27.4484	0.0000	0.0000	0.0000	0.0000	76.9382	163.6010	249.0649 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1199.1235
Space heating per m2										(98c) / (4) =		23.9825 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	388.5433	305.8745	313.5725	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9031	0.9581	0.9390	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	350.8866	293.0664	294.4379	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	417.5437	399.4079	376.8553	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	47.9931	79.1181	61.3186	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	11.9983	19.7795	15.3296	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												47.1075 (107)
Energy for space heating												23.9825 (99)
Energy for space cooling												0.9421 (108)
Total												24.9246 (109)
Fabric Energy Efficiency (DFEE)												24.9 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			118.5000

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)

Full SAP Calculation Printout



Number of sides sheltered

3 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.7750 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.3246 \quad (21)$$

Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	33.4900	5.9700	27.5200	0.1800	4.9536			(29a)
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)
Total net area of external elements Aum(A, m2)			83.4900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	17.2895			(33)
Main dwelling								
Corridor			16.6400	0.0000	0.0000			(32)
Party Wall			16.8300	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

264.8536 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	3.1800	0.0500	0.1590	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	7.5200	0.0500	0.3760	
E4 Jamb	4.7400	0.0600	0.2844	
E18 Party wall between dwellings	14.1300	0.0700	0.9891	
E7 Party floor between dwellings (in blocks of flats)	2.3700	0.0900	0.2133	
E16 Corner (normal)	14.1200	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1300	0.0800	1.1304	
E14 Flat roof	14.1200	0.1200	1.6944	
P4 Party wall - Roof (insulation at ceiling level)				5.0056 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 22.2951 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	45.1956	45.0656	44.9382	44.3396	44.2276	43.7063	43.7063	43.6098	43.9071	44.2276	44.4542	44.6910	(39)
Average = Sum(39)m / 12 =													44.3391

HLP	Jan 0.9039	Feb 0.9013	Mar 0.8988	Apr 0.8868	May 0.8846	Jun 0.8741	Jul 0.8741	Aug 0.8722	Sep 0.8781	Oct 0.8846	Nov 0.8891	Dec 0.8938	(40)
HLP (average)													0.8868
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													50.1040 (43)

Daily hot water use	Jan 54.6627	Feb 53.1639	Mar 51.5272	Apr 49.4895	May 47.6720	Jun 45.7830	Jul 45.3900	Aug 47.0234	Sep 48.6986	Oct 50.6385	Nov 52.6942	Dec 54.5859	(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)										Total = Sum(45)m =			832.1197

Distribution loss (46)m = 0.15 x (45)m

Distribution loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
-------------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Water storage loss:

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
--------------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

If cylinder contains dedicated solar storage

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
--------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(62)
---	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
-------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
-------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(64)
-----------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =					707.3017 (64)
-----------------------------	--	--	--	--	--	--	--	--	--	--	--	--	---------------

Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893	(64a)
--------------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	-------

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													478.7637 (64a)
--	--	--	--	--	--	--	--	--	--	--	--	--	----------------

Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844	(65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542	(72)
Total internal gains	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637	(73)

6. Solar gains

[Jan]														
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
-----					-----		-----		-----		-----		-----	
Northwest				5.9700	11.2829		0.6300		0.7000		0.7700		20.5858 (81)	
-----					-----		-----		-----		-----		-----	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114	(83)	
Total gains	337.5612	368.2691	387.6595	427.8883	455.6099	457.7476	436.1007	402.0087	369.3784	336.1345	326.6467	326.9751	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	81.3911	81.6259	81.8574	82.9624	83.1725	84.1646	84.1646	84.3509	83.7796	83.1725	82.7486	82.3101
alpha	6.4261	6.4417	6.4572	6.5308	6.5448	6.6110	6.6110	6.6234	6.5853	6.5448	6.5166	6.4873
util living area	0.9969	0.9937	0.9855	0.9435	0.8192	0.6017	0.4399	0.4965	0.7688	0.9619	0.9925	0.9974 (86)
MIT	20.1052	20.2303	20.4228	20.7150	20.9183	20.9908	20.9990	20.9978	20.9592	20.7066	20.3700	20.0898 (87)
Th 2	20.1642	20.1664	20.1686	20.1787	20.1807	20.1895	20.1895	20.1912	20.1861	20.1807	20.1768	20.1728 (88)
util rest of house	0.9958	0.9916	0.9805	0.9245	0.7703	0.5297	0.3595	0.4106	0.6975	0.9450	0.9896	0.9966 (89)
MIT 2	19.3494	19.4755	19.6672	19.9545	20.1289	20.1857	20.1893	20.1906	20.1655	19.9529	19.6232	19.3412 (90)
Living area fraction	19.7040	19.8296	20.0217	20.3113	20.4992	20.5634	20.5692	20.5694	20.5379	20.3065	19.9736	19.6924 (91)
MIT	19.7040	19.8296	20.0217	20.3113	20.4992	20.5634	20.5692	20.5694	20.5379	20.3065	19.9736	19.6924 (92)
Temperature adjustment	19.7040	19.8296	20.0217	20.3113	20.4992	20.5634	20.5692	20.5694	20.5379	20.3065	19.9736	0.0000
adjusted MIT	19.7040	19.8296	20.0217	20.3113	20.4992	20.5634	20.5692	20.5694	20.5379	20.3065	19.9736	19.6924 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9951	0.9906	0.9794	0.9280	0.7903	0.5634	0.3973	0.4510	0.7297	0.9480	0.9887	0.9959	(94)
Useful gains	335.8937	364.7949	379.6748	397.0692	360.0872	257.8898	173.2429	181.3036	269.5508	318.6651	322.9636	325.6423	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	696.1941	672.8136	607.6407	505.9740	389.1697	260.6388	173.4788	181.8247	282.6697	429.2977	572.2850	692.3731	(97)
Space heating kWh	268.0635	206.9886	169.6066	78.4114	21.6374	0.0000	0.0000	0.0000	0.0000	82.3106	179.5114	272.8477	(98a)
Space heating requirement - total per year (kWh/year)	1279.3773												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	0.0000												
Space heating kWh	268.0635	206.9886	169.6066	78.4114	21.6374	0.0000	0.0000	0.0000	0.0000	82.3106	179.5114	272.8477	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1279.3773												
Space heating per m2	(98c) / (4) = 25.5875 (99)												

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	410.8393	323.4267	331.4343	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9369	0.9737	0.9563	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	384.9357	314.9196	316.9530	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	499.4277	475.9778	437.7817	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	82.4342	119.8272	89.8966	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) = 1.0000 (105)											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	20.6085	29.9568	22.4741	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	73.0395 (107)											
Energy for space heating	25.5875 (99)											
Energy for space cooling	1.4608 (108)											
Total	27.0483 (109)											
Fabric Energy Efficiency (TFEE)	27.0 (109)											

Full SAP Calculation Printout



Property Reference	Plot 17			Issued on Date	27/08/2025
Assessment Reference	Plot 17	Prop Type Ref			
Property	Flat 17, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	4.06	TER	12.81
Environmental	97 A	% DER < TER			68.31
CO ₂ Emissions (t/year)	0.17	DFEE	24.92	TFEE	27.05
Compliance Check	See BREL	% DFEE < TFEE			7.85
% DPER < TPER	37.11	DPER	42.67	TPER	67.84
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		4
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

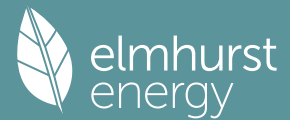
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3376	0.3338	0.3299	0.3105	0.3066	0.2873	0.2873	0.2834	0.2950	0.3066	0.3144	0.3221 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			83.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	15.8567		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999 (32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 13242.6802 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							264.8536 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543	
E16 Corner (normal)	2.3700	0.0490	0.1161	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000	
E14 Flat roof	14.1300	0.1600	2.2608	
P4 Party wall - Roof (insulation at ceiling level)	14.1200	0.1280	1.8074	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.4838 (36)
Point Thermal Bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	20.3405 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.2028	13.0513	12.8998	12.1421	11.9906	11.2329	11.2329	11.0814	11.5360	11.9906	12.2936	12.5967 (38)
Average = Sum(39)m / 12 =	33.5433	33.3918	33.2403	32.4826	32.3311	31.5734	31.5734	31.4219	31.8765	32.3311	32.6342	32.9372 (39)
												32.4447
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6709	0.6678	0.6648	0.6497	0.6466	0.6315	0.6315	0.6284	0.6375	0.6466	0.6527	0.6587 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
Hot water usage for baths	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
12Total per year (kWh/year)													2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200	(73)

6. Solar gains

[Jan]												
				Area	Solar flux		g		FF		Access	Gains
				m2	Table 6a		Specific data		Specific data		factor	W
					W/m2		or Table 6b		or Table 6c		Table 6d	
Northwest				5.9700		11.2829		0.2400		0.0000	0.7700	12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	109.6648	110.1624	110.6646	113.2459	113.7766	116.5069	116.5069	117.0688	115.3992	113.7766	112.7200	111.6829
alpha	8.3110	8.3442	8.3776	8.5497	8.5851	8.7671	8.7671	8.8046	8.6933	8.5851	8.5147	8.4455
util living area	0.9862	0.9753	0.9525	0.8617	0.6923	0.4792	0.3463	0.3780	0.5945	0.8684	0.9658	0.9881 (86)
MIT	20.5920	20.6794	20.7892	20.9325	20.9899	20.9996	21.0000	21.0000	20.9977	20.9391	20.7695	20.5858 (87)
Th 2	20.3666	20.3693	20.3720	20.3855	20.3882	20.4018	20.4018	20.4045	20.3963	20.3882	20.3828	20.3774 (88)
util rest of house	0.9824	0.9688	0.9402	0.8335	0.6504	0.4346	0.2992	0.3290	0.5437	0.8360	0.9558	0.9848 (89)
MIT 2	19.8998	20.0107	20.1470	20.3221	20.3806	20.4016	20.4018	20.4045	20.3950	20.3337	20.1345	19.9012 (90)
Living area fraction	fLA = Living area / (4) = 0.4692 (91)											
MIT	20.2246	20.3244	20.4483	20.6085	20.6665	20.6822	20.6824	20.6839	20.6778	20.6177	20.4325	20.2224 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.2246	20.3244	20.4483	20.6085	20.6665	20.6822	20.6824	20.6839	20.6778	20.6177	20.4325	20.2224 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9814	0.9682	0.9418	0.8442	0.6697	0.4555	0.3213	0.3520	0.5675	0.8487	0.9567	0.9838	(94)
Useful gains	375.7053	391.2914	383.3846	355.5642	286.5086	191.9284	128.8925	134.5984	208.9992	302.0852	347.4925	366.7471	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	534.1650	515.0493	463.6470	380.3242	289.8967	192.0350	128.8967	134.6073	209.6770	323.8844	435.0941	527.7340	(97)
Space heating kWh	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743	(98a)
Space heating requirement - total per year (kWh/year)												480.1885	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												480.1885	
Space heating per m2											(98c) / (4) =	9.6038	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	117.8941	83.1653	59.7152	17.8272	2.5208	0.0000	0.0000	0.0000	0.0000	16.2186	63.0732	119.7743	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													480.1885 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 121.4388 (230a)
Total electricity for the above, kWh/year 121.4388 (231)
Electricity for lighting (calculated in Appendix L) 124.5474 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
PV generation 0.0000 (233)
Wind generation 0.0000 (234)
Hydro-electric generation (Appendix N) 0.0000 (235a)
Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
Appendix Q - special features
Energy saved or generated -0.0000 (236)
Energy used 0.0000 (237)
Total delivered energy for all uses 1381.7236 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	480.1885	0.1578	75.7946 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			168.3419 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			203.1630 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	480.1885	1.5843	760.7847 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1758.5488 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			2133.2963 (286)
Dwelling Primary energy Rate (DPER)			42.6700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1688 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
5.0000 (17)
0.4188 (18)
3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
External Wall	33.4900	5.9700	27.5200	0.1800	4.9536			(29a)					
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)					
Total net area of external elements Aum(A, m2)			83.4900					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		17.2895			(33)					
Main dwelling													
Corridor			16.6400	0.0000	0.0000			(32)					
Party Wall			16.8300	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							264.8536	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E18 Party wall between dwellings				4.7400	0.0600		0.2844						
E7 Party floor between dwellings (in blocks of flats)				14.1300	0.0700		0.9891						
E16 Corner (normal)				2.3700	0.0900		0.2133						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1200	0.0000		0.0000						
E14 Flat roof				14.1300	0.0800		1.1304						
P4 Party wall - Roof (insulation at ceiling level)				14.1200	0.1200		1.6944						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								5.0056 (36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	22.2951	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	45.1956	45.0656	44.9382	44.3396	44.2276	43.7063	43.7063	43.6098	43.9071	44.2276	44.4542	44.6910	(39)
Average = Sum(39)m / 12 =												44.3391	
HLP	Jan 0.9039	Feb 0.9013	Mar 0.8988	Apr 0.8868	May 0.8846	Jun 0.8741	Jul 0.8741	Aug 0.8722	Sep 0.8781	Oct 0.8846	Nov 0.8891	Dec 0.8938	(40)
HLP (average)												0.8868	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	52.3556	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)
Average daily hot water use (litres/day)													98.5597 (43)
Daily hot water use	Jan 107.2197	Feb 104.9310	Mar 102.1434	Apr 97.9036	May 94.4609	Jun 90.7597	Jul 89.3366	Aug 92.1121	Sep 95.0395	Oct 98.9252	Nov 103.2304	Dec 106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)										Total = Sum(45)m =		1637.0557	
Distribution loss (46)m = 0.15 x (45)m													
25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	25.1167	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)
Electric shower(s)												1962	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 84.5050	Feb 84.5050	Mar 84.5050	Apr 84.5050	May 84.5050	Jun 84.5050	Jul 84.5050	Aug 84.5050	Sep 84.5050	Oct 84.5050	Nov 84.5050	Dec 84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

Northwest					5.9700	11.2829	0.6300	0.7000			0.7700	20.5858 (81)	

Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114	(83)
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	473.0747	442.3087	415.8430	411.5583	416.3553	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	81.3911	81.6259	81.8574	82.9624	83.1725	84.1646	84.1646	84.3509	83.7796	83.1725	82.7486	82.3101
alpha	6.4261	6.4417	6.4572	6.5308	6.5448	6.6110	6.6110	6.6234	6.5853	6.5448	6.5166	6.4873
util living area	0.9886	0.9804	0.9613	0.8887	0.7332	0.5245	0.3799	0.4232	0.6660	0.9069	0.9752	0.9902 (86)
MIT	20.2898	20.4069	20.5815	20.8199	20.9572	20.9958	20.9996	20.9992	20.9820	20.8222	20.5354	20.2744 (87)
Th 2	20.1642	20.1664	20.1686	20.1787	20.1807	20.1895	20.1895	20.1912	20.1861	20.1807	20.1768	20.1728 (88)
util rest of house	0.9851	0.9746	0.9497	0.8592	0.6803	0.4598	0.3102	0.3493	0.5953	0.8755	0.9668	0.9872 (89)
MIT 2	19.3525	19.5012	19.7191	20.0066	20.1479	20.1874	20.1894	20.1909	20.1753	20.0163	19.6718	19.3399 (90)
Living area fraction	19.7923	19.9262	20.1237	20.3882	20.5276	20.5667	20.5695	20.5701	20.5538	20.3944	20.0770	19.7784 (92)
MIT	19.7923	19.9262	20.1237	20.3882	20.5276	20.5667	20.5695	20.5701	20.5538	20.3944	20.0770	19.7784 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7923	19.9262	20.1237	20.3882	20.5276	20.5667	20.5695	20.5701	20.5538	20.3944	20.0770	19.7784 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9832	0.9726	0.9490	0.8673	0.7034	0.4901	0.3429	0.3840	0.6280	0.8845	0.9655	0.9854 (94)
Useful gains	420.4913	444.8792	450.3190	441.7160	375.4787	259.5517	173.3972	181.6597	277.7513	367.8108	397.3768	410.2666 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	700.1824	677.1638	612.2257	509.3835	390.4246	260.7815	173.4940	181.8589	283.3684	433.1830	576.8840	696.2132 (97)
Space heating kWh	208.0902	156.0953	120.4586	48.7206	11.1197	0.0000	0.0000	0.0000	0.0000	48.6370	129.2452	212.7442 (98a)
Space heating requirement - total per year (kWh/year)												935.1107
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	208.0902	156.0953	120.4586	48.7206	11.1197	0.0000	0.0000	0.0000	0.0000	48.6370	129.2452	212.7442 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												935.1107
Space heating per m2										(98c) / (4) =		18.7022 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	208.0902	156.0953	120.4586	48.7206	11.1197	0.0000	0.0000	0.0000	0.0000	48.6370	129.2452	212.7442	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	225.4498	169.1173	130.5076	52.7850	12.0474	0.0000	0.0000	0.0000	0.0000	52.6944	140.0273	230.4921	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
Efficiency of water heater	84.2362	83.8655	83.1643	81.7271	80.3399	79.8000	79.8000	79.8000	79.8000	81.7038	83.4295	79.8000	(216)
Fuel for water heating, kWh/month	228.3790	203.0113	218.0433	196.6202	194.9046	177.9421	176.5248	182.9609	184.3137	199.3949	205.9927	225.9054	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)

elmhurst
energy

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1013.1211	1.1300	1144.8268 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2393.9929	1.1300	2705.2119 (278)
Space and water heating			3850.0387 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			3392.0223 (286)
Target Primary Energy Rate (TPER)			67.8400 (287)

Full SAP Calculation Printout



Property Reference	Plot 17			Issued on Date	27/08/2025
Assessment Reference	Plot 17	Prop Type Ref			
Property	Flat 17, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	4.06	TER	12.81
Environmental	97 A	% DER < TER			68.31
CO ₂ Emissions (t/year)	0.17	DFEE	24.92	TFEE	27.05
Compliance Check	See BREL	% DFEE < TFEE			7.85
% DPER < TPER	37.11	DPER	42.67	TPER	67.84
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3376	0.3338	0.3299	0.3105	0.3066	0.2873	0.2873	0.2834	0.2950	0.3066	0.3144	0.3221 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			83.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	15.8567		(33)
Main dwelling							
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999 (32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13242.6802 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							264.8536 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543	
E16 Corner (normal)	2.3700	0.0490	0.1161	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000	
E14 Flat roof	14.1300	0.1600	2.2608	
P4 Party wall - Roof (insulation at ceiling level)	14.1200	0.1280	1.8074	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.4838 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 20.3405 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.2028	13.0513	12.8998	12.1421	11.9906	11.2329	11.2329	11.0814	11.5360	11.9906	12.2936	12.5967 (38)
Average = Sum(39)m / 12 =	33.5433	33.3918	33.2403	32.4826	32.3311	31.5734	31.5734	31.4219	31.8765	32.3311	32.6342	32.9372 (39)
												32.4447
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6709	0.6678	0.6648	0.6497	0.6466	0.6315	0.6315	0.6284	0.6375	0.6466	0.6527	0.6587 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (44)
Energy content (annual)												1938.9067 (45)
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains												
[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	W/m2	Specific data	factor	W						
				or Table 6b	Table 6d							
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)						
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	420.3031	431.2727	438.5037	442.6707	444.6142	429.3686	409.3093	391.7531	379.6128	377.2367	389.2227	407.5463 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	109.6648	110.1624	110.6646	113.2459	113.7766	116.5069	116.5069	117.0688	115.3992	113.7766	112.7200	111.6829
alpha	8.3110	8.3442	8.3776	8.5497	8.5851	8.7671	8.7671	8.8046	8.6933	8.5851	8.5147	8.4455
util living area	0.9754	0.9640	0.9305	0.8348	0.6685	0.4703	0.3394	0.3689	0.5773	0.8373	0.9497	0.9789 (86)
MIT	20.6644	20.7276	20.8346	20.9473	20.9922	20.9997	21.0000	21.0000	20.9982	20.9543	20.8118	20.6543 (87)
Th 2	20.3666	20.3693	20.3720	20.3855	20.3882	20.4018	20.4018	20.4045	20.3963	20.3882	20.3828	20.3774 (88)
util rest of house	0.9691	0.9550	0.9144	0.8046	0.6272	0.4265	0.2933	0.3212	0.5277	0.8022	0.9363	0.9734 (89)
MIT 2	19.9893	20.0691	20.1994	20.3369	20.3824	20.4016	20.4018	20.4045	20.3953	20.3483	20.1842	19.9863 (90)
Living area fraction	fLA = Living area / (4) = 0.4692 (91)											
MIT	20.3061	20.3781	20.4974	20.6233	20.6685	20.6822	20.6824	20.6839	20.6782	20.6326	20.4787	20.2997 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.3061	20.3781	20.4974	20.6233	20.6685	20.6822	20.6824	20.6839	20.6782	20.6326	20.4787	20.2997 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9684	0.9552	0.9179	0.8167	0.6463	0.4470	0.3149	0.3436	0.5510	0.8167	0.9386	0.9727 (94)
Useful gains	407.0128	411.9405	402.4835	361.5351	287.3481	191.9445	128.8932	134.6002	209.1477	308.1073	365.3309	396.4086 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	536.8969	516.8405	465.2790	380.8040	289.9617	192.0362	128.8968	134.6074	209.6885	324.3659	436.6024	530.2807 (97)
Space heating kWh	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (98a)
Space heating requirement - total per year (kWh/year)												392.6773
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												392.6773
Space heating per m2										(98c) / (4) =		7.8535 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)	
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)	
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													392.6773 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													121.4388 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1294.2124	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	392.6773	16.4900	64.7525 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			213.4156 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.8087 (257)
SAP value		86.8904
SAP rating (Section 12)		87 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	392.6773	0.1580	62.0476 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			154.5948 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			189.4159 (272)
CO2 emissions per m2			3.7900 (273)
EI value			97.3282
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.1550 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1666	0.1628	0.1666	0.1511	0.1550	0.1318	0.1279	0.1279	0.1318	0.1473	0.1473	0.1511	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3066	0.3028	0.3066	0.2911	0.2950	0.2718	0.2679	0.2679	0.2718	0.2873	0.2873	0.2911	(25)

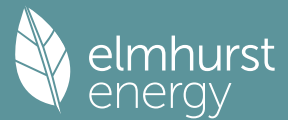
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)			83.4900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.8567			(33)
Main dwelling								
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999	(32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								(28)...(30) + (32) + (32a)...(32e) = 13242.6802 (34)
List of Thermal Bridges								264.8536 (35)
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340		0.1081	
E3 Sill				3.1800	0.0260		0.0827	
E4 Jamb				7.5200	0.0300		0.2256	
E18 Party wall between dwellings				4.7400	0.0290		0.1375	
E7 Party floor between dwellings (in blocks of flats)				14.1300	-0.0180		-0.2543	
E16 Corner (normal)				2.3700	0.0490		0.1161	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1200	0.0000		0.0000	
E14 Flat roof				14.1300	0.1600		2.2608	
P4 Party wall - Roof (insulation at ceiling level)				14.1200	0.1280		1.8074	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.4838 (36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	20.3405 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		Specific data		Specific data		factor		W	
			W/m2		or Table 6b		or Table 6c		Table 6d			
Northwest	5.9700		9.9768		0.2400		0.0000		0.7700		11.0070 (81)	
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	113.7766	114.3124	113.7766	115.9504	115.3992	118.7873	119.3714	119.3714	118.7873	116.5069	116.5069	115.9504
alpha	8.5851	8.6208	8.5851	8.7300	8.6933	8.9192	8.9581	8.9581	8.9192	8.7671	8.7671	8.7300
util living area	0.9629	0.9466	0.9056	0.7798	0.5929	0.3928	0.2902	0.3188	0.5233	0.7914	0.9268	0.9685 (86)
MIT	20.7514	20.8061	20.8850	20.9729	20.9974	20.9999	21.0000	21.0000	20.9993	20.9739	20.8709	20.7379 (87)
Th 2	20.3882	20.3909	20.3882	20.3990	20.3963	20.4126	20.4153	20.4153	20.4126	20.4018	20.4018	20.3990 (88)
util rest of house	0.9537	0.9341	0.8853	0.7453	0.5503	0.3501	0.2456	0.2722	0.4756	0.7523	0.9088	0.9607 (89)
MIT 2	20.1152	20.1832	20.2722	20.3755	20.3946	20.4126	20.4153	20.4153	20.4123	20.3802	20.2704	20.1085 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.4137	20.4755	20.5597	20.6558	20.6774	20.6882	20.6897	20.6897	20.6877	20.6588	20.5522	20.4038 (91)
Temperature adjustment	0.0000											
adjusted MIT	20.4137	20.4755	20.5597	20.6558	20.6774	20.6882	20.6897	20.6897	20.6877	20.6588	20.5522	20.4038 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9541	0.9360	0.8913	0.7604	0.5702	0.3701	0.2665	0.2940	0.4980	0.7695	0.9136	0.9607 (94)
Useful gains	399.6456	401.4533	388.7225	334.7161	250.2623	157.5532	107.5360	113.6982	188.3297	289.5729	354.3011	391.0707 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	495.1086	475.4678	431.9349	344.3998	251.1035	157.5672	107.5366	113.6996	188.5200	298.6459	402.6302	491.8575 (97)
Space heating kWh	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854 (98a)
Space heating requirement - total per year (kWh/year)												277.0431
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												277.0431
Space heating per m2												(98c) / (4) = 5.5409 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													0.0000 (213)

elmhurst
energy

B 87
A 97

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 87
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£335	£335	£0
Space heating	£113	£113	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£335	£335	£0
Total cost of uses	£334	£334	£0
Delivered energy	24 kWh/m ²	24 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	36 kWh/m ²	36 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3376	0.3338	0.3299	0.3105	0.3066	0.2873	0.2873	0.2834	0.2950	0.3066	0.3144	0.3221 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							

Full SAP Calculation Printout



Window				5.9700	0.7752	4.6279			(27)				
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003	(29a)					
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)					
Total net area of external elements Aum(A, m2)			83.4900					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.8567			(33)					
Main dwelling													
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999	(32)					
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000	(32)					
Party Floor 1			50.0000			40.0000	2000.0000	(32d)					
Internal Wall			71.1200			9.0000	640.0800	(32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13242.6802	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							264.8536	(35)					
List of Thermal Bridges													
K1 Element					Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081						
E3 Sill					3.1800	0.0260	0.0827						
E4 Jamb					7.5200	0.0300	0.2256						
E18 Party wall between dwellings					4.7400	0.0290	0.1375						
E7 Party floor between dwellings (in blocks of flats)					14.1300	-0.0180	-0.2543						
E16 Corner (normal)					2.3700	0.0490	0.1161						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					14.1200	0.0000	0.0000						
E14 Flat roof					14.1300	0.1600	2.2608						
P4 Party wall - Roof (insulation at ceiling level)					14.1200	0.1280	1.8074						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.4838	(36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	20.3405 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	13.2028	13.0513	12.8998	12.1421	11.9906	11.2329	11.2329	11.0814	11.5360	11.9906	12.2936	12.5967	(38)
Average = Sum(39)m / 12 =	33.5433	33.3918	33.2403	32.4826	32.3311	31.5734	31.5734	31.4219	31.8765	32.3311	32.6342	32.9372	(39)
												32.4447	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6709	0.6678	0.6648	0.6497	0.6466	0.6315	0.6315	0.6284	0.6375	0.6466	0.6527	0.6587	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)	
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)												116.7306 (43)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use													
126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)	
Energy content	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)	
Energy content (annual)										Total =	Sum(45)m =	1938.9067	
Distribution loss (46)m = 0.15 x (45)m													
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)	
Water storage loss:													
Store volume												201.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8694 (55)	
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
												2256.2377 (64)	
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month													
66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northwest	5.9700				11.2829	0.2400	0.0000	0.7700	12.4480 (81)			
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	420.3031	431.2727	438.5037	442.6707	444.6142	429.3686	409.3093	391.7531	379.6128	377.2367	389.2227	407.5463 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	109.6648	110.1624	110.6646	113.2459	113.7766	116.5069	116.5069	117.0688	115.3992	113.7766	112.7200	111.6829
alpha	8.3110	8.3442	8.3776	8.5497	8.5851	8.7671	8.7671	8.8046	8.6933	8.5851	8.5147	8.4455
util living area	0.9754	0.9640	0.9305	0.8348	0.6685	0.4703	0.3394	0.3689	0.5773	0.8373	0.9497	0.9789 (86)
MIT	20.6644	20.7276	20.8346	20.9473	20.9922	20.9997	21.0000	21.0000	20.9982	20.9543	20.8118	20.6543 (87)
Th 2	20.3666	20.3693	20.3720	20.3855	20.3882	20.4018	20.4018	20.4045	20.3963	20.3882	20.3828	20.3774 (88)
util rest of house	0.9691	0.9550	0.9144	0.8046	0.6272	0.4265	0.2933	0.3212	0.5277	0.8022	0.9363	0.9734 (89)
MIT 2	19.9893	20.0691	20.1994	20.3369	20.3824	20.4016	20.4018	20.4045	20.3953	20.3483	20.1842	19.9863 (90)
Living area fraction	20.3061	20.3781	20.4974	20.6233	20.6685	20.6822	20.6824	20.6839	20.6782	20.6326	20.4787	20.2997 (92)
Temperature adjustment	20.3061	20.3781	20.4974	20.6233	20.6685	20.6822	20.6824	20.6839	20.6782	20.6326	20.4787	0.0000
adjusted MIT	20.3061	20.3781	20.4974	20.6233	20.6685	20.6822	20.6824	20.6839	20.6782	20.6326	20.4787	20.2997 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9684	0.9552	0.9179	0.8167	0.6463	0.4470	0.3149	0.3436	0.5510	0.8167	0.9386	0.9727 (94)
Useful gains	407.0128	411.9405	402.4835	361.5351	287.3481	191.9445	128.8932	134.6002	209.1477	308.1073	365.3309	396.4086 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	536.8969	516.8405	465.2790	380.8040	289.9617	192.0362	128.8968	134.6074	209.6885	324.3659	436.6024	530.2807 (97)
Space heating kWh	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (98a)
Space heating requirement - total per year (kWh/year)												392.6773
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												392.6773
Space heating per m2										(98c) / (4) =		7.8535 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	96.6338	70.4928	46.7199	13.8736	1.9445	0.0000	0.0000	0.0000	0.0000	12.0964	51.3154	99.6008 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													392.6773	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													344.1753	
Water heating fuel used													655.5490	(219)
Space cooling fuel													0.0000	(221)

Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													121.4388	(230a)
Total electricity for the above, kWh/year													121.4388	(231)
Electricity for lighting (calculated in Appendix L)													124.5474	(232)

Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1294.2124	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	392.6773	16.4900	64.7525	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	124.5474	16.4900	20.5379	(250)
Additional standing charges			0.0000	(251)
Total energy cost			213.4156	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.8087	(257)
SAP value		86.8904	
SAP rating (Section 12)		87	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	392.6773	0.1580	62.0476	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			154.5948	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			189.4159	(272)
CO2 emissions per m2			3.7900	(273)
EI value			97.3282	
EI rating			97	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

Full SAP Calculation Printout



Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 4.0000 (17)
Infiltration rate 0.2000 (18)
Number of sides sheltered 3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1550 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1666	0.1628	0.1666	0.1511	0.1550	0.1318	0.1279	0.1279	0.1318	0.1473	0.1473	0.1511	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3066	0.3028	0.3066	0.2911	0.2950	0.2718	0.2679	0.2679	0.2718	0.2873	0.2873	0.2911	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	33.4900	5.9700	27.5200	0.1900	5.2288	150.0000	4128.0003	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)			83.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 15.8567			(33)
Main dwelling								
Corridor			16.6400	0.0000	0.0000	180.0000	2995.1999	(32)
Party Wall			16.8300	0.0000	0.0000	180.0000	3029.4000	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 13242.6802 (34)
List of Thermal Bridges 264.8536 (35)

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	14.1300	-0.0180	-0.2543	
E16 Corner (normal)	2.3700	0.0490	0.1161	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1200	0.0000	0.0000	
E14 Flat roof	14.1300	0.1600	2.2608	
P4 Party wall - Roof (insulation at ceiling level)	14.1200	0.1280	1.8074	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.4838	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			20.3405	(33) + (36) + (36a) = (37)

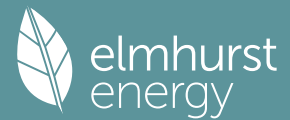
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan 11.9906 Feb 11.8390 Mar 11.9906 Apr 11.3844 May 11.5360 Jun 10.6268 Jul 10.4753 Aug 10.4753 Sep 10.6268 Oct 11.2329 Nov 11.2329 Dec 11.3844 (38)
Heat transfer coeff 32.3311 32.1796 32.3311 31.7250 31.8765 30.9673 30.8158 30.8158 30.9673 31.5734 31.5734 31.7250 (39)
Average = Sum(39)m / 12 = 31.5734

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6466	0.6436	0.6466	0.6345	0.6375	0.6193	0.6163	0.6163	0.6193	0.6315	0.6315	0.6345	(40)
HLP (average)												0.6315	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6901 (42)
Hot water usage for mixer showers 72.2658 71.1798 69.5972 66.5693 64.3348 61.8429 60.4265 61.9971 63.7187 66.3942 69.4872 71.9889 (42a)
Hot water usage for baths 22.7244 22.3869 21.9117 21.0354 20.3792 19.6517 19.2587 19.7306 20.2445 21.0230 21.9173 22.6476 (42b)
Hot water usage for other uses 31.9383 30.7769 29.6155 28.4541 27.2927 26.1314 26.1314 27.2927 28.4541 29.6155 30.7769 31.9383 (42c)
Average daily hot water use (litres/day) 116.7306 (43)
Daily hot water use
Jan 126.9285 Feb 124.3436 Mar 121.1244 Apr 116.0589 May 112.0068 Jun 107.6259 Jul 105.8165 Aug 109.0204 Sep 112.4173 Oct 117.0328 Nov 122.1814 Dec 126.5748 (44)
Energy conte 201.0237 177.0637 186.1637 158.8788 150.7827 132.3386 127.9759 134.9900 138.6218 158.8123 174.0698 198.1856 (45)
Energy content (annual) Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m 30.1536 26.5595 27.9246 23.8318 22.6174 19.8508 19.1964 20.2485 20.7933 23.8219 26.1105 29.7278 (46)
Water storage loss:
Store volume 201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.8694 (55)
Total storage loss
26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (56)
If cylinder contains dedicated solar storage
26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month

Full SAP Calculation Printout



WWHRS	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]													
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d		Gains W	

Northwest				5.9700	9.9768	0.2400	0.0000			0.7700		11.0070	(81)

Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765	(83)
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	113.7766	114.3124	113.7766	115.9504	115.3992	118.7873	119.3714	119.3714	118.7873	116.5069	116.5069	115.9504	
alpha	8.5851	8.6208	8.5851	8.7300	8.6933	8.9192	8.9581	8.9581	8.9192	8.7671	8.7671	8.7300	
util living area	0.9629	0.9466	0.9056	0.7798	0.5929	0.3928	0.2902	0.3188	0.5233	0.7914	0.9268	0.9685	(86)
MIT	20.7514	20.8061	20.8850	20.9729	20.9974	20.9999	21.0000	21.0000	20.9993	20.9739	20.8709	20.7379	(87)
Th 2	20.3882	20.3909	20.3882	20.3990	20.3963	20.4126	20.4153	20.4153	20.4126	20.4018	20.4018	20.3990	(88)
util rest of house	0.9537	0.9341	0.8853	0.7453	0.5503	0.3501	0.2456	0.2722	0.4756	0.7523	0.9088	0.9607	(89)
MIT 2	20.1152	20.1832	20.2722	20.3755	20.3946	20.4126	20.4153	20.4153	20.4123	20.3802	20.2704	20.1085	(90)
Living area fraction	20.4137	20.4755	20.5597	20.6558	20.6774	20.6882	20.6897	20.6897	20.6877	20.6588	20.5522	20.4038	(91)
MIT	20.4137	20.4755	20.5597	20.6558	20.6774	20.6882	20.6897	20.6897	20.6877	20.6588	20.5522	20.4038	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4137	20.4755	20.5597	20.6558	20.6774	20.6882	20.6897	20.6897	20.6877	20.6588	20.5522	20.4038	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	399.6456	401.4533	388.7225	334.7161	250.2623	157.5532	107.5360	113.6982	188.3297	289.5729	354.3011	391.0707	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	495.1086	475.4678	431.9349	344.3998	251.1035	157.5672	107.5366	113.6996	188.5200	298.6459	402.6302	491.8575	(97)
Space heating kWh	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854	(98a)
Space heating requirement - total per year (kWh/year)												277.0431	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												277.0431	
Space heating per m2										(98c) / (4) =		5.5409	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	71.0245	49.7377	32.1501	6.9722	0.6259	0.0000	0.0000	0.0000	0.0000	6.7503	34.7969	74.9854	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												277.0431	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1178.5782	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	277.0431	28.4300	78.7633	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	124.5474	28.4300	35.4088	(250)
Additional standing charges			0.0000	(251)
Total energy cost			335.0698	(255)

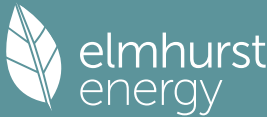
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	277.0431	0.1586	43.9286	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			136.4759	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			171.2970	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	277.0431	1.5870	439.6656	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	1.5220	997.7642	(278)
Space and water heating			1437.4298	(279)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1812.1773 (286)

Full SAP Calculation Printout



Property Reference	Plot 18			Issued on Date	27/08/2025
Assessment Reference	Plot 18	Prop Type Ref			
Property	Flat 18, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.45	TER	11.04
Environmental	98 A	% DER < TER			68.75
CO ₂ Emissions (t/year)	0.18	DFEE	21.76	TFEE	24.41
Compliance Check	See BREL	% DFEE < TFEE			10.87
% DPER < TPER	37.41	DPER	36.34	TPER	58.06
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.6000	(17)
Infiltration rate	0.1800	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1395 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1779	0.1744	0.1709	0.1535	0.1500	0.1325	0.1325	0.1290	0.1395	0.1500	0.1569	0.1639 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3179	0.3144	0.3109	0.2934	0.2900	0.2725	0.2725	0.2690	0.2795	0.2900	0.2969	0.3039 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements A _{um} (A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.6926		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16000.2800 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							258.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	23.5700	0.1280	3.0170
E14 Flat roof	9.3700	0.1600	1.4992

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 21.7883 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.4132	15.2441	15.0750	14.2294	14.0603	13.2148	13.2148	13.0457	13.5530	14.0603	14.3986	14.7368 (38)
Average = Sum(39)m / 12 =	37.2015	37.0324	36.8633	36.0178	35.8487	35.0031	35.0031	34.8340	35.3413	35.8487	36.1869	36.5251 (39)
												35.9755
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6000	0.5973	0.5946	0.5809	0.5782	0.5646	0.5646	0.5618	0.5700	0.5782	0.5837	0.5891 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2153.9058
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)												2471 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
	430.7076	440.7252	420.5228	403.0119	380.5447	365.1370	349.6164	351.2521	363.3156	377.6397	403.9136	421.4465 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	8.6000											
Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	448.6394	477.2258	486.2853	511.0128	525.7191	519.9083	494.4017	466.6767	443.4482	422.2464	426.4764	436.0905 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	119.4715	120.0170	120.5676	123.3980	123.9801	126.9750	126.9750	127.5915	125.7599	123.9801	122.8214	121.6840
alpha	8.9648	9.0011	9.0378	9.2265	9.2653	9.4650	9.4650	9.5061	9.3840	9.2653	9.1881	9.1123
util living area	0.9844	0.9698	0.9374	0.8169	0.6307	0.4308	0.3115	0.3433	0.5490	0.8377	0.9590	0.9867 (86)
MIT	20.6644	20.7506	20.8528	20.9655	20.9966	20.9999	21.0000	21.0000	20.9992	20.9642	20.8238	20.6567 (87)
Th 2	20.4300	20.4324	20.4349	20.4472	20.4497	20.4620	20.4620	20.4645	20.4571	20.4497	20.4447	20.4398 (88)
util rest of house	0.9803	0.9625	0.9232	0.7881	0.5946	0.3946	0.2734	0.3034	0.5062	0.8052	0.9480	0.9832 (89)
MIT 2	20.0457	20.1544	20.2795	20.4155	20.4471	20.4619	20.4620	20.4645	20.4566	20.4181	20.2557	20.0448 (90)
Living area fraction									FLA = Living area / (4) =			0.3702 (91)
MIT	20.2747	20.3751	20.4917	20.6191	20.6505	20.6611	20.6611	20.6627	20.6575	20.6202	20.4660	20.2713 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2747	20.3751	20.4917	20.6191	20.6505	20.6611	20.6611	20.6627	20.6575	20.6202	20.4660	20.2713 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9790	0.9617	0.9247	0.7973	0.6079	0.4080	0.2875	0.3182	0.5220	0.8157	0.9485	0.9820 (94)
Useful gains	439.2241	458.9242	449.6886	407.4310	319.5666	212.1309	142.1519	148.4849	231.4986	344.4061	404.5159	428.2265 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	594.2846	573.0817	515.7809	422.0954	320.8636	212.1568	142.1526	148.4868	231.7497	359.2113	483.6729	587.0061 (97)
Space heating kWh	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321 (98a)
Space heating requirement - total per year (kWh/year)												438.9150
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												438.9150
Space heating per m2										(98c) / (4) =		7.0793 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater													(216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													438.9150 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													340.0764
Water heating fuel used													726.6710 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													150.5841 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	150.5841	(231)
Electricity for lighting (calculated in Appendix L)	145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1461.2982	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	438.9150	0.1586	69.5989 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			172.2123 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8979 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			214.0466 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	438.9150	1.5870	696.5574 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1802.6669 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			2253.0729 (286)
Dwelling Primary energy Rate (DPER)			36.3400 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000	2.3700	146.9400
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1361 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.3861		(18)
Number of sides sheltered	3		(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.2992 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			8.6000	1.1450	9.8473			(27)					
External Wall	22.2100	8.6000	13.6100	0.1800	2.4498			(29a)					
External Roof 1	62.0000		62.0000	0.1100	6.8200			(30)					
Total net area of external elements Aum(A, m2)			84.2100					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.1171			(33)					
Main dwelling													
Corridor			32.4500	0.0000	0.0000			(32)					
Party Wall			23.4200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							258.0690	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				4.7700	0.0500		0.2385						
E3 Sill				4.7700	0.0500		0.2385						
E4 Jamb				10.8200	0.0500		0.5410						
E18 Party wall between dwellings				4.7400	0.0600		0.2844						
E7 Party floor between dwellings (in blocks of flats)				9.3700	0.0700		0.6559						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.5700	0.0000		0.0000						
P4 Party wall - Roof (insulation at ceiling level)				23.5700	0.1200		2.8284						
E14 Flat roof				9.3700	0.0800		0.7496						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								5.5363 (36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	24.6534 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 27.7742	Feb 27.6372	Mar 27.5029	Apr 26.8719	May 26.7539	Jun 26.2044	Jul 26.2044	Aug 26.1026	Sep 26.4160	Oct 26.7539	Nov 26.9927	Dec 27.2424	(38)
Heat transfer coeff	52.4277	52.2906	52.1563	51.5254	51.4073	50.8578	50.8578	50.7560	51.0695	51.4073	51.6461	51.8958	(39)
Average = Sum(39)m / 12 =												51.5248	
HLP	Jan 0.8456	Feb 0.8434	Mar 0.8412	Apr 0.8311	May 0.8292	Jun 0.8203	Jul 0.8203	Aug 0.8186	Sep 0.8237	Oct 0.8292	Nov 0.8330	Dec 0.8370	(40)
HLP (average)												0.8310	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594	58.1594	(42a)
Hot water usage for baths													
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	25.1446	(42b)
Hot water usage for other uses													
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	35.4969	(42c)
Average daily hot water use (litres/day)													109.4892 (43)
Daily hot water use	Jan 119.1099	Feb 116.5670	Mar 113.4700	Apr 108.7601	May 104.9355	Jun 100.8238	Jul 99.2431	Aug 102.3267	Sep 105.5789	Oct 109.8956	Nov 114.6781	Dec 118.8009	(44)
Energy conte	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020	27.9020	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084	232.6084	(62)
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)
12Total per year (kWh/year)													2119.2152 (64)
Electric shower(s)													2119 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254	99.1254	(65)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
(66)m	Jan 101.8790	Feb 101.8790	Mar 101.8790	Apr 101.8790	May 101.8790	Jun 101.8790	Jul 101.8790	Aug 101.8790	Sep 101.8790	Oct 101.8790	Nov 101.8790	Dec 101.8790	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092	170.1092	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)													
134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331	133.2331	(72)
Total internal gains	465.4239	475.4341	456.2523	440.3782	419.0310	401.6141	386.9341	388.0709	399.4389	415.6535	440.1792	456.3976	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Northwest	8.6000				11.2829		0.6300		0.7000	0.7700	29.6546 (81)
Solar gains	29.6546	60.3629	108.7547	178.6064	240.0821	255.9529	239.4387	190.8833	132.5193	73.7682	24.2175 (83)
Total gains	495.0786	535.7970	565.0070	618.9846	659.1131	657.5670	626.3728	578.9542	531.9582	489.4218	480.6150 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	84.7744	84.9965	85.2154	86.2589	86.4570	87.3911	87.3911	87.5664	87.0289	86.4570	86.0572	85.6432
alpha	6.6516	6.6664	6.6810	6.7506	6.7638	6.8261	6.8261	6.8378	6.8019	6.7638	6.7371	6.7095
util living area	0.9901	0.9815	0.9596	0.8741	0.7006	0.4929	0.3571	0.4028	0.6483	0.9063	0.9776	0.9917 (86)
MIT	20.3131	20.4366	20.6182	20.8527	20.9708	20.9976	20.9998	20.9995	20.9865	20.8372	20.5514	20.2944 (87)
Th 2	20.2140	20.2159	20.2177	20.2265	20.2281	20.2358	20.2358	20.2372	20.2328	20.2281	20.2248	20.2214 (88)
util rest of house	0.9871	0.9762	0.9481	0.8440	0.6504	0.4350	0.2952	0.3363	0.5821	0.8760	0.9701	0.9892 (89)
MIT 2	19.4235	19.5802	19.8062	20.0861	20.2058	20.2345	20.2357	20.2370	20.2247	20.0763	19.7328	19.4058 (90)
Living area fraction	19.7528	19.8972	20.1068	20.3699	20.4890	20.5170	20.5185	20.5193	FLA = Living area / (4) =	20.3579	20.0358	0.3702 (91)
MIT	19.7528	19.8972	20.1068	20.3699	20.4890	20.5170	20.5185	20.5193	20.5067	20.3579	20.0358	19.7347 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7528	19.8972	20.1068	20.3699	20.4890	20.5170	20.5185	20.5193	20.5067	20.3579	20.0358	19.7347 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9850	0.9736	0.9462	0.8500	0.6678	0.4564	0.3181	0.3609	0.6062	0.8817	0.9679	0.9872 (94)
Useful gains	487.6326	521.6403	534.6190	526.1096	440.1474	300.1358	199.2335	208.9514	322.4612	431.5088	462.1783	474.4645 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	810.1553	784.2137	709.6794	590.9905	451.8196	300.9235	199.2882	209.0776	327.1852	501.6285	668.0850	806.1866 (97)
Space heating kWh	239.9569	176.4493	130.2449	46.7143	8.6841	0.0000	0.0000	0.0000	0.0000	52.1690	148.2528	246.8013 (98a)
Space heating requirement - total per year (kWh/year)												1049.2727
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	239.9569	176.4493	130.2449	46.7143	8.6841	0.0000	0.0000	0.0000	0.0000	52.1690	148.2528	246.8013 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1049.2727
Space heating per m2										(98c) / (4) =		16.9238 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	239.9569	176.4493	130.2449	46.7143	8.6841	0.0000	0.0000	0.0000	0.0000	52.1690	148.2528	246.8013 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	259.9750	191.1693	141.1104	50.6114	9.4086	0.0000	0.0000	0.0000	0.0000	56.5212	160.6206	267.3903 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Efficiency of water heater (217)m	84.3752	83.9602	83.1621	81.5533	80.1977	79.8000	79.8000	79.8000	79.8000	81.6947	83.5571	79.8000 (216)
Fuel for water heating, kWh/month	247.1643	219.7118	236.0165	212.7585	210.4591	191.4084	189.6254	196.7757	198.4878	215.2077	222.5035	244.3860 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa (234a)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting (235c)m	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-9.0502	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	1136.8068 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2584.5047 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	161.8073 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2947.6171 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1136.8068	0.2100	238.7294 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2584.5047	0.2100	542.7460 (264)
Space and water heating			781.4754 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	161.8073	0.1443	23.3538 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	0.1339	-66.4499
PV Unit electricity exported	-525.1326	0.1255	-65.9198
Total			-132.3697 (269)
Total CO2, kg/year			684.3888 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1136.8068	1.1300	1284.5917 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2584.5047	1.1300	2920.4904 (278)
Space and water heating			4205.0821 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			3599.4696 (286)
Target Primary Energy Rate (TPER)			58.0600 (287)

Full SAP Calculation Printout



Property Reference	Plot 18			Issued on Date	27/08/2025
Assessment Reference	Plot 18	Prop Type Ref			
Property	Flat 18, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.45	TER	11.04
Environmental	98 A	% DER < TER			68.75
CO ₂ Emissions (t/year)	0.18	DFEE	21.76	TFEE	24.41
Compliance Check	See BREL	% DFEE < TFEE			10.87
% DPER < TPER	37.41	DPER	36.34	TPER	58.06
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume			146.9400 (5)

2. Ventilation rate

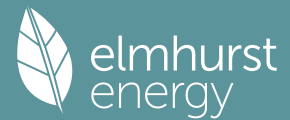
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.6000 (17)
Infiltration rate	0.3161 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2450 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3124	0.3062	0.3001	0.2695	0.2634	0.2327	0.2327	0.2266	0.2450	0.2634	0.2756	0.2879 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5488	0.5469	0.5450	0.5363	0.5347	0.5271	0.5271	0.5257	0.5300	0.5347	0.5380	0.5414 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements Aum(A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	16.6926	(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16000.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							258.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				10.8200	0.0300	0.3246	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	23.5700	0.1280	3.0170
E14 Flat roof	9.3700	0.1600	1.4992
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0958 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	21.7883 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	26.6106	26.5187	26.4287	26.0058	25.9267	25.5584	25.5584	25.4902	25.7002	25.9267	26.0868	26.2541 (38)
Average = Sum(39)m / 12 =	48.3989	48.3071	48.2170	47.7941	47.7150	47.3467	47.3467	47.2785	47.4886	47.7150	47.8751	48.0424 (39)
												47.7938
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7806	0.7791	0.7777	0.7709	0.7696	0.7637	0.7637	0.7626	0.7659	0.7696	0.7722	0.7749 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												25.2299 (42b)
Hot water usage for other uses												35.4969 (42c)
Average daily hot water use (litres/day)												55.6619 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414 (44)
Energy conte	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499 (45)
Energy content (annual)												924.4260
Distribution loss (46)m = 0.15 x (45)m												0.0000 (46)
Water storage loss:												
Total storage loss												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (64)
12Total per year (kWh/year)												785.7621 (64)
Electric shower(s)												786 (64)
	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551 (64a)
Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656 (65)
												531.8370 (64a)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
	374.0866	385.4940	368.5137	358.7915	340.9103	330.3519	318.1474	317.5698	326.9630	335.8843	354.7262	365.8842 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northwest				8.6000	11.2829	0.2400	0.0000	0.7700	17.9318 (81)			
Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	392.0184	421.9946	434.2762	466.7924	486.0846	485.1231	462.9328	432.9943	407.0956	380.4909	377.2890	380.5282 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



tau	91.8310	92.0056	92.1774	92.9930	93.1472	93.8719	93.8719	94.0073	93.5914	93.1472	92.8358	92.5124
alpha	7.1221	7.1337	7.1452	7.1995	7.2098	7.2581	7.2581	7.2672	7.2394	7.2098	7.1891	7.1675
util living area	0.9970	0.9941	0.9871	0.9501	0.8347	0.6168	0.4493	0.5006	0.7657	0.9612	0.9926	0.9976 (86)
MIT	20.2468	20.3535	20.5117	20.7563	20.9312	20.9931	20.9994	20.9987	20.9711	20.7641	20.4742	20.2278 (87)
Th 2	20.2702	20.2714	20.2727	20.2786	20.2798	20.2849	20.2849	20.2859	20.2829	20.2798	20.2775	20.2752 (88)
util rest of house	0.9961	0.9923	0.9828	0.9340	0.7912	0.5514	0.3767	0.4238	0.7010	0.9453	0.9899	0.9968 (89)
MIT 2	19.5801	19.6870	19.8444	20.0837	20.2350	20.2819	20.2848	20.2855	20.2680	20.0950	19.8123	19.5653 (90)
Living area fraction	19.8269	19.9337	20.0914	20.3327	20.4927	20.5452	20.5493	20.5495	20.5283	20.3426	20.0573	19.8105 (92)
MIT	19.8269	19.9337	20.0914	20.3327	20.4927	20.5452	20.5493	20.5495	20.5283	20.3426	20.0573	19.8105 (93)
Temperature adjustment												0.0000
adjusted MIT												19.8105 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9953	0.9912	0.9815	0.9353	0.8048	0.5755	0.4036	0.4523	0.7241	0.9469	0.9888	0.9962 (94)
Useful gains	390.1884	418.2722	426.2507	436.6070	391.2139	279.1846	186.8310	195.8415	294.7900	360.2943	373.0747	379.0739 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	751.4844	726.2337	655.3367	546.4143	419.5432	281.4835	186.9858	196.1824	305.2704	464.8706	620.3319	749.9684 (97)
Space heating kWh	268.8043	206.9501	170.4400	79.0613	21.0770	0.0000	0.0000	0.0000	0.0000	77.8048	178.0252	275.9455 (98a)
Space heating requirement - total per year (kWh/year)												1278.1080
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	268.8043	206.9501	170.4400	79.0613	21.0770	0.0000	0.0000	0.0000	0.0000	77.8048	178.0252	275.9455 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1278.1080
Space heating per m2										(98c) / (4) =		20.6146 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	445.0589	350.3655	359.3164	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9373	0.9759	0.9610	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	417.1695	341.9328	345.3047	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	523.1479	499.4171	466.4293	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	76.3045	117.1683	90.1167	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	19.0761	29.2921	22.5292	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												70.8974 (107)
Energy for space heating												20.6146 (99)
Energy for space cooling												1.1435 (108)
Total												21.7582 (109)
Fabric Energy Efficiency (DFEE)												21.8 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1361 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3861 (18)
Number of sides sheltered		3 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2992 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			8.6000	1.1450	9.8473			(27)
External Wall	22.2100	8.6000	13.6100	0.1800	2.4498			(29a)
External Roof 1	62.0000		62.0000	0.1100	6.8200			(30)
Total net area of external elements Aum(A, m2)			84.2100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.1171			(33)
Main dwelling								
Corridor			32.4500	0.0000	0.0000			(32)
Party Wall			23.4200	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							258.0690	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0500		0.2385	
E3 Sill				4.7700	0.0500		0.2385	
E4 Jamb				10.8200	0.0500		0.5410	
E18 Party wall between dwellings				4.7400	0.0600		0.2844	
E7 Party floor between dwellings (in blocks of flats)				9.3700	0.0700		0.6559	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.5700	0.0000		0.0000	
P4 Party wall - Roof (insulation at ceiling level)				23.5700	0.1200		2.8284	
E14 Flat roof				9.3700	0.0800		0.7496	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.5363	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	24.6534	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376	(42)
Hot water usage for mixer showers														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths														
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446			(42b)
Hot water usage for other uses														
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969			(42c)
Average daily hot water use (litres/day)													55.6619	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414			(44)
Energy content (annual)	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499		(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		924.4260		
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(46)
Water storage loss:														
Total storage loss														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(56)
If cylinder contains dedicated solar storage														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month														
81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074			(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h														
81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074			(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		785.7621		(64)
Electric shower(s)	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551		(64a)
												531.8370		(64a)
Heat gains from water heating, kWh/month														
32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656			(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
	371.1971	382.2948	365.6242	355.8056	338.0207	327.3660	315.2579	314.6802	323.9771	332.9947	351.7403	362.9947 (73)

6. Solar gains

[Jan]													
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	
Northwest					8.6000	11.2829	0.6300		0.7000		0.7700	29.6546 (81)	
Solar gains	29.6546	60.3629	108.7547	178.6064	240.0821	255.9529	239.4387	190.8833	132.5193	73.7682	37.3132	24.2175 (83)	
Total gains	400.8517	442.6577	474.3788	534.4121	578.1028	583.3189	554.6966	505.5635	456.4964	406.7629	389.0535	387.2121 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	84.7744	84.9965	85.2154	86.2589	86.4570	87.3911	87.3911	87.5664	87.0289	86.4570	86.0572	85.6432
util living area	6.6516	6.6664	6.6810	6.7506	6.7638	6.8261	6.8261	6.8378	6.8019	6.7638	6.7371	6.7095
	0.9970	0.9934	0.9830	0.9276	0.7757	0.5534	0.4029	0.4606	0.7370	0.9572	0.9925	0.9976 (86)
MIT	20.1518	20.2830	20.4828	20.7717	20.9469	20.9951	20.9995	20.9989	20.9715	20.7403	20.4074	20.1332 (87)
Th 2	20.2140	20.2159	20.2177	20.2265	20.2281	20.2358	20.2358	20.2372	20.2328	20.2281	20.2248	20.2214 (88)
util rest of house	0.9960	0.9913	0.9774	0.9060	0.7264	0.4894	0.3332	0.3849	0.6686	0.9396	0.9897	0.9968 (89)
MIT 2	19.4385	19.5703	19.7686	20.0488	20.1951	20.2337	20.2357	20.2369	20.2185	20.0265	19.7018	19.4261 (90)
Living area fraction	19.7026	19.8341	20.0329	20.3164	20.4734	20.5156	20.5184	20.5189	20.4972	20.2907	19.9629	19.6878 (92)
MIT	19.7026	19.8341	20.0329	20.3164	20.4734	20.5156	20.5184	20.5189	20.4972	20.2907	19.9629	19.6878 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7026	19.8341	20.0329	20.3164	20.4734	20.5156	20.5184	20.5189	20.4972	20.2907	19.9629	19.6878 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9952	0.9900	0.9758	0.9088	0.7427	0.5130	0.3591	0.4129	0.6931	0.9413	0.9885	0.9961 (94)
Ext temp.	398.9291	438.2437	462.8990	485.6496	429.3719	299.2575	199.1639	208.7681	316.4013	382.8665	384.5984	385.7126 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	807.5202	780.9137	705.8283	588.2330	451.0178	300.8534	199.2818	209.0610	326.7035	498.1745	664.3210	803.7538 (97)
Space heating requirement - total per year (kWh/year)	303.9918	230.2742	180.7394	73.8600	16.1045	0.0000	0.0000	0.0000	0.0000	85.7891	201.4002	311.0227 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	303.9918	230.2742	180.7394	73.8600	16.1045	0.0000	0.0000	0.0000	0.0000	85.7891	201.4002	311.0227 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1403.1820
Space heating per m2										(98c) / (4) =		22.6320 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9619	0.9855	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	459.8333	370.8775	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	641.1594	609.7777	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	130.5547	177.7418	133.1558	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	32.6387	44.4354	33.2889	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												110.3631 (107)
Energy for space heating												22.6320 (99)
Energy for space cooling												1.7800 (108)
Total												24.4120 (109)
Fabric Energy Efficiency (TFEE)												24.4 (109)

Full SAP Calculation Printout



Property Reference	Plot 18			Issued on Date	27/08/2025
Assessment Reference	Plot 18	Prop Type Ref			
Property	Flat 18, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.45	TER	11.04
Environmental	98 A	% DER < TER			68.75
CO ₂ Emissions (t/year)	0.18	DFEE	21.76	TFEE	24.41
Compliance Check	See BREL	% DFEE < TFEE			10.87
% DPER < TPER	37.41	DPER	36.34	TPER	58.06
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.6000	(17)
Infiltration rate	0.1800	(18)
Number of sides sheltered	3	(19)

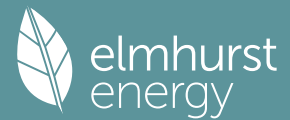
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1395 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1779	0.1744	0.1709	0.1535	0.1500	0.1325	0.1325	0.1290	0.1395	0.1500	0.1569	0.1639 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3179	0.3144	0.3109	0.2934	0.2900	0.2725	0.2725	0.2690	0.2795	0.2900	0.2969	0.3039 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements A _{um} (A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.6926		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16000.2800 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							258.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	23.5700	0.1280	3.0170
E14 Flat roof	9.3700	0.1600	1.4992

Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0958 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		21.7883 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.4132	15.2441	15.0750	14.2294	14.0603	13.2148	13.2148	13.0457	13.5530	14.0603	14.3986	14.7368 (38)
Average = Sum(39)m / 12 =	37.2015	37.0324	36.8633	36.0178	35.8487	35.0031	35.0031	34.8340	35.3413	35.8487	36.1869	36.5251 (39)
												35.9755
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6000	0.5973	0.5946	0.5809	0.5782	0.5646	0.5646	0.5618	0.5700	0.5782	0.5837	0.5891 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)										Total = Sum(45)m =		2153.9058
Distribution loss (46)m = 0.15 x (45)m												
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Pumps, fans	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
	430.7076	440.7252	420.5228	403.0119	380.5447	365.1370	349.6164	351.2521	363.3156	377.6397	403.9136	421.4465 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	8.6000											
Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	448.6394	477.2258	486.2853	511.0128	525.7191	519.9083	494.4017	466.6767	443.4482	422.2464	426.4764	436.0905 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	119.4715	120.0170	120.5676	123.3980	123.9801	126.9750	126.9750	127.5915	125.7599	123.9801	122.8214	121.6840
alpha	8.9648	9.0011	9.0378	9.2265	9.2653	9.4650	9.4650	9.5061	9.3840	9.2653	9.1881	9.1123
util living area	0.9844	0.9698	0.9374	0.8169	0.6307	0.4308	0.3115	0.3433	0.5490	0.8377	0.9590	0.9867 (86)
MIT	20.6644	20.7506	20.8528	20.9655	20.9966	20.9999	21.0000	21.0000	20.9992	20.9642	20.8238	20.6567 (87)
Th 2	20.4300	20.4324	20.4349	20.4472	20.4497	20.4620	20.4620	20.4645	20.4571	20.4497	20.4447	20.4398 (88)
util rest of house	0.9803	0.9625	0.9232	0.7881	0.5946	0.3946	0.2734	0.3034	0.5062	0.8052	0.9480	0.9832 (89)
MIT 2	20.0457	20.1544	20.2795	20.4155	20.4471	20.4619	20.4620	20.4645	20.4566	20.4181	20.2557	20.0448 (90)
Living area fraction									FLA = Living area / (4) =			0.3702 (91)
MIT	20.2747	20.3751	20.4917	20.6191	20.6505	20.6611	20.6611	20.6627	20.6575	20.6202	20.4660	20.2713 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2747	20.3751	20.4917	20.6191	20.6505	20.6611	20.6611	20.6627	20.6575	20.6202	20.4660	20.2713 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9790	0.9617	0.9247	0.7973	0.6079	0.4080	0.2875	0.3182	0.5220	0.8157	0.9485	0.9820 (94)
Useful gains	439.2241	458.9242	449.6886	407.4310	319.5666	212.1309	142.1519	148.4849	231.4986	344.4061	404.5159	428.2265 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	594.2846	573.0817	515.7809	422.0954	320.8636	212.1568	142.1526	148.4868	231.7497	359.2113	483.6729	587.0061 (97)
Space heating kWh	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321 (98a)
Space heating requirement - total per year (kWh/year)												438.9150
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												438.9150
Space heating per m2										(98c) / (4) =		7.0793 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	115.3650	76.7138	49.1727	10.5584	0.9650	0.0000	0.0000	0.0000	0.0000	11.0151	56.9930	118.1321	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(217)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												438.9150	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												150.5841	(230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	150.5841	(231)
Electricity for lighting (calculated in Appendix L)	145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1461.2982	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	438.9150	0.1586	69.5989 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			172.2123 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8979 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			214.0466 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	438.9150	1.5870	696.5574 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1802.6669 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			2253.0729 (286)
Dwelling Primary energy Rate (DPER)			36.3400 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000	2.3700	146.9400
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1361 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3861 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2992 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3815	0.3740	0.3666	0.3292	0.3217	0.2843	0.2843	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
Effective ac	0.5728	0.5700	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings	NetArea	U-value	A x U	K-value	A x K					
Main dwelling	m2		m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opening Type				8.6000	1.1450	9.8473			(27)				
External Wall	22.2100		8.6000	13.6100	0.1800	2.4498			(29a)				
External Roof 1	62.0000			62.0000	0.1100	6.8200			(30)				
Total net area of external elements Aum(A, m2)				84.2100					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		19.1171			(33)				
Main dwelling													
Corridor				32.4500	0.0000	0.0000			(32)				
Party Wall				23.4200	0.0000	0.0000			(32)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K									258.0690 (35)				
List of Thermal Bridges													
K1 Element					Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)					4.7700	0.0500	0.2385						
E3 Sill					4.7700	0.0500	0.2385						
E4 Jamb					10.8200	0.0500	0.5410						
E18 Party wall between dwellings					4.7400	0.0600	0.2844						
E7 Party floor between dwellings (in blocks of flats)					9.3700	0.0700	0.6559						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					23.5700	0.0000	0.0000						
P4 Party wall - Roof (insulation at ceiling level)					23.5700	0.1200	2.8284						
E14 Flat roof					9.3700	0.0800	0.7496						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)									5.5363 (36)				
Point Thermal bridges									(36a) = 0.0000				
Total fabric heat loss									(33) + (36) + (36a) = 24.6534 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 27.7742	Feb 27.6372	Mar 27.5029	Apr 26.8719	May 26.7539	Jun 26.2044	Jul 26.2044	Aug 26.1026	Sep 26.4160	Oct 26.7539	Nov 26.9927	Dec 27.2424	(38)
Heat transfer coeff	52.4277	52.2906	52.1563	51.5254	51.4073	50.8578	50.8578	50.7560	51.0695	51.4073	51.6461	51.8958	(39)
Average = Sum(39)m / 12 =	51.5248												
HLP	Jan 0.8456	Feb 0.8434	Mar 0.8412	Apr 0.8311	May 0.8292	Jun 0.8203	Jul 0.8203	Aug 0.8186	Sep 0.8237	Oct 0.8292	Nov 0.8330	Dec 0.8370	(40)
HLP (average)	0.8310												
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594	(42a)	
Hot water usage for baths													
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)	
Hot water usage for other uses													
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)	
Average daily hot water use (litres/day)													109.4892 (43)
Daily hot water use	Jan 119.1099	Feb 116.5670	Mar 113.4700	Apr 108.7601	May 104.9355	Jun 100.8238	Jul 99.2431	Aug 102.3267	Sep 105.5789	Oct 109.8956	Nov 114.6781	Dec 118.8009	(44)
Energy conte	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135	(45)
Energy content (annual)											Total = Sum(45)m =	1818.5931	
Distribution loss (46)m = 0.15 x (45)m													
28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020	(46)	
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084	(62)
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =	2119.2152 (64)			2119 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)
Heat gains from water heating, kWh/month	99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254	(65)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
(66)m	Jan 101.8790	Feb 101.8790	Mar 101.8790	Apr 101.8790	May 101.8790	Jun 101.8790	Jul 101.8790	Aug 101.8790	Sep 101.8790	Oct 101.8790	Nov 101.8790	Dec 101.8790	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331	(72)
Total internal gains	465.4239	475.4341	456.2523	440.3782	419.0310	401.6141	386.9341	388.0709	399.4389	415.6535	440.1792	456.3976	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Northwest	8.6000				11.2829		0.6300		0.7000	0.7700	29.6546 (81)
Solar gains	29.6546	60.3629	108.7547	178.6064	240.0821	255.9529	239.4387	190.8833	132.5193	73.7682	24.2175 (83)
Total gains	495.0786	535.7970	565.0070	618.9846	659.1131	657.5670	626.3728	578.9542	531.9582	489.4218	480.6150 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)											
tau	84.7744	84.9965	85.2154	86.2589	86.4570	87.3911	87.3911	87.5664	87.0289	86.4570	86.0572
alpha	6.6516	6.6664	6.6810	6.7506	6.7638	6.8261	6.8261	6.8378	6.8019	6.7638	6.7371
util living area	0.9901	0.9815	0.9596	0.8741	0.7006	0.4929	0.3571	0.4028	0.6483	0.9063	0.9776
MIT	20.3131	20.4366	20.6182	20.8527	20.9708	20.9976	20.9998	20.9995	20.9865	20.8372	20.5514
Th 2	20.2140	20.2159	20.2177	20.2265	20.2281	20.2358	20.2358	20.2372	20.2328	20.2281	20.2248
util rest of house	0.9871	0.9762	0.9481	0.8440	0.6504	0.4350	0.2952	0.3363	0.5821	0.8760	0.9701
MIT 2	19.4235	19.5802	19.8062	20.0861	20.2058	20.2345	20.2357	20.2370	20.2247	20.0763	19.7328
Living area fraction	19.7528	19.8972	20.1068	20.3699	20.4890	20.5170	20.5185	20.5193	20.5067	20.3579	20.0358
Temperature adjustment	19.7528	19.8972	20.1068	20.3699	20.4890	20.5170	20.5185	20.5193	20.5067	20.3579	20.0358
adjusted MIT	19.7528	19.8972	20.1068	20.3699	20.4890	20.5170	20.5185	20.5193	20.5067	20.3579	20.0358

8. Space heating requirement

Utilisation	0.9850	0.9736	0.9462	0.8500	0.6678	0.4564	0.3181	0.3609	0.6062	0.8817	0.9679	0.9872 (94)
Useful gains	487.6326	521.6403	534.6190	526.1096	440.1474	300.1358	199.2335	208.9514	322.4612	431.5088	462.1783	474.4645 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	810.1553	784.2137	709.6794	590.9905	451.8196	300.9235	199.2882	209.0776	327.1852	501.6285	668.0850	806.1866 (97)
Space heating kWh	239.9569	176.4493	130.2449	46.7143	8.6841	0.0000	0.0000	0.0000	0.0000	52.1690	148.2528	246.8013 (98a)
Space heating requirement - total per year (kWh/year)												1049.2727
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	239.9569	176.4493	130.2449	46.7143	8.6841	0.0000	0.0000	0.0000	0.0000	52.1690	148.2528	246.8013 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1049.2727
Space heating per m2										(98c) / (4) =		16.9238 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	239.9569	176.4493	130.2449	46.7143	8.6841	0.0000	0.0000	0.0000	0.0000	52.1690	148.2528	246.8013 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	259.9750	191.1693	141.1104	50.6114	9.4086	0.0000	0.0000	0.0000	0.0000	56.5212	160.6206	267.3903 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Efficiency of water heater (217)m	84.3752	83.9602	83.1621	81.5533	80.1977	79.8000	79.8000	79.8000	79.8000	81.6947	83.5571	79.8000 (216)
Fuel for water heating, kWh/month	247.1643	219.7118	236.0165	212.7585	210.4591	191.4084	189.6254	196.7757	198.4878	215.2077	222.5035	244.3860 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.3041	7.0685	7.3041	7.3041 (231)
Lighting	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.0502	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	1136.8068 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2584.5047 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	161.8073 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1021.5018 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2947.6171 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1136.8068	0.2100	238.7294 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2584.5047	0.2100	542.7460 (264)
Space and water heating			781.4754 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	161.8073	0.1443	23.3538 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	0.1339	-66.4499
PV Unit electricity exported	-525.1326	0.1255	-65.9198
Total			-132.3697 (269)
Total CO2, kg/year			684.3888 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1136.8068	1.1300	1284.5917 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2584.5047	1.1300	2920.4904 (278)
Space and water heating			4205.0821 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			3599.4696 (286)
Target Primary Energy Rate (TPER)			58.0600 (287)

Full SAP Calculation Printout



Property Reference	Plot 18			Issued on Date	27/08/2025
Assessment Reference	Plot 18	Prop Type Ref			
Property	Flat 18, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	88 B	DER	3.45	TER	11.04
Environmental	98 A	% DER < TER			68.75
CO ₂ Emissions (t/year)	0.18	DFEE	21.76	TFEE	24.41
Compliance Check	See BREL	% DFEE < TFEE			10.87
% DPER < TPER	37.41	DPER	36.34	TPER	58.06
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.6000 (17)
Infiltration rate	0.1800 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1395 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1779	0.1744	0.1709	0.1535	0.1500	0.1325	0.1325	0.1290	0.1395	0.1500	0.1569	0.1639 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3179	0.3144	0.3109	0.2934	0.2900	0.2725	0.2725	0.2690	0.2795	0.2900	0.2969	0.3039 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements A _{um} (A, m ²)			84.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.6926		(33)
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16000.2800 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							258.0690 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						4.7700	0.0340	0.1622				
E3 Sill						4.7700	0.0260	0.1240				
E4 Jamb						10.8200	0.0300	0.3246				
E18 Party wall between dwellings						4.7400	0.0290	0.1375				
E7 Party floor between dwellings (in blocks of flats)						9.3700	-0.0180	-0.1687				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						23.5700	0.0000	0.0000				
P4 Party wall - Roof (insulation at ceiling level)						23.5700	0.1280	3.0170				
E14 Flat roof						9.3700	0.1600	1.4992				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											5.0958	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	21.7883 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.4132	15.2441	15.0750	14.2294	14.0603	13.2148	13.2148	13.0457	13.5530	14.0603	14.3986	14.7368 (38)
Average = Sum(39)m / 12 =	37.2015	37.0324	36.8633	36.0178	35.8487	35.0031	35.0031	34.8340	35.3413	35.8487	36.1869	36.5251 (39)
												35.9755
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6000	0.5973	0.5946	0.5809	0.5782	0.5646	0.5646	0.5618	0.5700	0.5782	0.5837	0.5891 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths												
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses												
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m												
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
												Total per year (kWh/year) = Sum(64)m = 2471.2368 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
Heat gains from water heating, kWh/month												
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)												
	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains												
	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	8.6000											17.9318 (81)

Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440 (83)
Total gains	493.9062	510.4571	524.4649	537.3951	546.4180	530.1973	504.7070	478.3694	457.5279	448.1234	458.0368	478.0608 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	119.4715	120.0170	120.5676	123.3980	123.9801	126.9750	126.9750	127.5915	125.7599	123.9801	122.8214	121.6840
alpha	8.9648	9.0011	9.0378	9.2265	9.2653	9.4650	9.4650	9.5061	9.3840	9.2653	9.1881	9.1123
util living area	0.9708	0.9549	0.9087	0.7858	0.6077	0.4225	0.3052	0.3350	0.5323	0.8020	0.9385	0.9753 (86)
MIT	20.7351	20.7966	20.8916	20.9747	20.9975	20.9999	21.0000	21.0000	20.9994	20.9748	20.8629	20.7241 (87)
Th 2	20.4300	20.4324	20.4349	20.4472	20.4497	20.4620	20.4620	20.4645	20.4571	20.4497	20.4447	20.4398 (88)
util rest of house	0.9639	0.9449	0.8908	0.7562	0.5726	0.3870	0.2678	0.2960	0.4907	0.7678	0.9239	0.9694 (89)
MIT 2	20.1327	20.2096	20.3233	20.4243	20.4478	20.4620	20.4620	20.4645	20.4567	20.4280	20.3011	20.1281 (90)
Living area fraction									fLA = Living area / (4) =			0.3702 (91)
MIT	20.3557	20.4269	20.5337	20.6280	20.6513	20.6611	20.6611	20.6627	20.6576	20.6304	20.5091	20.3487 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3557	20.4269	20.5337	20.6280	20.6513	20.6611	20.6611	20.6627	20.6576	20.6304	20.5091	20.3487 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9629	0.9448	0.8941	0.7661	0.5855	0.4001	0.2817	0.3104	0.5061	0.7794	0.9258	0.9683 (94)
Useful gains	475.5935	482.2675	468.9218	411.6985	319.9309	212.1353	142.1520	148.4853	231.5607	349.2576	424.0305	462.8939 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	597.2974	574.9993	517.3270	422.4164	320.8904	212.1572	142.1526	148.4868	231.7542	359.5758	485.2322	589.8321 (97)
Space heating kWh	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420 (98a)
Space heating requirement - total per year (kWh/year)												343.4917
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												343.4917
Space heating per m2										(98c) / (4) =		5.5402 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

0.0000 (201)

Fraction of space heat from main system(s)

1.0000 (202)

Fraction of main heating from main system 2

0.0000 (203)

Fraction of total heating from main system 1

1.0000 (204)

Fraction of total heating from main system 2

0.0000 (205)

Efficiency of main space heating system 1 (in %)

100.0000 (206)

Efficiency of main space heating system 2 (in %)

0.0000 (207)

Efficiency of secondary/supplementary heating system, %

0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												343.4917 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764
Water heating fuel used												726.6710 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

mechanical ventilation fans (SFP = 0.8400)

150.5841 (230a)

Total electricity for the above, kWh/year

150.5841 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1365.8749	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price £/year p/kWh	Fuel cost £/year	
Space heating - main system 1	343.4917	16.4900	56.6418	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	16.4900	119.8280	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313	(249)
Energy for lighting	145.1281	16.4900	23.9316	(250)
Additional standing charges			0.0000	(251)
Total energy cost			225.2328	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.7578	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	87.7162	
SAP rating (Section 12)		88	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	343.4917	0.1588	54.5295	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			157.1429	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	145.1281	0.1443	20.9465	(268)
Total CO2, kg/year			198.9773	(272)
CO2 emissions per m2			3.2100	(273)
EI value			97.5081	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.0000	(1b) x 2.3700	(2b) =	146.9400 (1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =
Dwelling volume				146.9400 (5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	$= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =$	0.0000 / (5) =
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.6000 (17)
Infiltration rate		0.1800 (18)
Number of sides sheltered		3 (19)
Shelter factor	$(20) = 1 - [0.075 \times (19)] =$	0.7750 (20)
Infiltration rate adjusted to include shelter factor	$(21) = (18) \times (20) =$	0.1395 (21)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1500	0.1465	0.1500	0.1360	0.1395	0.1186	0.1151	0.1151	0.1186	0.1325	0.1325	0.1360	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.2900	0.2865	0.2900	0.2760	0.2795	0.2586	0.2551	0.2551	0.2586	0.2725	0.2725	0.2760	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.6000	0.7752	6.6667			(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999	(29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000	(30)
Total net area of external elements Aum(A, m2)			84.2100					(31)
Fabric heat loss, W/K = Sum (A x U)								(32)
				(26)...(30) + (32) =	16.6926			(33)
Main dwelling								
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001	(32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000	(32)
Party Floor 1			62.0000			40.0000	2480.0000	(32d)
Internal Wall			96.0200			9.0000	864.1800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 16000.2800 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 258.0690 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	4.7700	0.0340	0.1622	
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240	
E3 Sill	10.8200	0.0300	0.3246	
E4 Jamb	4.7400	0.0290	0.1375	
E18 Party wall between dwellings	9.3700	-0.0180	-0.1687	
E7 Party floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.1280	3.0170	
P4 Party wall - Roof (insulation at ceiling level)	9.3700	0.1600	1.4992	
E14 Flat roof				5.0958 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000
Point Thermal Bridges				(36a) =
Total fabric heat loss				(33) + (36) + (36a) = 21.7883 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	14.0603	13.8912	14.0603	13.3839	13.5530	12.5384	12.3692	12.3692	12.5384	13.2148	13.2148	13.3839	(38)
Heat transfer coeff	35.8487	35.6796	35.8487	35.1722	35.3413	34.3267	34.1576	34.1576	34.3267	35.0031	35.0031	35.1722	(39)
Average = Sum(39)m / 12 =													35.0031

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.5782	0.5755	0.5782	0.5673	0.5700	0.5537	0.5509	0.5509	0.5537	0.5646	0.5646	0.5673	(40)
HLP (average)													0.5646
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	(42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)													129.6745 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Energy content (annual)										Total = Sum(45)m =			2153.9058
Distribution loss (46)m = 0.15 x (45)m													
	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)

Water storage loss:

Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)

If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h													
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Total per year (kWh/year) = Sum(64)m =													2471.2368 (64)

Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	8.6000		9.9768		0.2400		0.0000		0.7700		15.8559 (81)	
Solar gains	15.8559	33.1182	62.3563	104.4552	136.9322	149.4328	136.4321	108.1317	78.0748	43.2583	20.5050	13.9393 (83)
Total gains	491.8304	507.0747	521.0588	533.8494	538.1758	524.8589	496.3538	471.0766	455.4701	446.7751	455.9790	477.3561 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	123.9801	124.5678	123.9801	126.3645	125.7599	129.4772	130.1182	130.1182	129.4772	126.9750	126.9750	126.3645
alpha	9.2653	9.3045	9.2653	9.4243	9.3840	9.6318	9.6745	9.6745	9.6318	9.4650	9.4650	9.4243
util living area	0.9552	0.9328	0.8776	0.7264	0.5377	0.3532	0.2615	0.2900	0.4821	0.7522	0.9103	0.9622 (86)
MIT	20.8119	20.8631	20.9297	20.9884	20.9992	21.0000	21.0000	21.0000	20.9998	20.9869	20.9116	20.7989 (87)
Th 2	20.4497	20.4521	20.4497	20.4595	20.4571	20.4719	20.4744	20.4744	20.4719	20.4620	20.4620	20.4595 (88)
util rest of house	0.9451	0.9189	0.8558	0.6946	0.5024	0.3186	0.2253	0.2519	0.4424	0.7157	0.8911	0.9536 (89)
MIT 2	20.2440	20.3066	20.3797	20.4496	20.4565	20.4719	20.4744	20.4744	20.4718	20.4513	20.3729	20.2374 (90)
Living area fraction	20.4542	20.5126	20.5833	20.6491	20.6574	20.6674	20.6689	20.6689	20.6672	20.6496	20.5723	20.4452 (91)
MIT	20.4542	20.5126	20.5833	20.6491	20.6574	20.6674	20.6689	20.6689	20.6672	20.6496	20.5723	20.4452 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4542	20.5126	20.5833	20.6491	20.6574	20.6674	20.6689	20.6689	20.6672	20.6496	20.5723	20.4452 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9452	0.9206	0.8614	0.7059	0.5155	0.3314	0.2387	0.2660	0.4571	0.7287	0.8953	0.9534 (94)
Useful gains	464.8962	466.7896	448.8149	376.8465	277.4215	173.9431	118.4903	125.3216	208.2079	325.5499	408.2273	455.0883 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	550.4284	528.5072	479.7740	381.5865	277.6921	173.9459	118.4904	125.3219	208.2681	330.7638	447.0716	546.7604 (97)
Space heating kWh	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040 (98a)
Space heating requirement - total per year (kWh/year)												231.8089
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												231.8089
Space heating per m ²										(98c) / (4) =		3.7389 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)

Water heating
Water heating requirement

Full SAP Calculation Printout



Efficiency of water heater	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
(217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893 (231)
Pumps and Fa	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Lighting	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (211)
Annual totals kWh/year												231.8089 (211)
Space heating fuel - main system 1												0.0000 (213)
Space heating fuel - main system 2												0.0000 (215)
Space heating fuel - secondary												340.0764
Efficiency of water heater												726.6710 (219)
Water heating fuel used												0.0000 (221)
Space cooling fuel												
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												150.5841 (230a)
Total electricity for the above, kWh/year												150.5841 (231)
Electricity for lighting (calculated in Appendix L)												145.1281 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1254.1922 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	231.8089	28.4300	65.9033 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	28.4300	206.5926 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111 (249)
Energy for lighting	145.1281	28.4300	41.2599 (250)
Additional standing charges			0.0000 (251)
Total energy cost			356.5668 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	231.8089	0.1592	36.9152 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			139.5287 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			181.3630 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	231.8089	1.5895	368.4583 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1474.5678 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			1924.9737 (286)

SAP 10 EPC IMPROVEMENTS

Plot 18

Current energy efficiency rating: B 88
Current environmental impact rating: A 98

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £357	Potential £357	Saving £0
Space heating	£109	£109	£0
Water heating	£207	£207	£0
Lighting	£41	£41	£0
Total cost of fuels	£357	£357	£0
Total cost of uses	£357	£357	£0
Delivered energy	20 kWh/m ²	20 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	31 kWh/m ²	31 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure Test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.6000 (17)
Infiltration rate		0.1800 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1395 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1779	0.1744	0.1709	0.1535	0.1500	0.1325	0.1325	0.1290	0.1395	0.1500	0.1569	0.1639 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												72.0000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3179	0.3144	0.3109	0.2934	0.2900	0.2725	0.2725	0.2690	0.2795	0.2900	0.2969	0.3039 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)

Full SAP Calculation Printout



External Roof 1	62.0000	62.0000	0.1200	7.4400	9.0000	558.0000	(30)
Total net area of external elements Aum(A, m2)		84.2100					(31)
Fabric heat loss, W/K = Sum (A x U)		(26)...(30) + (32) =		16.6926			(33)
Main dwelling							
Corridor		32.4500	0.0000	0.0000	180.0000	5841.0001	(32)
Party Wall		23.4200	0.0000	0.0000	180.0000	4215.6000	(32)
Party Floor 1		62.0000			40.0000	2480.0000	(32d)
Internal Wall		96.0200			9.0000	864.1800	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
(28)...(30) + (32) + (32a)...(32e) = 16000.2800 (34)
List of Thermal Bridges
258.0690 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	9.3700	-0.0180	-0.1687
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	23.5700	0.1280	3.0170
E14 Flat roof	9.3700	0.1600	1.4992
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.0958 (36)
Point Thermal bridges			0.0000 (36a)
Total fabric heat loss		(33) + (36) + (36a) =	21.7883 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.4132	15.2441	15.0750	14.2294	14.0603	13.2148	13.2148	13.0457	13.5530	14.0603	14.3986	14.7368 (38)
Average = Sum(39)m / 12 =	37.2015	37.0324	36.8633	36.0178	35.8487	35.0031	35.0031	34.8340	35.3413	35.8487	36.1869	36.5251 (39)
												35.9755
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6000	0.5973	0.5946	0.5809	0.5782	0.5646	0.5646	0.5618	0.5700	0.5782	0.5837	0.5891 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												
80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)	
Hot water usage for baths												
25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)	
Hot water usage for other uses												
35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)	
Average daily hot water use (litres/day)												129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)	
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2153.9058
33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)	
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)	
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h												
250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)	
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		PF Specific data or Table 6c		Access factor Table 6d		Gains W	

Northwest														
8.6000				11.2829		0.2400		0.0000		0.7700		17.9318 (81)		

Solar gains	17.9318	36.5006	65.7625	108.0009	145.1744	154.7712	144.7853	115.4245	80.1326	44.6066	22.5628	14.6440	(83)	
Total gains	493.9062	510.4571	524.4649	537.3951	546.4180	530.1973	504.7070	478.3694	457.5279	448.1234	458.0368	478.0608	(84)	

7. Mean internal temperature (heating season)														

Temperature during heating periods in the living area from Table 9, Th1 (C)														
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	119.4715	120.0170	120.5676	123.3980	123.9801	126.9750	126.9750	127.5915	125.7599	123.9801	122.8214	121.6840		
alpha	8.9648	9.0011	9.0378	9.2265	9.2653	9.4650	9.4650	9.5061	9.3840	9.2653	9.1881	9.1123		
util living area	0.9708	0.9549	0.9087	0.7858	0.6077	0.4225	0.3052	0.3350	0.5323	0.8020	0.9385	0.9753	(86)	
MIT	20.7351	20.7966	20.8916	20.9747	20.9975	20.9999	21.0000	21.0000	20.9994	20.9748	20.8629	20.7241	(87)	
Th 2	20.4300	20.4324	20.4349	20.4472	20.4497	20.4620	20.4620	20.4645	20.4571	20.4497	20.4447	20.4398	(88)	
util rest of house	0.9639	0.9449	0.8908	0.7562	0.5726	0.3870	0.2678	0.2960	0.4907	0.7678	0.9239	0.9694	(89)	
MIT 2	20.1327	20.2096	20.3233	20.4243	20.4478	20.4620	20.4620	20.4645	20.4567	20.4280	20.3011	20.1281	(90)	
Living area fraction	fLA = Living area / (4) =												0.3702 (91)	
MIT	20.3557	20.4269	20.5337	20.6280	20.6513	20.6611	20.6611	20.6627	20.6576	20.6304	20.5091	20.3487	(92)	
Temperature adjustment													0.0000	
adjusted MIT	20.3557	20.4269	20.5337	20.6280	20.6513	20.6611	20.6611	20.6627	20.6576	20.6304	20.5091	20.3487	(93)	

8. Space heating requirement														

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9629	0.9448	0.8941	0.7661	0.5855	0.4001	0.2817	0.3104	0.5061	0.7794	0.9258	0.9683	(94)	
Useful gains	475.5935	482.2675	468.9218	411.6985	319.9309	212.1353	142.1520	148.4853	231.5607	349.2576	424.0305	462.8939	(95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Heat loss rate W	597.2974	574.9993	517.3270	422.4164	320.8904	212.1572	142.1526	148.4868	231.7542	359.5758	485.2322	589.8321	(97)	
Space heating kWh	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420	(98a)	
Space heating requirement - total per year (kWh/year)													343.4917	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)													0.0000	
Space heating kWh	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													343.4917	
Space heating per m2	(98c) / (4) =												5.5402 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP														

Fraction of space heat from secondary/supplementary system (Table 11)														
Fraction of space heat from main system(s)														
Fraction of main heating from main system 2														
Fraction of total heating from main system 1														
Fraction of total heating from main system 2														
Efficiency of main space heating system 1 (in %)														
Efficiency of main space heating system 2 (in %)														
Efficiency of secondary/supplementary heating system, %														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	90.5477	62.3158	36.0135	7.7169	0.7138	0.0000	0.0000	0.0000	0.0000	7.6768	44.0652	94.4420	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2													0.0000 (213)	
Water heating														
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)	
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)	
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)	
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														

Full SAP Calculation Printout



(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												343.4917	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												150.5841	(230a)
Total electricity for the above, kWh/year												150.5841	(231)
Electricity for lighting (calculated in Appendix L)												145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1365.8749	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	343.4917	16.4900	56.6418 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	16.4900	119.8280 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313 (249)
Energy for lighting	145.1281	16.4900	23.9316 (250)
Additional standing charges			0.0000 (251)
Total energy cost			225.2328 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.7578 (257)
SAP value		87.7162
SAP rating (Section 12)		88 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	343.4917	0.1588	54.5295 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			157.1429 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			198.9773 (272)
CO2 emissions per m2			3.2100 (273)
EI value			97.5081
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

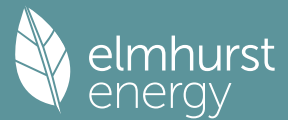
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)

Full SAP Calculation Printout



Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.6000 (17)
Infiltration rate 0.1800 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1395 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1500	0.1465	0.1500	0.1360	0.1395	0.1186	0.1151	0.1151	0.1186	0.1325	0.1325	0.1360 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2900	0.2865	0.2900	0.2760	0.2795	0.2586	0.2551	0.2551	0.2586	0.2725	0.2725	0.2760 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		
External Wall	22.2100	8.6000	13.6100	0.1900	2.5859	150.0000	2041.4999 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements Aum(A, m2)			84.2100				
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.6926		
Main dwelling							
Corridor			32.4500	0.0000	0.0000	180.0000	5841.0001 (32)
Party Wall			23.4200	0.0000	0.0000	180.0000	4215.6000 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall			96.0200			9.0000	864.1800 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 16000.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 258.0690 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	4.7700	0.0340	0.1622
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240
E3 Sill	10.8200	0.0300	0.3246
E4 Jamb	4.7400	0.0290	0.1375
E18 Party wall between dwellings	9.3700	-0.0180	-0.1687
E7 Party floor between dwellings (in blocks of flats)	23.5700	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.5700	0.1280	3.0170
P4 Party wall - Roof (insulation at ceiling level)	9.3700	0.1600	1.4992
E14 Flat roof			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.0958 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 21.7883 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	14.0603	13.8912	14.0603	13.3839	13.5530	12.5384	12.3692	12.3692	12.5384	13.2148	13.2148	13.3839 (38)
Heat transfer coeff	35.8487	35.6796	35.8487	35.1722	35.3413	34.3267	34.1576	34.1576	34.3267	35.0031	35.0031	35.1722 (39)
Average = Sum(39)m / 12 =												35.0031

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.5782	0.5755	0.5782	0.5673	0.5700	0.5537	0.5509	0.5509	0.5537	0.5646	0.5646	0.5673 (40)
HLP (average)												0.5646
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0376 (42)

Hot water usage for mixer showers 80.2768 79.0704 77.3124 73.9489 71.4666 68.6985 67.1251 68.8697 70.7822 73.7544 77.1902 79.9692 (42a)

Hot water usage for baths 25.2299 24.8552 24.3275 23.3546 22.6261 21.8183 21.3820 21.9060 22.4765 23.3408 24.3338 25.1446 (42b)

Hot water usage for other uses 35.4969 34.2061 32.9153 31.6245 30.3337 29.0429 29.0429 30.3337 31.6245 32.9153 34.2061 35.4969 (42c)

Average daily hot water use (litres/day) 129.6745 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy conte	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Energy content (annual)										Total = Sum(45)m =		2153.9058
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)

Full SAP Calculation Printout



FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
	Total per year (kWh/year) = Sum(64)m =											2471.2368 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924	(72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
-----												-----	
Northwest					8.6000	9.9768	0.2400	0.0000			0.7700	15.8559 (81)	
-----												-----	
Solar gains	15.8559	33.1182	62.3563	104.4552	136.9322	149.4328	136.4321	108.1317	78.0748	43.2583	20.5050	13.9393 (83)	
Total gains	491.8304	507.0747	521.0588	533.8494	538.1758	524.8589	496.3538	471.0766	455.4701	446.7751	455.9790	477.3561 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	123.9801	124.5678	123.9801	126.3645	125.7599	129.4772	130.1182	130.1182	129.4772	126.9750	126.9750	126.3645	
alpha	9.2653	9.3045	9.2653	9.4243	9.3840	9.6318	9.6745	9.6745	9.6318	9.4650	9.4650	9.4243	
util living area	0.9552	0.9328	0.8776	0.7264	0.5377	0.3532	0.2615	0.2900	0.4821	0.7522	0.9103	0.9622	(86)
MIT	20.8119	20.8631	20.9297	20.9884	20.9992	21.0000	21.0000	21.0000	20.9998	20.9869	20.9116	20.7989	(87)
Th 2	20.4497	20.4521	20.4497	20.4595	20.4571	20.4719	20.4744	20.4744	20.4719	20.4620	20.4620	20.4595	(88)
util rest of house	0.9451	0.9189	0.8558	0.6946	0.5024	0.3186	0.2253	0.2519	0.4424	0.7157	0.8911	0.9536	(89)
MIT 2	20.2440	20.3066	20.3797	20.4496	20.4565	20.4719	20.4744	20.4744	20.4718	20.4513	20.3729	20.2374	(90)
Living area fraction	20.4542	20.5126	20.5833	20.6491	20.6574	20.6674	20.6689	20.6689	20.6672	20.6496	20.5723	20.4452	(91)
MIT	20.4542	20.5126	20.5833	20.6491	20.6574	20.6674	20.6689	20.6689	20.6672	20.6496	20.5723	20.4452	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4542	20.5126	20.5833	20.6491	20.6574	20.6674	20.6689	20.6689	20.6672	20.6496	20.5723	20.4452	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	464.8962	466.7896	448.8149	376.8465	277.4215	173.9431	118.4903	125.3216	208.2079	325.5499	408.2273	455.0883	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	550.4284	528.5072	479.7740	381.5865	277.6921	173.9459	118.4904	125.3219	208.2681	330.7638	447.0716	546.7604	(97)
Space heating kWh	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040	(98a)
Space heating requirement - total per year (kWh/year)												231.8089	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												231.8089	
Space heating per m2										(98c) / (4) =		3.7389	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040	(98)
Space heating efficiency (main heating system 1)													

Full SAP Calculation Printout



Space heating fuel (main heating system)	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating efficiency (main heating system 2)	63.6359	41.4743	23.0336	3.4128	0.2013	0.0000	0.0000	0.0000	0.0000	3.8792	27.9679	68.2040 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												231.8089 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764
Water heating fuel used												726.6710 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												150.5841 (230a)
Total electricity for the above, kWh/year												150.5841 (231)
Electricity for lighting (calculated in Appendix L)												145.1281 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1254.1922 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	231.8089	28.4300	65.9033	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	28.4300	206.5926	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111	(249)
Energy for lighting	145.1281	28.4300	41.2599	(250)
Additional standing charges			0.0000	(251)
Total energy cost			356.5668	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	231.8089	0.1592	36.9152	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			139.5287	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	145.1281	0.1443	20.9465	(268)
Total CO2, kg/year			181.3630	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	231.8089	1.5895	368.4583	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	1.5222	1106.1095	(278)
Space and water heating			1474.5678	(279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036	(281)
Energy for lighting	145.1281	1.5338	222.6023	(282)
Total Primary energy kWh/year			1924.9737	(286)

Full SAP Calculation Printout



Property Reference	Plot 19			Issued on Date	27/08/2025	
Assessment Reference	Plot 19		Prop Type Ref			
Property	Flat 19, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	89 B	DER	3.43	TER	11.85	
Environmental	98 A	% DER < TER				71.05
CO ₂ Emissions (t/year)	0.15	DFEE	20.22	TFEE	22.51	
Compliance Check	See BREL	% DFEE < TFEE				10.19
% DPER < TPER	42.13	DPER	36.27	TPER	62.68	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9200	(17)
Infiltration rate	0.1960	(18)
Number of sides sheltered	3	(19)

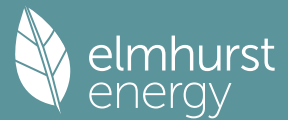
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13959.6799 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							279.1936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
E14 Flat roof	5.9700	0.1600	0.9552	
P4 Party wall - Roof (insulation at ceiling level)	22.6000	0.1280	2.8928	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.2944 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		16.4765 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.0483	12.8998	12.7513	12.0088	11.8603	11.1177	11.1177	10.9692	11.4147	11.8603	12.1573	12.4543 (38)
Average = Sum(39)m / 12 =	29.5248	29.3763	29.2278	28.4853	28.3368	27.5943	27.5943	27.4458	27.8913	28.3368	28.6338	28.9308 (39)
												28.4481
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5905	0.5875	0.5846	0.5697	0.5667	0.5519	0.5519	0.5489	0.5578	0.5667	0.5727	0.5786 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700											
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	131.3368	132.0007	132.6714	136.1297	136.8431	140.5252	140.5252	141.2856	139.0288	136.8431	135.4237	134.0334
alpha	9.7558	9.8000	9.8448	10.0753	10.1229	10.3683	10.3683	10.4190	10.2686	10.1229	10.0282	9.9356
util living area	0.9797	0.9619	0.9250	0.7962	0.6142	0.4191	0.3027	0.3302	0.5223	0.8040	0.9450	0.9823 (86)
MIT	20.7446	20.8175	20.8976	20.9798	20.9984	21.0000	21.0000	21.0000	20.9997	20.9814	20.8811	20.7400 (87)
Th 2	20.4386	20.4412	20.4439	20.4573	20.4600	20.4735	20.4735	20.4762	20.4681	20.4600	20.4547	20.4493 (88)
util rest of house	0.9743	0.9525	0.9083	0.7664	0.5792	0.3847	0.2664	0.2926	0.4822	0.7694	0.9309	0.9776 (89)
MIT 2	20.1511	20.2422	20.3388	20.4394	20.4589	20.4735	20.4735	20.4762	20.4680	20.4445	20.3312	20.1551 (90)
Living area fraction									FLA = Living area / (4) =			0.4460 (91)
MIT	20.4158	20.4988	20.5880	20.6804	20.6995	20.7083	20.7083	20.7098	20.7051	20.6840	20.5764	20.4160 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4158	20.4988	20.5880	20.6804	20.6995	20.7083	20.7083	20.7098	20.7051	20.6840	20.5764	20.4160 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9741	0.9536	0.9129	0.7788	0.5948	0.4000	0.2826	0.3093	0.5001	0.7841	0.9343	0.9772 (94)
Useful gains	372.9063	385.3685	371.6164	328.0531	254.4671	168.5463	113.3658	118.2856	184.1505	279.0655	339.3391	364.3000 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	475.8152	458.2353	411.7611	335.5682	255.0159	168.5539	113.3659	118.2860	184.2256	285.7472	385.8813	469.1402 (97)
Space heating kWh	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (98a)
Space heating requirement - total per year (kWh/year)												277.7003
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												277.7003
Space heating per m2										(98c) / (4) =		5.5540 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												277.7003 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1179.2354	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	277.7003	0.1590	44.1624 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			136.7096 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			171.5307 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	277.7003	1.5887	441.1775 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1438.9417 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1813.6892 (286)
Dwelling Primary energy Rate (DPER)			36.2700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

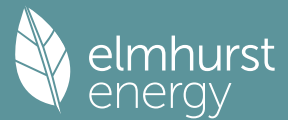
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings		NetArea		U-value		A x U		K-value		A x K	
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		kJ/K	
TER Opening Type					5.9700		1.1450		6.8359				(27)	
External Wall	14.1500		5.9700		8.1800		0.1800		1.4724				(29a)	
External Roof 1	50.0000				50.0000		0.1100		5.5000				(30)	
Total net area of external elements Aum(A, m2)					64.1500								(31)	
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =				13.8083				(33)	
Main dwelling														
Corridor					22.1400		0.0000		0.0000				(32)	
Party Wall					31.4300		0.0000		0.0000				(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K														279.1936 (35)
List of Thermal Bridges														
K1 Element							Length		Psi-value		Total			
E2 Other lintels (including other steel lintels)							3.1800		0.0500		0.1590			
E3 Sill							3.1800		0.0500		0.1590			
E4 Jamb							7.5200		0.0500		0.3760			
E18 Party wall between dwellings							4.7400		0.0600		0.2844			
E7 Party floor between dwellings (in blocks of flats)							5.9700		0.0700		0.4179			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							22.6000		0.0000		0.0000			
E14 Flat roof							5.9700		0.0800		0.4776			
P4 Party wall - Roof (insulation at ceiling level)							22.6000		0.1200		2.7120			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														4.5859 (36)
Point Thermal bridges														(36a) = 0.0000
Total fabric heat loss														(33) + (36) + (36a) = 18.3942 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)	
	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960		
Heat transfer coeff	41.2947	41.1647	41.0373	40.4387	40.3267	39.8054	39.8054	39.7089	40.0062	40.3267	40.5533	40.7901	(39)	
Average = Sum(39)m / 12 =													40.4382	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP	0.8259	0.8233	0.8207	0.8088	0.8065	0.7961	0.7961	0.7942	0.8001	0.8065	0.8111	0.8158	(40)	
HLP (average)													0.8088	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)														

Assumed occupancy														1.6901 (42)
Hot water usage for mixer showers														
	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)	
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)													98.5597 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Energy content (annual)													Total = Sum(45)m = 1637.0557	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):														1.3938 (48)
Temperature factor from Table 2b														0.5400 (49)
Enter (49) or (54) in (55)														0.7527 (55)
Total storage loss														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
Total per year (kWh/year)														Total per year (kWh/year) = Sum(64)m = 1962.4258 (64)
Electric shower(s)														1962 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =														0.0000 (64a)
Heat gains from water heating, kWh/month														
	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)														

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)	
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)	
Water heating gains (Table 5)														
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)	
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northwest				5.9700	11.2829	0.6300	0.7000	0.7700	20.5858 (81)
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	91.9930	16.8114 (83)
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	442.3087	416.3553 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	93.9028	94.1994	94.4919	95.8905	96.1568	97.4161	97.4161	97.6530	96.9272	96.1568	95.6196	95.0644
alpha	7.2602	7.2800	7.2995	7.3927	7.4105	7.4944	7.4944	7.5102	7.4618	7.4105	7.3746	7.3376
util living area	0.9879	0.9782	0.9542	0.8625	0.6864	0.4800	0.3463	0.3859	0.6170	0.8848	0.9714	0.9897 (86)
MIT	20.4458	20.5530	20.7046	20.8959	20.9821	20.9989	20.9999	20.9998	20.9935	20.8929	20.6590	20.4321 (87)
Th 2	20.2309	20.2332	20.2354	20.2457	20.2477	20.2567	20.2567	20.2584	20.2532	20.2477	20.2438	20.2397 (88)
util rest of house	0.9842	0.9716	0.9408	0.8301	0.6365	0.4248	0.2879	0.3238	0.5534	0.8498	0.9618	0.9865 (89)
MIT 2	19.6001	19.7357	19.9230	20.1496	20.2346	20.2561	20.2567	20.2583	20.2495	20.1523	19.8775	19.5901 (90)
Living area fraction	19.9773	20.1002	20.2716	20.4824	20.5680	20.5874	20.5882	20.5890	fLA = Living area / (4) =	20.4826	20.2261	0.4460 (91)
MIT	19.9773	20.1002	20.2716	20.4824	20.5680	20.5874	20.5882	20.5890	20.5813	20.4826	20.2261	19.9657 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9773	20.1002	20.2716	20.4824	20.5680	20.5874	20.5882	20.5890	20.5813	20.4826	20.2261	19.9657 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9827	0.9703	0.9415	0.8408	0.6581	0.4494	0.3139	0.3515	0.5817	0.8615	0.9615	0.9851 (94)
Useful gains	420.2865	443.8236	446.7837	428.2559	351.3371	237.9999	158.7321	166.2996	257.2762	358.2664	395.7200	410.1456 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	647.3890	625.7133	565.1488	468.3779	357.6166	238.3305	158.7505	166.3416	259.2929	398.5337	532.3056	643.0829 (97)
Space heating kWh	168.9642	122.2299	88.0636	28.8878	4.6720	0.0000	0.0000	0.0000	0.0000	29.9589	98.3417	173.3054 (98a)
Space heating requirement - total per year (kWh/year)												714.4235
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	168.9642	122.2299	88.0636	28.8878	4.6720	0.0000	0.0000	0.0000	0.0000	29.9589	98.3417	173.3054 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												714.4235
Space heating per m2										(98c) / (4) =		14.2885 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	168.9642	122.2299	88.0636	28.8878	4.6720	0.0000	0.0000	0.0000	0.0000	29.9589	98.3417	173.3054 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	183.0598	132.4267	95.4102	31.2978	5.0618	0.0000	0.0000	0.0000	0.0000	32.4581	106.5457	187.7631 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater (217)m	83.7700	83.3294	82.5344	81.0517	80.0350	79.8000	79.8000	79.8000	79.8000	81.0764	82.8564	79.8000 (216)
Fuel for water heating, kWh/month	229.6499	204.3174	219.7073	198.2586	195.6470	177.9421	176.5248	182.9609	184.3137	200.9380	207.4176	83.8487 (217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	227.1442 (219)
Pumps and Fa (234b)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	0.0000 (221)
Lighting (235b)m	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	7.3041 (231)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	17.6226 (232)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-14.8063 (233a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	0.0000 (235c)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-5.6417 (233b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	774.0233 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2404.8215 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2579.4319 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	774.0233	0.2100	162.5449 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2404.8215	0.2100	505.0125 (264)
Space and water heating			667.5574 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			592.6893 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.8500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	774.0233	1.1300	874.6463 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2404.8215	1.1300	2717.4483 (278)
Space and water heating			3592.0946 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			3134.0782 (286)
Target Primary Energy Rate (TPER)			62.6800 (287)

Full SAP Calculation Printout



Property Reference	Plot 19	Issued on Date	27/08/2025
Assessment Reference	Plot 19	Prop Type Ref	
Property	Flat 19, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	89 B	DER	3.43
Environmental	98 A	% DER < TER	11.85
CO ₂ Emissions (t/year)	0.15	DFEE	20.22
Compliance Check	See BREL	% DFEE < TFEE	10.19
% DPER < TPER	42.13	DPER	36.27
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume			118.5000 (5)

2. Ventilation rate

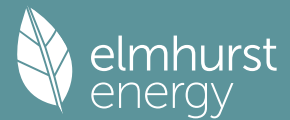
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9200 (17)
Infiltration rate	0.3648 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2827 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3604	0.3534	0.3463	0.3110	0.3039	0.2686	0.2686	0.2615	0.2827	0.3039	0.3180	0.3322 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5650	0.5624	0.5600	0.5484	0.5462	0.5361	0.5361	0.5342	0.5400	0.5462	0.5506	0.5552 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	12.1821	(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13959.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							279.1936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000
E14 Flat roof	5.9700	0.1600	0.9552
P4 Party wall - Roof (insulation at ceiling level)	22.6000	0.1280	2.8928
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.2944 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	16.4765 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.0928	21.9941	21.8974	21.4433	21.3583	20.9628	20.9628	20.8895	21.1151	21.3583	21.5302	21.7099 (38)
Average = Sum(39)m / 12 =	38.5693	38.4706	38.3739	37.9198	37.8348	37.4393	37.4393	37.3660	37.5916	37.8348	38.0067	38.1864 (39)
												37.9194
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7714	0.7694	0.7675	0.7584	0.7567	0.7488	0.7488	0.7473	0.7518	0.7567	0.7601	0.7637 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.7244 (42b)
Hot water usage for other uses												31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss (46)m = 0.15 x (45)m												832.1197
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
If cylinder contains dedicated solar storage												0.0000 (56)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												
WWHRS	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (64)
12Total per year (kWh/year)												707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 478.7637 (64a)												

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (73)

6. Solar gains												
[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)						
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	331.8630	354.4053	360.2546	381.3959	392.1659	390.0297	372.8334	352.0659	335.5333	318.3307	318.9282	322.7690 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



tau	100.5383	100.7961	101.0500	102.2603	102.4899	103.5727	103.5727	103.7758	103.1529	102.4899	102.0264	101.5463
alpha	7.7026	7.7197	7.7367	7.8174	7.8327	7.9048	7.9048	7.9184	7.8769	7.8327	7.8018	7.7698
util living area	0.9971	0.9942	0.9875	0.9505	0.8332	0.6092	0.4415	0.4874	0.7473	0.9571	0.9922	0.9976 (86)
MIT	20.3438	20.4404	20.5793	20.7978	20.9473	20.9958	20.9997	20.9994	20.9819	20.8135	20.5553	20.3297 (87)
Th 2	20.2782	20.2799	20.2816	20.2895	20.2910	20.2979	20.2979	20.2992	20.2953	20.2910	20.2880	20.2849 (88)
util rest of house	0.9961	0.9922	0.9831	0.9336	0.7886	0.5448	0.3712	0.4136	0.6816	0.9389	0.9891	0.9968 (89)
MIT 2	19.6796	19.7769	19.9153	20.1303	20.2578	20.2962	20.2979	20.2991	20.2865	20.1487	19.8980	19.6713 (90)
Living area fraction	FLA = Living area / (4) = 0.4460 (91)											
MIT	19.9758	20.0728	20.2115	20.4280	20.5653	20.6082	20.6109	20.6114	20.5966	20.4452	20.1912	19.9649 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.9758	20.0728	20.2115	20.4280	20.5653	20.6082	20.6109	20.6114	20.5966	20.4452	20.1912	19.9649 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9955	0.9915	0.9825	0.9373	0.8067	0.5736	0.4026	0.4465	0.7106	0.9434	0.9886	0.9963 (94)
Useful gains	330.3806	351.4095	353.9631	357.4661	316.3583	223.7066	150.0968	157.2149	238.4297	300.3133	315.2918	321.5839 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	604.6061	583.7077	526.1633	437.1392	335.4185	224.9439	150.1646	157.3631	244.2188	372.4897	497.5518	602.0055 (97)
Space heating kWh	204.0238	156.1044	128.1169	57.3646	14.1808	0.0000	0.0000	0.0000	0.0000	53.6993	131.2272	208.6337 (98a)
Space heating requirement - total per year (kWh/year)	953.3507											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	204.0238	156.1044	128.1169	57.3646	14.1808	0.0000	0.0000	0.0000	0.0000	53.6993	131.2272	208.6337 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	953.3507											
Space heating per m2	(98c) / (4) = 19.0670 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	351.9293	277.0507	283.9819	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9480	0.9823	0.9715	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	333.6168	272.1521	275.8861	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	417.5437	399.4079	376.8553	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	60.4273	94.6784	75.1211	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) = 1.0000 (105)											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	15.1068	23.6696	18.7803	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	57.5567 (107)											
Energy for space heating	19.0670 (99)											
Energy for space cooling	1.1511 (108)											
Total	20.2181 (109)											
Fabric Energy Efficiency (DFEE)	20.2 (109)											

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	
Pressure test	20.0000 / (5) =	0.1688 (8)
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate	5.0000 (17)	
Number of sides sheltered	0.4188 (18)	
	3 (19)	

Full SAP Calculation Printout



Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.7750 \quad (20)$$
$$(21) = (18) \times (20) = 0.3246 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724			(29a)
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)
Total net area of external elements Aum(A, m2)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		13.8083			(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000			(32)
Party Wall			31.4300	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							279.1936	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	3.1800	0.0500	0.1590	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	7.5200	0.0500	0.3760	
E4 Jamb	4.7400	0.0600	0.2844	
E18 Party wall between dwellings	5.9700	0.0700	0.4179	
E7 Party floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9700	0.0800	0.4776	
E14 Flat roof	22.6000	0.1200	2.7120	
P4 Party wall - Roof (insulation at ceiling level)				4.5859 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000 (36a)
Point Thermal bridges				(33) + (36) + (36a) = 18.3942 (37)
Total fabric heat loss				

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Heat transfer coeff	41.2947	41.1647	41.0373	40.4387	40.3267	39.8054	39.8054	39.7089	40.0062	40.3267	40.5533	40.7901	(39)
Average = Sum(39)m / 12 =												40.4382	
HLP	0.8259	0.8233	0.8207	0.8088	0.8065	0.7961	0.7961	0.7942	0.8001	0.8065	0.8111	0.8158	(40)
HLP (average)												0.8088	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)												50.1040	(43)
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)										Total = Sum(45)m =		832.1197	
Distribution loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				707.3017	(64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893	(64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637 (73)

6. Solar gains

[Jan]														
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
-----	-----				-----		-----		-----		-----		-----	
Northwest	5.9700				11.2829		0.6300		0.7000		0.7700		20.5858 (81)	
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114	(83)	
Total gains	337.5612	368.2691	387.6595	427.8883	455.6099	457.7476	436.1007	402.0087	369.3784	336.1345	326.6467	326.9751	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	93.9028	94.1994	94.4919	95.8905	96.1568	97.4161	97.4161	97.6530	96.9272	96.1568	95.6196	95.0644
alpha	7.2602	7.2800	7.2995	7.3927	7.4105	7.4944	7.4944	7.5102	7.4618	7.4105	7.3746	7.3376
util living area	0.9971	0.9938	0.9843	0.9311	0.7804	0.5535	0.4014	0.4537	0.7238	0.9544	0.9924	0.9977 (86)
MIT	20.2675	20.3840	20.5567	20.8108	20.9595	20.9971	20.9998	20.9994	20.9819	20.7947	20.5017	20.2537 (87)
Th 2	20.2309	20.2332	20.2354	20.2457	20.2477	20.2567	20.2567	20.2584	20.2532	20.2477	20.2438	20.2397 (88)
util rest of house	0.9962	0.9917	0.9787	0.9092	0.7308	0.4907	0.3337	0.3809	0.6553	0.9350	0.9894	0.9969 (89)
MIT 2	19.5637	19.6810	19.8527	20.1005	20.2232	20.2555	20.2567	20.2582	20.2447	20.0920	19.8072	19.5573 (90)
Living area fraction	19.8776	19.9945	20.1667	20.4173	20.5516	20.5863	20.5881	20.5888	FLA = Living area / (4) =	20.4054	20.1169	0.4460 (91)
MIT	19.8776	19.9945	20.1667	20.4173	20.5516	20.5863	20.5881	20.5888	20.5735	20.4054	20.1169	19.8679 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8776	19.9945	20.1667	20.4173	20.5516	20.5863	20.5881	20.5888	20.5735	20.4054	20.1169	19.8679 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9956	0.9908	0.9781	0.9147	0.7516	0.5187	0.3639	0.4134	0.6855	0.9396	0.9887	0.9964 (94)
Ext temp.	336.0676	364.8963	379.1854	391.3840	342.4184	237.4251	158.6953	166.2041	253.2227	315.8333	322.9670	325.8022 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	643.2716	621.3623	560.8439	465.7455	356.9557	238.2854	158.7472	166.3332	258.9794	395.4196	527.8800	639.0944 (97)
Space heating requirement - total per year (kWh/year)	228.5598	172.3451	135.1539	53.5402	10.8158	0.0000	0.0000	0.0000	0.0000	59.2122	147.5374	233.0894 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	228.5598	172.3451	135.1539	53.5402	10.8158	0.0000	0.0000	0.0000	0.0000	59.2122	147.5374	233.0894 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1040.2538
Space heating per m2										(98c) / (4) =		20.8051 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9685	0.9894	0.9802	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	362.3769	291.4284	295.7983	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	499.4277	475.9778	437.7817	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	98.6766	137.3047	105.6357	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction									fc = cooled area / (4) =			0.0000 (104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	24.6691	34.3262	26.4089	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												85.4042 (107)
Energy for space heating												20.8051 (99)
Energy for space cooling												1.7081 (108)
Total												22.5132 (109)
Fabric Energy Efficiency (TFEE)												22.5 (109)

Full SAP Calculation Printout



Property Reference	Plot 19			Issued on Date	27/08/2025	
Assessment Reference	Plot 19		Prop Type Ref			
Property	Flat 19, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	89 B	DER	3.43	TER	11.85	
Environmental	98 A	% DER < TER				71.05
CO ₂ Emissions (t/year)	0.15	DFEE	20.22	TFEE	22.51	
Compliance Check	See BREL	% DFEE < TFEE				10.19
% DPER < TPER	42.13	DPER	36.27	TPER	62.68	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9200	(17)
Infiltration rate	0.1960	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 13959.6799 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							279.1936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
E14 Flat roof	5.9700	0.1600	0.9552	
P4 Party wall - Roof (insulation at ceiling level)	22.6000	0.1280	2.8928	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.2944 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		16.4765 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.0483	12.8998	12.7513	12.0088	11.8603	11.1177	11.1177	10.9692	11.4147	11.8603	12.1573	12.4543 (38)
Average = Sum(39)m / 12 =	29.5248	29.3763	29.2278	28.4853	28.3368	27.5943	27.5943	27.4458	27.8913	28.3368	28.6338	28.9308 (39)
												28.4481
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5905	0.5875	0.5846	0.5697	0.5667	0.5519	0.5519	0.5489	0.5578	0.5667	0.5727	0.5786 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700											
		11.2829										
			0.2400									
				0.0000								
					0.7700							
						12.4480						
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	382.8327	404.1240	407.0728	421.2027	427.8445	421.3430	401.1614	382.3864	368.2574	355.9184	363.2061	372.7856 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	131.3368	132.0007	132.6714	136.1297	136.8431	140.5252	140.5252	141.2856	139.0288	136.8431	135.4237	134.0334
alpha	9.7558	9.8000	9.8448	10.0753	10.1229	10.3683	10.3683	10.4190	10.2686	10.1229	10.0282	9.9356
util living area	0.9797	0.9619	0.9250	0.7962	0.6142	0.4191	0.3027	0.3302	0.5223	0.8040	0.9450	0.9823 (86)
MIT	20.7446	20.8175	20.8976	20.9798	20.9984	21.0000	21.0000	21.0000	20.9997	20.9814	20.8811	20.7400 (87)
Th 2	20.4386	20.4412	20.4439	20.4573	20.4600	20.4735	20.4735	20.4762	20.4681	20.4600	20.4547	20.4493 (88)
util rest of house	0.9743	0.9525	0.9083	0.7664	0.5792	0.3847	0.2664	0.2926	0.4822	0.7694	0.9309	0.9776 (89)
MIT 2	20.1511	20.2422	20.3388	20.4394	20.4589	20.4735	20.4735	20.4762	20.4680	20.4445	20.3312	20.1551 (90)
Living area fraction									FLA = Living area / (4) =			0.4460 (91)
MIT	20.4158	20.4988	20.5880	20.6804	20.6995	20.7083	20.7083	20.7098	20.7051	20.6840	20.5764	20.4160 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4158	20.4988	20.5880	20.6804	20.6995	20.7083	20.7083	20.7098	20.7051	20.6840	20.5764	20.4160 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9741	0.9536	0.9129	0.7788	0.5948	0.4000	0.2826	0.3093	0.5001	0.7841	0.9343	0.9772 (94)
Useful gains	372.9063	385.3685	371.6164	328.0531	254.4671	168.5463	113.3658	118.2856	184.1505	279.0655	339.3391	364.3000 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	475.8152	458.2353	411.7611	335.5682	255.0159	168.5539	113.3659	118.2860	184.2256	285.7472	385.8813	469.1402 (97)
Space heating kWh	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (98a)
Space heating requirement - total per year (kWh/year)												277.7003
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												277.7003
Space heating per m2										(98c) / (4) =		5.5540 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	76.5642	48.9665	29.8677	5.4108	0.4084	0.0000	0.0000	0.0000	0.0000	4.9712	33.5103	78.0011 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												277.7003 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1179.2354	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	277.7003	0.1590	44.1624 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			136.7096 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			171.5307 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	277.7003	1.5887	441.1775 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1438.9417 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1813.6892 (286)
Dwelling Primary energy Rate (DPER)			36.2700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			

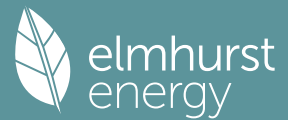
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings		NetArea		U-value		A x U		K-value		A x K	
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		kJ/K	
TER Opening Type					5.9700		1.1450		6.8359				(27)	
External Wall	14.1500		5.9700		8.1800		0.1800		1.4724				(29a)	
External Roof 1	50.0000				50.0000		0.1100		5.5000				(30)	
Total net area of external elements Aum(A, m2)					64.1500								(31)	
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =				13.8083				(33)	
Main dwelling														
Corridor					22.1400		0.0000		0.0000				(32)	
Party Wall					31.4300		0.0000		0.0000				(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K														279.1936 (35)
List of Thermal Bridges														
K1 Element							Length		Psi-value		Total			
E2 Other lintels (including other steel lintels)							3.1800		0.0500		0.1590			
E3 Sill							3.1800		0.0500		0.1590			
E4 Jamb							7.5200		0.0500		0.3760			
E18 Party wall between dwellings							4.7400		0.0600		0.2844			
E7 Party floor between dwellings (in blocks of flats)							5.9700		0.0700		0.4179			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							22.6000		0.0000		0.0000			
E14 Flat roof							5.9700		0.0800		0.4776			
P4 Party wall - Roof (insulation at ceiling level)							22.6000		0.1200		2.7120			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														4.5859 (36)
Point Thermal bridges														(36a) = 0.0000
Total fabric heat loss														(33) + (36) + (36a) = 18.3942 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)	
	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960		
Heat transfer coeff	41.2947	41.1647	41.0373	40.4387	40.3267	39.8054	39.8054	39.7089	40.0062	40.3267	40.5533	40.7901	(39)	
Average = Sum(39)m / 12 =													40.4382	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)	
	0.8259	0.8233	0.8207	0.8088	0.8065	0.7961	0.7961	0.7942	0.8001	0.8065	0.8111	0.8158		
HLP (average)													0.8088	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

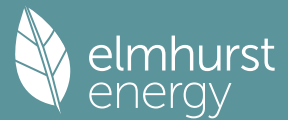
4. Water heating energy requirements (kWh/year)														

Assumed occupancy														1.6901 (42)
Hot water usage for mixer showers														
	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)	
Hot water usage for baths														
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses														
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)														98.5597 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Energy content (annual)												Total = Sum(45)m =	1637.0557	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):														1.3938 (48)
Temperature factor from Table 2b														0.5400 (49)
Enter (49) or (54) in (55)														0.7527 (55)
Total storage loss														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
Total per year (kWh/year)														1962.4258 (64)
Electric shower(s)														
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =														0.0000 (64a)
Heat gains from water heating, kWh/month														
	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)														

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)	
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)	
Water heating gains (Table 5)														
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)	
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
-----					5.9700	11.2829	0.6300	0.7000			0.7700	20.5858 (81)
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)
Total gains	427.6831	457.4121	474.5420	509.3196	533.8345	529.5856	505.6235	473.0747	442.3087	415.8430	411.5583	416.3553 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	93.9028	94.1994	94.4919	95.8905	96.1568	97.4161	97.4161	97.6530	96.9272	96.1568	95.6196	95.0644
alpha	7.2602	7.2800	7.2995	7.3927	7.4105	7.4944	7.4944	7.5102	7.4618	7.4105	7.3746	7.3376
util living area	0.9879	0.9782	0.9542	0.8625	0.6864	0.4800	0.3463	0.3859	0.6170	0.8848	0.9714	0.9897 (86)
MIT	20.4458	20.5530	20.7046	20.8959	20.9821	20.9989	20.9999	20.9998	20.9935	20.8929	20.6590	20.4321 (87)
Th 2	20.2309	20.2332	20.2354	20.2457	20.2477	20.2567	20.2567	20.2584	20.2532	20.2477	20.2438	20.2397 (88)
util rest of house	0.9842	0.9716	0.9408	0.8301	0.6365	0.4248	0.2879	0.3238	0.5534	0.8498	0.9618	0.9865 (89)
MIT 2	19.6001	19.7357	19.9230	20.1496	20.2346	20.2561	20.2567	20.2583	20.2495	20.1523	19.8775	19.5901 (90)
Living area fraction	19.9773	20.1002	20.2716	20.4824	20.5680	20.5874	20.5882	20.5890	fLA = Living area / (4) =	20.4826	20.2261	19.9657 (91)
MIT	19.9773	20.1002	20.2716	20.4824	20.5680	20.5874	20.5882	20.5890	20.5813	20.4826	20.2261	19.9657 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9773	20.1002	20.2716	20.4824	20.5680	20.5874	20.5882	20.5890	20.5813	20.4826	20.2261	19.9657 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9827	0.9703	0.9415	0.8408	0.6581	0.4494	0.3139	0.3515	0.5817	0.8615	0.9615	0.9851 (94)
Useful gains	420.2865	443.8236	446.7837	428.2559	351.3371	237.9999	158.7321	166.2996	257.2762	358.2664	395.7200	410.1456 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	647.3890	625.7133	565.1488	468.3779	357.6166	238.3305	158.7505	166.3416	259.2929	398.5337	532.3056	643.0829 (97)
Space heating kWh	168.9642	122.2299	88.0636	28.8878	4.6720	0.0000	0.0000	0.0000	0.0000	29.9589	98.3417	173.3054 (98a)
Space heating requirement - total per year (kWh/year)												714.4235
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	168.9642	122.2299	88.0636	28.8878	4.6720	0.0000	0.0000	0.0000	0.0000	29.9589	98.3417	173.3054 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												714.4235
Space heating per m2										(98c) / (4) =		14.2885 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	168.9642	122.2299	88.0636	28.8878	4.6720	0.0000	0.0000	0.0000	0.0000	29.9589	98.3417	173.3054 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	183.0598	132.4267	95.4102	31.2978	5.0618	0.0000	0.0000	0.0000	0.0000	32.4581	106.5457	187.7631 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater (217)m	83.7700	83.3294	82.5344	81.0517	80.0350	79.8000	79.8000	79.8000	79.8000	81.0764	82.8564	79.8000 (216)
Fuel for water heating, kWh/month	229.6499	204.3174	219.7073	198.2586	195.6470	177.9421	176.5248	182.9609	184.3137	200.9380	207.4176	83.8487 (217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	227.1442 (219)
Pumps and Fa (234b)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	0.0000 (221)
Lighting (235b)m	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	7.3041 (231)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	17.6226 (232)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-14.8063 (233a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	0.0000 (235c)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-5.6417 (233b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	774.0233 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2404.8215 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2579.4319 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	774.0233	0.2100	162.5449 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2404.8215	0.2100	505.0125 (264)
Space and water heating			667.5574 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			592.6893 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.8500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	774.0233	1.1300	874.6463 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2404.8215	1.1300	2717.4483 (278)
Space and water heating			3592.0946 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			3134.0782 (286)
Target Primary Energy Rate (TPER)			62.6800 (287)

Full SAP Calculation Printout



Property Reference	Plot 19			Issued on Date	27/08/2025	
Assessment Reference	Plot 19		Prop Type Ref			
Property	Flat 19, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	89 B	DER	3.43	TER	11.85	
Environmental	98 A	% DER < TER				71.05
CO ₂ Emissions (t/year)	0.15	DFEE	20.22	TFEE	22.51	
Compliance Check	See BREL	% DFEE < TFEE				10.19
% DPER < TPER	42.13	DPER	36.27	TPER	62.68	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9200	(17)
Infiltration rate	0.1960	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.1821		(33)
Main dwelling							
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999 (32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 13959.6799 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							279.1936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
E14 Flat roof	5.9700	0.1600	0.9552	
P4 Party wall - Roof (insulation at ceiling level)	22.6000	0.1280	2.8928	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.2944 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 16.4765 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.0483	12.8998	12.7513	12.0088	11.8603	11.1177	11.1177	10.9692	11.4147	11.8603	12.1573	12.4543 (38)
Average = Sum(39)m / 12 =	29.5248	29.3763	29.2278	28.4853	28.3368	27.5943	27.5943	27.4458	27.8913	28.3368	28.6338	28.9308 (39)
												28.4481
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5905	0.5875	0.5846	0.5697	0.5667	0.5519	0.5519	0.5489	0.5578	0.5667	0.5727	0.5786 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
								Total per year (kWh/year) = Sum(64)m =				2256.2377 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northwest	5.9700							0.0000		0.7700		12.4480 (81)
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	420.3031	431.2727	438.5037	442.6707	444.6142	429.3686	409.3093	391.7531	379.6128	377.2367	389.2227	407.5463 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	131.3368	132.0007	132.6714	136.1297	136.8431	140.5252	140.5252	141.2856	139.0288	136.8431	135.4237	134.0334	
alpha	9.7558	9.8000	9.8448	10.0753	10.1229	10.3683	10.3683	10.4190	10.2686	10.1229	10.0282	9.9356	
util living area	0.9621	0.9434	0.8916	0.7638	0.5915	0.4113	0.2966	0.3223	0.5067	0.7662	0.9191	0.9671	(86)
MIT	20.8080	20.8569	20.9288	20.9858	20.9988	21.0000	21.0000	21.0000	20.9998	20.9877	20.9126	20.8007	(87)
Th 2	20.4386	20.4412	20.4439	20.4573	20.4600	20.4735	20.4735	20.4762	20.4681	20.4600	20.4547	20.4493	(88)
util rest of house	0.9532	0.9310	0.8712	0.7337	0.5576	0.3775	0.2611	0.2856	0.4678	0.7311	0.9011	0.9592	(89)
MIT 2	20.2278	20.2883	20.3729	20.4450	20.4592	20.4735	20.4735	20.4762	20.4680	20.4500	20.3664	20.2289	(90)
Living area fraction									fLA = Living area / (4) =			0.4460	(91)
MIT	20.4866	20.5419	20.6208	20.6862	20.6999	20.7083	20.7083	20.7098	20.7052	20.6898	20.6100	20.4839	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4866	20.5419	20.6208	20.6862	20.6999	20.7083	20.7083	20.7098	20.7052	20.6898	20.6100	20.4839	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9540	0.9334	0.8779	0.7466	0.5727	0.3925	0.2770	0.3019	0.4852	0.7463	0.9065	0.9598	(94)
Useful gains	400.9775	402.5630	384.9762	330.4850	254.6347	168.5477	113.3658	118.2857	184.1703	281.5275	352.8334	391.1594	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	477.9057	459.5009	412.7204	335.7322	255.0271	168.5540	113.3659	118.2860	184.2269	285.9125	386.8412	471.1060	(97)
Space heating kWh	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(98a)
Space heating requirement - total per year (kWh/year)												207.4368	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												207.4368	
Space heating per m2										(98c) / (4) =		4.1487	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater												344.1753	(216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												207.4368	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1108.9719	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	207.4368	16.4900	34.2063	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	124.5474	16.4900	20.5379	(250)
Additional standing charges			0.0000	(251)
Total energy cost			182.8695	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.6930	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	88.7668	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	207.4368	0.1592	33.0245	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			125.5717	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			160.3928	(272)
CO2 emissions per m2			3.2100	(273)
EI value			97.7376	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	(1b) x 2.3700 (2b) =	118.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000	

2. Ventilation rate

		m3 per hour	
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		0 * 10 =	0.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
			Air changes per hour
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			3.9200 (17)
Infiltration rate			0.1960 (18)
Number of sides sheltered			3 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.1519 (21)

Full SAP Calculation Printout



Wind speed	Jan 4.3000	Feb 4.2000	Mar 4.3000	Apr 3.9000	May 4.0000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.4000	Oct 3.8000	Nov 3.8000	Dec 3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1633	0.1595	0.1633	0.1481	0.1519	0.1291	0.1253	0.1253	0.1291	0.1443	0.1443	0.1481	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3033	0.2995	0.3033	0.2881	0.2919	0.2691	0.2653	0.2653	0.2691	0.2843	0.2843	0.2881	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.1821			(33)
Main dwelling								
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999	(32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13959.6799 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 279.1936 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	3.1800	0.0340	0.1081	
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827	
E3 Sill	7.5200	0.0300	0.2256	
E4 Jamb	4.7400	0.0290	0.1375	
E18 Party wall between dwellings	5.9700	-0.0180	-0.1075	
E7 Party floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9700	0.1600	0.9552	
E14 Flat roof	22.6000	0.1280	2.8928	
P4 Party wall - Roof (insulation at ceiling level)				4.2944 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000
Point Thermal Bridges				(36a) =
Total fabric heat loss				(33) + (36) + (36a) = 16.4765 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 11.8603	Feb 11.7118	Mar 11.8603	Apr 11.2662	May 11.4147	Jun 10.5237	Jul 10.3752	Aug 10.3752	Sep 10.5237	Oct 11.1177	Nov 11.1177	Dec 11.2662	(38)
Heat transfer coeff	28.3368	28.1883	28.3368	27.7428	27.8913	27.0002	26.8517	26.8517	27.0002	27.5943	27.5943	27.7428	(39)
Average = Sum(39)m / 12 =													27.5943

HLP	Jan 0.5667	Feb 0.5638	Mar 0.5667	Apr 0.5549	May 0.5578	Jun 0.5400	Jul 0.5370	Aug 0.5370	Sep 0.5400	Oct 0.5519	Nov 0.5519	Dec 0.5549	(40)
HLP (average)													0.5519
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)

Daily hot water use	Jan 126.9285	Feb 124.3436	Mar 121.1244	Apr 116.0589	May 112.0068	Jun 107.6259	Jul 105.8165	Aug 109.0204	Sep 112.4173	Oct 117.0328	Nov 122.1814	Dec 126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)										Total = Sum(45)m =			1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)

Water storage loss:

Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)

If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Total per year (kWh/year) = Sum(64)m =													2256.2377 (64)

Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northwest	5.9700		9.9768		0.2400		0.0000		0.7700		11.0070 (81)	
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	136.8431	137.5640	136.8431	139.7730	139.0288	143.6168	144.4110	144.4110	143.6168	140.5252	140.5252	139.7730
alpha	10.1229	10.1709	10.1229	10.3182	10.2686	10.5745	10.6274	10.6274	10.5745	10.3683	10.3683	10.3182
util living area	0.9395	0.9130	0.8529	0.7000	0.5208	0.3425	0.2529	0.2778	0.4569	0.7119	0.8808	0.9477 (86)
MIT	20.8760	20.9137	20.9586	20.9944	20.9997	21.0000	21.0000	21.0000	20.9999	20.9945	20.9506	20.8673 (87)
Th 2	20.4600	20.4627	20.4600	20.4708	20.4681	20.4843	20.4870	20.4870	20.4843	20.4735	20.4735	20.4708 (88)
util rest of house	0.9265	0.8961	0.8289	0.6688	0.4871	0.3098	0.2187	0.2421	0.4201	0.6760	0.8579	0.9362 (89)
MIT 2	20.3284	20.3740	20.4204	20.4662	20.4679	20.4843	20.4870	20.4870	20.4843	20.4692	20.4259	20.3285 (90)
Living area fraction	20.5727	20.6147	20.6604	20.7018	20.7051	20.7143	20.7158	20.7158	20.7143	20.7035	20.6599	20.5688 (91)
MIT	20.5727	20.6147	20.6604	20.7018	20.7051	20.7143	20.7158	20.7158	20.7143	20.7035	20.6599	20.5688 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5727	20.6147	20.6604	20.7018	20.7051	20.7143	20.7158	20.7158	20.7143	20.7035	20.6599	20.5688 (93)

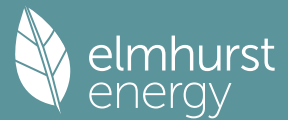
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9294	0.9011	0.8381	0.6825	0.5021	0.3244	0.2340	0.2580	0.4365	0.6918	0.8663	0.9385 (94)
Useful gains	389.2963	386.4988	365.5261	300.4490	220.3896	138.0867	94.4053	99.7756	165.0721	260.3302	335.9616	382.0070 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	438.4448	420.4189	381.4243	302.4460	220.4830	138.0873	94.4053	99.7756	165.0866	262.2419	354.8593	434.6957 (97)
Space heating kWh	36.5665	22.7943	11.8283	1.4379	0.0695	0.0000	0.0000	0.0000	0.0000	1.4223	13.6063	39.2003 (98a)
Space heating requirement - total per year (kWh/year)												126.9254
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	36.5665	22.7943	11.8283	1.4379	0.0695	0.0000	0.0000	0.0000	0.0000	1.4223	13.6063	39.2003 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												126.9254
Space heating per m ²										(98c) / (4) =		2.5385 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	36.5665	22.7943	11.8283	1.4379	0.0695	0.0000	0.0000	0.0000	0.0000	1.4223	13.6063	39.2003 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	36.5665	22.7943	11.8283	1.4379	0.0695	0.0000	0.0000	0.0000	0.0000	1.4223	13.6063	39.2003 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement												

Full SAP Calculation Printout



Efficiency of water heater	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												126.9254	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1028.4605	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	126.9254	28.4300	36.0849	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	124.5474	28.4300	35.4088	(250)
Additional standing charges			0.0000	(251)
Total energy cost			292.3913	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	126.9254	0.1597	20.2696	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			112.8168	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			147.6379	(272)

13a. Primary energy - Individual heating systems including micro-CHP

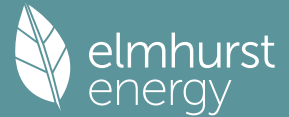
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	126.9254	1.5911	201.9559	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	1.5220	997.7642	(278)
Space and water heating			1199.7201	(279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126	(281)
Energy for lighting	124.5474	1.5338	191.0349	(282)
Total Primary energy kWh/year			1574.4676	(286)

SAP 10 EPC IMPROVEMENTS

Plot 19

Current energy efficiency rating: B 89
Current environmental impact rating: A 98

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £292	Potential £292	£0
Space heating	£71	£71	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£292	£292	£0
Total cost of uses	£292	£292	£0
Delivered energy	21 kWh/m ²	21 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	31 kWh/m ²	31 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure Test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.9200 (17)
Infiltration rate		0.1960 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												72.0000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)

Full SAP Calculation Printout



External Roof 1	50.0000	50.0000	0.1200	6.0000	9.0000	450.0000	(30)						
Total net area of external elements Aum(A, m2)	64.1500						(31)						
Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	12.1821					(33)						
Main dwelling													
Corridor	22.1400	0.0000	0.0000	180.0000	3985.1999		(32)						
Party Wall	31.4300	0.0000	0.0000	180.0000	5657.4001		(32)						
Party Floor 1	50.0000			40.0000	2000.0000		(32d)						
Internal Wall	71.1200			9.0000	640.0800		(32c)						
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =	13959.6799		(34)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					279.1936		(35)						
List of Thermal Bridges													
K1 Element		Length	Psi-value	Total									
E2 Other lintels (including other steel lintels)		3.1800	0.0340	0.1081									
E3 Sill		3.1800	0.0260	0.0827									
E4 Jamb		7.5200	0.0300	0.2256									
E18 Party wall between dwellings		4.7400	0.0290	0.1375									
E7 Party floor between dwellings (in blocks of flats)		5.9700	-0.0180	-0.1075									
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)		22.6000	0.0000	0.0000									
E14 Flat roof		5.9700	0.1600	0.9552									
P4 Party wall - Roof (insulation at ceiling level)		22.6000	0.1280	2.8928									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						4.2944	(36)						
Point Thermal bridges						0.0000							
Total fabric heat loss				(33) + (36) + (36a) =		16.4765	(37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	13.0483	12.8998	12.7513	12.0088	11.8603	11.1177	11.1177	10.9692	11.4147	11.8603	12.1573	12.4543	(39)
Average = Sum(39)m / 12 =	29.5248	29.3763	29.2278	28.4853	28.3368	27.5943	27.5943	27.4458	27.8913	28.3368	28.6338	28.9308	(39)
												28.4481	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	0.5905	0.5875	0.5846	0.5697	0.5667	0.5519	0.5519	0.5489	0.5578	0.5667	0.5727	0.5786	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers														
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)		
Hot water usage for baths														
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)		
Hot water usage for other uses														
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)		
Average daily hot water use (litres/day)													116.7306	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)	
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)	
Energy content (annual)										Total =	Sum(45)m =	1938.9067		
Distribution loss (46)m = 0.15 x (45)m														
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)		
Water storage loss:														
Store volume													201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month														
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)		
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
								Total per year (kWh/year) =	Sum(64)m =	2256.2377	(64)			
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000	(64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	

Northwest														
5.9700				11.2829		0.2400		0.0000		0.7700		12.4480 (81)		

Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656	(83)	
Total gains	420.3031	431.2727	438.5037	442.6707	444.6142	429.3686	409.3093	391.7531	379.6128	377.2367	389.2227	407.5463	(84)	

7. Mean internal temperature (heating season)														

Temperature during heating periods in the living area from Table 9, Th1 (C)														
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	131.3368	132.0007	132.6714	136.1297	136.8431	140.5252	140.5252	141.2856	139.0288	136.8431	135.4237	134.0334		
alpha	9.7558	9.8000	9.8448	10.0753	10.1229	10.3683	10.3683	10.4190	10.2686	10.1229	10.0282	9.9356		
util living area	0.9621	0.9434	0.8916	0.7638	0.5915	0.4113	0.2966	0.3223	0.5067	0.7662	0.9191	0.9671	(86)	
MIT	20.8080	20.8569	20.9288	20.9858	20.9988	21.0000	21.0000	21.0000	20.9998	20.9877	20.9126	20.8007	(87)	
Th 2	20.4386	20.4412	20.4439	20.4573	20.4600	20.4735	20.4735	20.4762	20.4681	20.4600	20.4547	20.4493	(88)	
util rest of house	0.9532	0.9310	0.8712	0.7337	0.5576	0.3775	0.2611	0.2856	0.4678	0.7311	0.9011	0.9592	(89)	
MIT 2	20.2278	20.2883	20.3729	20.4450	20.4592	20.4735	20.4735	20.4762	20.4680	20.4500	20.3664	20.2289	(90)	
Living area fraction	fLA = Living area / (4) =												0.4460 (91)	
MIT	20.4866	20.5419	20.6208	20.6862	20.6999	20.7083	20.7083	20.7098	20.7052	20.6898	20.6100	20.4839	(92)	
Temperature adjustment													0.0000	
adjusted MIT	20.4866	20.5419	20.6208	20.6862	20.6999	20.7083	20.7083	20.7098	20.7052	20.6898	20.6100	20.4839	(93)	

8. Space heating requirement														

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9540	0.9334	0.8779	0.7466	0.5727	0.3925	0.2770	0.3019	0.4852	0.7463	0.9065	0.9598	(94)	
Useful gains	400.9775	402.5630	384.9762	330.4850	254.6347	168.5477	113.3658	118.2857	184.1703	281.5275	352.8334	391.1594	(95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Heat loss rate W	477.9057	459.5009	412.7204	335.7322	255.0271	168.5540	113.3659	118.2860	184.2269	285.9125	386.8412	471.1060	(97)	
Space heating kWh	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(98a)	
Space heating requirement - total per year (kWh/year)													207.4368	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)													0.0000	
Space heating kWh	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													207.4368	
Space heating per m2	(98c) / (4) =												4.1487 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP														

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)	
Fraction of space heat from main system(s)													1.0000 (202)	
Fraction of main heating from main system 2													0.0000 (203)	
Fraction of total heating from main system 1													1.0000 (204)	
Fraction of total heating from main system 2													0.0000 (205)	
Efficiency of main space heating system 1 (in %)													100.0000 (206)	
Efficiency of main space heating system 2 (in %)													0.0000 (207)	
Efficiency of secondary/supplementary heating system, %													0.0000 (208)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	57.2346	38.2623	20.6416	3.7780	0.2919	0.0000	0.0000	0.0000	0.0000	3.2625	24.4856	59.4803	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Water heating														
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)	
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)	
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)	
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														

Full SAP Calculation Printout



(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												207.4368	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1108.9719	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	207.4368	16.4900	34.2063	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	124.5474	16.4900	20.5379	(250)
Additional standing charges			0.0000	(251)
Total energy cost			182.8695	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.6930	(257)
SAP value	[(255) x (256)] / [(4) + 45.0] =	88.7668	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	207.4368	0.1592	33.0245	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			125.5717	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			160.3928	(272)
CO2 emissions per m2			3.2100	(273)
EI value			97.7376	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	2.3700	118.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			
Dwelling volume			118.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)

Full SAP Calculation Printout



Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.9200 (17)
Infiltration rate 0.1960 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1633	0.1595	0.1633	0.1481	0.1519	0.1291	0.1253	0.1253	0.1291	0.1443	0.1443	0.1481	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000	(23c)
Effective ac	0.3033	0.2995	0.3033	0.2881	0.2919	0.2691	0.2653	0.2653	0.2691	0.2843	0.2843	0.2881	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	12.1821		(33)

Main dwelling								
Corridor			22.1400	0.0000	0.0000	180.0000	3985.1999	(32)
Party Wall			31.4300	0.0000	0.0000	180.0000	5657.4001	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13959.6799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 279.1936 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	3.1800	0.0340	0.1081
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827
E3 Sill	7.5200	0.0300	0.2256
E4 Jamb	4.7400	0.0290	0.1375
E18 Party wall between dwellings	5.9700	-0.0180	-0.1075
E7 Party floor between dwellings (in blocks of flats)	22.6000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9700	0.1600	0.9552
E14 Flat roof	22.6000	0.1280	2.8928
P4 Party wall - Roof (insulation at ceiling level)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.2944 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 16.4765 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	11.8603	11.7118	11.8603	11.2662	11.4147	10.5237	10.3752	10.3752	10.5237	11.1177	11.1177	11.2662	(38)
Heat transfer coeff	28.3368	28.1883	28.3368	27.7428	27.8913	27.0002	26.8517	26.8517	27.0002	27.5943	27.5943	27.7428	(39)
Average = Sum(39)m / 12 =												27.5943	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.5667	0.5638	0.5667	0.5549	0.5578	0.5400	0.5370	0.5370	0.5400	0.5519	0.5519	0.5549	(40)
HLP (average)												0.5519	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6901 (42)

Hot water usage for mixer showers													
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)	
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)												116.7306	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)												1938.9067	
Distribution loss (46)m = 0.15 x (45)m													
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)	
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)

Full SAP Calculation Printout



FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
	Total per year (kWh/year) = Sum(64)m =											2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d		Gains W
Northwest				5.9700	9.9768	0.2400	0.0000			0.7700		11.0070 (81)
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	418.8621	428.9247	436.1392	440.2094	438.8926	425.6628	403.5106	386.6905	378.1843	376.3007	387.7942	407.0571 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	136.8431	137.5640	136.8431	139.7730	139.0288	143.6168	144.4110	144.4110	143.6168	140.5252	140.5252	139.7730	
alpha	10.1229	10.1709	10.1229	10.3182	10.2686	10.5745	10.6274	10.6274	10.5745	10.3683	10.3683	10.3182	
util living area	0.9395	0.9130	0.8529	0.7000	0.5208	0.3425	0.2529	0.2778	0.4569	0.7119	0.8808	0.9477	(86)
MIT	20.8760	20.9137	20.9586	20.9944	20.9997	21.0000	21.0000	21.0000	20.9999	20.9945	20.9506	20.8673	(87)
Th 2	20.4600	20.4627	20.4600	20.4708	20.4681	20.4843	20.4870	20.4870	20.4843	20.4735	20.4735	20.4708	(88)
util rest of house	0.9265	0.8961	0.8289	0.6688	0.4871	0.3098	0.2187	0.2421	0.4201	0.6760	0.8579	0.9362	(89)
MIT 2	20.3284	20.3740	20.4204	20.4662	20.4679	20.4843	20.4870	20.4870	20.4843	20.4692	20.4259	20.3285	(90)
Living area fraction	20.5727	20.6147	20.6604	20.7018	20.7051	20.7143	20.7158	20.7158	20.7143	20.7035	20.6599	20.5688	(91)
MIT	20.5727	20.6147	20.6604	20.7018	20.7051	20.7143	20.7158	20.7158	20.7143	20.7035	20.6599	20.5688	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.5727	20.6147	20.6604	20.7018	20.7051	20.7143	20.7158	20.7158	20.7143	20.7035	20.6599	20.5688	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	389.2963	386.4988	365.5261	300.4490	220.3896	138.0867	94.4053	99.7756	165.0721	260.3302	335.9616	382.0070	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	438.4448	420.4189	381.4243	302.4460	220.4830	138.0873	94.4053	99.7756	165.0866	262.2419	354.8593	434.6957	(97)
Space heating kWh	36.5665	22.7943	11.8283	1.4379	0.0695	0.0000	0.0000	0.0000	0.0000	1.4223	13.6063	39.2003	(98a)
Space heating requirement - total per year (kWh/year)												126.9254	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	36.5665	22.7943	11.8283	1.4379	0.0695	0.0000	0.0000	0.0000	0.0000	1.4223	13.6063	39.2003	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												126.9254	
Space heating per m2										(98c) / (4) =		2.5385	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)	
Fraction of space heat from main system(s)												1.0000 (202)	
Fraction of main heating from main system 2												0.0000 (203)	
Fraction of total heating from main system 1												1.0000 (204)	
Fraction of total heating from main system 2												0.0000 (205)	
Efficiency of main space heating system 1 (in %)												100.0000 (206)	
Efficiency of main space heating system 2 (in %)												0.0000 (207)	
Efficiency of secondary/supplementary heating system, %												0.0000 (208)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	36.5665	22.7943	11.8283	1.4379	0.0695	0.0000	0.0000	0.0000	0.0000	1.4223	13.6063	39.2003	(98)
Space heating efficiency (main heating system 1)													

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	126.9254	1.5911	201.9559 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1199.7201 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1574.4676 (286)

Full SAP Calculation Printout



Property Reference	Plot 20			Issued on Date	27/08/2025	
Assessment Reference	Plot 20		Prop Type Ref			
Property	Flat 20, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	87 B	DER	4.01	TER	12.66	
Environmental	97 A	% DER < TER				68.33
CO ₂ Emissions (t/year)	0.17	DFEE	24.71	TFEE	26.84	
Compliance Check	See BREL	% DFEE < TFEE				7.95
% DPER < TPER	37.13	DPER	42.12	TPER	66.99	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9000	(17)
Infiltration rate	0.1950	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1511 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1927	0.1889	0.1851	0.1662	0.1625	0.1436	0.1436	0.1398	0.1511	0.1625	0.1700	0.1776 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3327	0.3289	0.3251	0.3062	0.3025	0.2836	0.2836	0.2798	0.2911	0.3025	0.3100	0.3176 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements A _{um} (A, m ²)			85.0600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.0850		(33)
Main dwelling							
Corridor			14.3900	0.0000	0.0000	180.0000	2590.2001 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13486.9804 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							264.4506 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.5512 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	20.6362 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.2698	13.1191	12.9684	12.2149	12.0642	11.3107	11.3107	11.1600	11.6121	12.0642	12.3656	12.6670 (38)
Average = Sum(39)m / 12 =	33.9060	33.7553	33.6046	32.8511	32.7004	31.9469	31.9469	31.7962	32.2483	32.7004	33.0018	33.3032 (39)
												32.8134
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6648	0.6619	0.6589	0.6441	0.6412	0.6264	0.6264	0.6235	0.6323	0.6412	0.6471	0.6530 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths												
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses												
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Energy content (annual)										Total = Sum(45)m =		1957.1409
Distribution loss (46)m = 0.15 x (45)m												
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
12Total per year (kWh/year)												2274.4719 (64)
Electric shower(s)												2274 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)												
	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	376.1328	384.7396	367.0660	351.6998	332.2354	318.9035	305.4404	307.0498	317.5847	330.0552	352.9786	368.2415 (73)

6. Solar gains

[Jan]												
				Area	Solar flux		g		FF	Access	Gains	
				m2	Table 6a	Specific data	Table 6b	Specific data	Table 6c	factor	W	
					W/m2	or Table 6b		or Table 6c		Table 6d		
Northwest				5.9700	11.2829		0.2400	0.0000		0.7700	12.4480 (81)	
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	388.5808	410.0778	412.7174	426.6725	433.0134	426.3435	405.9483	387.1759	373.2116	361.0205	368.6413	378.4072 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	110.4933	110.9865	111.4843	114.0413	114.5669	117.2690	117.2690	117.8248	116.1730	114.5669	113.5206	112.4932
alpha	8.3662	8.3991	8.4323	8.6028	8.6378	8.8179	8.8179	8.8550	8.7449	8.6378	8.5680	8.4995
util living area	0.9861	0.9752	0.9523	0.8614	0.6921	0.4792	0.3462	0.3777	0.5936	0.8675	0.9656	0.9881 (86)
MIT	20.5981	20.6846	20.7929	20.9340	20.9902	20.9996	21.0000	21.0000	20.9978	20.9407	20.7736	20.5916 (87)
Th 2	20.3720	20.3746	20.3773	20.3904	20.3931	20.4063	20.4063	20.4089	20.4010	20.3931	20.3878	20.3825 (88)
util rest of house	0.9823	0.9686	0.9400	0.8333	0.6504	0.4349	0.2995	0.3292	0.5432	0.8351	0.9555	0.9847 (89)
MIT 2	19.9121	20.0219	20.1562	20.3284	20.3857	20.4061	20.4063	20.4089	20.3997	20.3400	20.1439	19.9129 (90)
Living area fraction	20.2148	20.3143	20.4371	20.5956	20.6524	20.6680	20.6682	20.6697	20.6636	20.6050	20.4217	20.2123 (91)
Temperature adjustment												0.0000
adjusted MIT	20.2148	20.3143	20.4371	20.5956	20.6524	20.6680	20.6682	20.6697	20.6636	20.6050	20.4217	20.2123 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9812	0.9679	0.9413	0.8432	0.6684	0.4544	0.3201	0.3506	0.5654	0.8470	0.9562	0.9836 (94)	
Useful gains	381.2694	396.9113	388.4881	359.7566	289.4464	193.7510	129.9629	135.7513	211.0192	305.7828	352.4824	372.2171 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	539.6063	520.3129	468.3496	384.2123	292.7466	193.8524	129.9667	135.7595	211.6645	327.1680	439.6407	533.2618 (97)	
Space heating kWh	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (98a)	
Space heating requirement - total per year (kWh/year)												478.6907	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												478.6907	
Space heating per m2										(98c) / (4) =		9.3861 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)	
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)	
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)	
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													478.6907 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.8277
Water heating fuel used													661.5151 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 123.8676 (230a)
 Total electricity for the above, kWh/year 123.8676 (231)
 Electricity for lighting (calculated in Appendix L) 127.2803 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1391.3536 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	478.6907	0.1579	75.5727 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			168.9644 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			204.5168 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	478.6907	1.5845	758.4651 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1765.3178 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			2147.9314 (286)
Dwelling Primary energy Rate (DPER)			42.1200 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
 CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1655 (8)
 Pressure test
 Pressure Test Method
 Measured/design AP50
 Infiltration rate
 Number of sides sheltered
 Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359		(27)						
External Wall	34.0600	5.9700	28.0900	0.1800	5.0562		(29a)						
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)						
Total net area of external elements Aum(A, m2)			85.0600				(31)						
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		17.5021		(33)						
Main dwelling													
Corridor			14.3900	0.0000	0.0000		(32)						
Party Wall			19.6900	0.0000	0.0000		(32)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							264.4506 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590							
E3 Sill				3.1800	0.0500	0.1590							
E4 Jamb				7.5200	0.0500	0.3760							
E18 Party wall between dwellings				4.7400	0.0600	0.2844							
E7 Party floor between dwellings (in blocks of flats)				14.3700	0.0700	1.0059							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.3800	0.0000	0.0000							
E14 Flat roof				14.3700	0.0800	1.1496							
P4 Party wall - Roof (insulation at ceiling level)				14.3800	0.1200	1.7256							
E16 Corner (normal)				2.3700	0.0900	0.2133							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.0728 (36)						
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	22.5749 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 23.3048	Feb 23.1743	Mar 23.0463	Apr 22.4454	May 22.3330	Jun 21.8096	Jul 21.8096	Aug 21.7127	Sep 22.0112	Oct 22.3330	Nov 22.5604	Dec 22.7982	(38)
Heat transfer coeff	45.8797	45.7491	45.6212	45.0203	44.9079	44.3845	44.3845	44.2876	44.5861	44.9079	45.1353	45.3731	(39)
Average = Sum(39)m / 12 =												45.0198	
HLP	Jan 0.8996	Feb 0.8970	Mar 0.8945	Apr 0.8828	May 0.8805	Jun 0.8703	Jul 0.8703	Aug 0.8684	Sep 0.8742	Oct 0.8805	Nov 0.8850	Dec 0.8897	(40)
HLP (average)												0.8827	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478	52.8478	(42a)
Hot water usage for baths													
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	22.8594	(42b)
Hot water usage for other uses													
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	32.2401	(42c)
Average daily hot water use (litres/day)												99.4866	(43)
Daily hot water use	Jan 108.2281	Feb 105.9178	Mar 103.1040	Apr 98.8243	May 95.3493	Jun 91.6132	Jul 90.1768	Aug 92.9784	Sep 95.9333	Oct 99.8556	Nov 104.2013	Dec 107.9473	(44)
Energy conte	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194	(45)
Energy content (annual)										Total = Sum(45)m =		1652.4520	
Distribution loss (46)m = 0.15 x (45)m													
25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529	25.3529	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143	215.6143	(62)
WWHRS	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107	(64)
12Total per year (kWh/year)												1975.7233	(64)
Electric shower(s)												1976	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749	93.4749	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 85.9785	Feb 85.9785	Mar 85.9785	Apr 85.9785	May 85.9785	Jun 85.9785	Jul 85.9785	Aug 85.9785	Sep 85.9785	Oct 85.9785	Nov 85.9785	Dec 85.9785	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441	87.1555	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)													
126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383	125.6383	(72)
Total internal gains													
412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957	404.9957	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W

Northwest				5.9700	11.2829	0.6300	0.7000			0.7700			20.5858 (81)

Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114	(83)
Total gains	433.2595	463.1924	480.0235	514.6395	538.8636	534.4542	510.2861	477.7357	447.1280	420.8013	416.8344	421.8072	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	81.6567	81.8897	82.1193	83.2154	83.4238	84.4075	84.4075	84.5922	84.0258	83.4238	83.0034	82.5684	
alpha	6.4438	6.4593	6.4746	6.5477	6.5616	6.6272	6.6272	6.6395	6.6017	6.5616	6.5336	6.5046	
util living area	0.9888	0.9808	0.9622	0.8908	0.7367	0.5277	0.3823	0.4256	0.6687	0.9084	0.9757	0.9904 (86)	
MIT	20.2901	20.4065	20.5800	20.8181	20.9564	20.9957	20.9996	20.9991	20.9818	20.8212	20.5349	20.2746 (87)	
Th 2	20.1678	20.1700	20.1721	20.1822	20.1841	20.1928	20.1928	20.1945	20.1895	20.1841	20.1803	20.1763 (88)	
util rest of house	0.9854	0.9751	0.9508	0.8617	0.6841	0.4629	0.3124	0.3515	0.5982	0.8773	0.9674	0.9874 (89)	
MIT 2	19.3559	19.5038	19.7204	20.0079	20.1506	20.1906	20.1927	20.1942	20.1785	20.0184	19.6742	19.3431 (90)	
Living area fraction									fLA = Living area / (4) =				0.4412 (91)
MIT	19.7680	19.9021	20.0996	20.3653	20.5061	20.5458	20.5487	20.5493	20.5329	20.3726	20.0539	19.7541 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.7680	19.9021	20.0996	20.3653	20.5061	20.5458	20.5487	20.5493	20.5329	20.3726	20.0539	19.7541 (93)	

8. Space heating requirement

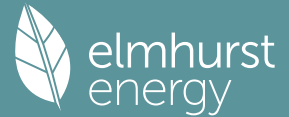
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9834	0.9729	0.9496	0.8688	0.7055	0.4914	0.3433	0.3842	0.6288	0.8853	0.9659	0.9856	(94)
Useful gains	426.0572	450.6470	455.8414	447.1165	380.1703	262.6511	175.1629	183.5636	281.1377	372.5197	402.6061	415.7125	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	709.6677	686.3317	620.4324	516.1720	395.4631	263.9006	175.2596	183.7625	286.8166	438.8653	584.6805	705.7355	(97)
Space heating kWh	211.0062	158.3801	122.4557	49.7200	11.3778	0.0000	0.0000	0.0000	0.0000	49.3611	131.0936	215.7771	(98a)
Space heating requirement - total per year (kWh/year)												949.1717	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	211.0062	158.3801	122.4557	49.7200	11.3778	0.0000	0.0000	0.0000	0.0000	49.3611	131.0936	215.7771	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												949.1717	
Space heating per m2										(98c) / (4) =		18.6112	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	211.0062	158.3801	122.4557	49.7200	11.3778	0.0000	0.0000	0.0000	0.0000	49.3611	131.0936	215.7771	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	228.6091	171.5927	132.6714	53.8678	12.3270	0.0000	0.0000	0.0000	0.0000	53.4790	142.0299	233.7780	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107	(64)
Efficiency of water heater	84.2515	83.8822	83.1843	81.7477	80.3483	79.8000	79.8000	79.8000	79.8000	81.7160	83.4453	79.8000	(216)
Fuel for water heating, kWh/month	229.9650	204.4081	219.5143	197.9006	196.1717	179.0842	177.6359	184.1325	185.5158	200.7041	207.3826	227.4674	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	1028.3550	1.1300	1162.0412 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2409.8822	1.1300	2723.1669 (278)
Space and water heating			3885.2080 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			3416.4777 (286)
Target Primary Energy Rate (TPER)			66.9900 (287)

Full SAP Calculation Printout



Property Reference	Plot 20			Issued on Date	27/08/2025
Assessment Reference	Plot 20	Prop Type Ref			
Property	Flat 20, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	4.01	TER	12.66
Environmental	97 A	% DER < TER			68.33
CO ₂ Emissions (t/year)	0.17	DFEE	24.71	TFEE	26.84
Compliance Check	See BREL	% DFEE < TFEE			7.95
% DPER < TPER	37.13	DPER	42.12	TPER	66.99
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		
Dwelling volume			

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1655 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9000	(17)
Infiltration rate	0.3605	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2794 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3562	0.3492	0.3422	0.3073	0.3003	0.2654	0.2654	0.2584	0.2794	0.3003	0.3143	0.3283 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5634	0.5610	0.5586	0.5472	0.5451	0.5352	0.5352	0.5334	0.5390	0.5451	0.5494	0.5539 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			85.0600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	16.0850	(33)
Main dwelling							
Corridor			14.3900	0.0000	0.0000	180.0000	2590.2001 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13486.9804 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							264.4506 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.5512 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	20.6362 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22.4738	22.3755	22.2792	21.8269	21.7422	21.3483	21.3483	21.2753	21.5000	21.7422	21.9134	22.0924	(38)
Heat transfer coeff	43.1099	43.0117	42.9154	42.4630	42.3784	41.9844	41.9844	41.9115	42.1362	42.3784	42.5496	42.7286 (39)
Average = Sum(39)m / 12 =												42.4626

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8453	0.8434	0.8415	0.8326	0.8309	0.8232	0.8232	0.8218	0.8262	0.8309	0.8343	0.8378 (40)
HLP (average)												0.8326
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.9369 (42b)
Hot water usage for other uses												32.2401 (42c)
Average daily hot water use (litres/day)												50.5753 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995 (44)
Energy conte	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725 (45)
Energy content (annual)										Total = Sum(45)m =		839.9482
Distribution loss (46)m = 0.15 x (45)m												0.0000 (46)
Water storage loss:												
Total storage loss												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				713.9560 (64)
Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850 (64a)
Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)												
39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169	38.9169 (72)
Total internal gains	324.6838	334.5534	319.8076	311.5186	296.2212	287.2957	276.8459	276.4442	284.5528	292.1140	308.2842	317.7546 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northwest				5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)			
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	337.1318	359.8916	365.4590	386.4913	396.9993	394.7358	377.3539	356.5703	340.1797	323.0793	323.9470	327.9202 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	86.9030	87.1015	87.2970	88.2269	88.4031	89.2327	89.2327	89.3880	88.9113	88.4031	88.0474	87.6786
alpha	6.7935	6.8068	6.8198	6.8818	6.8935	6.9488	6.9488	6.9592	6.9274	6.8935	6.8698	6.8452
util living area	0.9969	0.9944	0.9889	0.9609	0.8701	0.6650	0.4878	0.5372	0.7959	0.9657	0.9927	0.9974 (86)
MIT	20.1852	20.2895	20.4458	20.6970	20.8964	20.9867	20.9986	20.9974	20.9574	20.7260	20.4260	20.1694 (87)
Th 2	20.2143	20.2159	20.2175	20.2252	20.2266	20.2333	20.2333	20.2345	20.2307	20.2266	20.2237	20.2207 (88)
util rest of house	0.9959	0.9925	0.9850	0.9469	0.8287	0.5922	0.4038	0.4497	0.7288	0.9505	0.9899	0.9966 (89)
MIT 2	19.4706	19.5756	19.7317	19.9806	20.1577	20.2274	20.2329	20.2337	20.2085	20.0119	19.7180	19.4603 (90)
Living area fraction	19.7859	19.8905	20.0467	20.2967	20.4836	20.5624	20.5707	20.5706	FLA = Living area / (4) =			0.4412 (91)
MIT	19.7859	19.8905	20.0467	20.2967	20.4836	20.5624	20.5707	20.5706	20.5389	20.3269	20.0304	19.7731 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7859	19.8905	20.0467	20.2967	20.4836	20.5624	20.5707	20.5706	20.5389	20.3269	20.0304	19.7731 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9952	0.9916	0.9839	0.9484	0.8435	0.6241	0.4409	0.4885	0.7571	0.9528	0.9890	0.9960 (94)
Useful gains	335.5145	356.8553	359.5788	366.5380	334.8637	246.3552	166.3884	174.1713	257.5619	307.8238	320.3906	326.6053 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	667.5960	644.7670	581.3634	483.9370	372.2350	250.3282	166.7076	174.7976	271.3111	412.2115	550.1826	665.4176 (97)
Space heating kWh	247.0686	193.4767	165.0077	84.5272	27.8042	0.0000	0.0000	0.0000	0.0000	77.6644	165.4502	252.0764 (98a)
Space heating requirement - total per year (kWh/year)												1213.0756
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	247.0686	193.4767	165.0077	84.5272	27.8042	0.0000	0.0000	0.0000	0.0000	77.6644	165.4502	252.0764 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1213.0756
Space heating per m2										(98c) / (4) =		23.7858 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	394.6536	310.6848	318.5272	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9013	0.9573	0.9379	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	355.7172	297.4087	298.7599	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	421.8534	403.5510	381.0218	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	47.6181	78.9699	61.2028	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	11.9045	19.7425	15.3007	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												46.9477 (107)
Energy for space heating												23.7858 (99)
Energy for space cooling												0.9205 (108)
Total												24.7063 (109)
Fabric Energy Efficiency (DFEE)												24.7 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000	2.3700	120.8700
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour
Pressure test	20.0000 / (5) = 0.1655 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	5.0000 (17)
	0.4155 (18)

Full SAP Calculation Printout



Number of sides sheltered

3 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.7750 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.3220 \quad (21)$$

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	34.0600	5.9700	28.0900	0.1800	5.0562			(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100			(30)
Total net area of external elements Aum(A, m2)			85.0600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	17.5021			(33)
Main dwelling								
Corridor			14.3900	0.0000	0.0000			(32)
Party Wall			19.6900	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

264.4506 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	3.1800	0.0500	0.1590
E4 Jamb	7.5200	0.0500	0.3760
E18 Party wall between dwellings	4.7400	0.0600	0.2844
E7 Party floor between dwellings (in blocks of flats)	14.3700	0.0700	1.0059
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E14 Flat roof	14.3700	0.0800	1.1496
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1200	1.7256
E16 Corner (normal)	2.3700	0.0900	0.2133

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

5.0728 (36)

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 22.5749 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982	(38)
Average = Sum(39)m / 12 =	45.8797	45.7491	45.6212	45.0203	44.9079	44.3845	44.3845	44.2876	44.5861	44.9079	45.1353	45.3731	(39)
													45.0198

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8996	0.8970	0.8945	0.8828	0.8805	0.8703	0.8703	0.8684	0.8742	0.8805	0.8850	0.8897	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)													50.5753 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995	(44)
Energy content (annual)	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =			839.9482
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													
WWHRS	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316	(62)

PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316	(64)
													714 (64)

12Total per year (kWh/year)													
Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850	(64a)
													483.2649 (64a)

Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542	(65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169	(72)
Total internal gains	322.2036	331.8074	317.3273	308.9557	293.7410	284.7328	274.3657	273.9640	281.9899	289.6338	305.7214	315.2744	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
-----					Northwest	5.9700	11.2829	0.6300	0.7000	0.7700		20.5858 (81)	

Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114 (83)	
Total gains	342.7895	373.7105	392.8233	432.9418	460.4027	462.4118	440.5808	406.4725	373.9830	340.8426	331.6237	332.0858 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	81.6567	81.8897	82.1193	83.2154	83.4238	84.4075	84.4075	84.5922	84.0258	83.4238	83.0034	82.5684	
alpha	6.4438	6.4593	6.4746	6.5477	6.5616	6.6272	6.6272	6.6395	6.6017	6.5616	6.5336	6.5046	
util living area	0.9969	0.9938	0.9858	0.9446	0.8219	0.6047	0.4421	0.4986	0.7706	0.9623	0.9926	0.9975	(86)
MIT	20.1079	20.2322	20.4230	20.7137	20.9172	20.9906	20.9990	20.9978	20.9589	20.7068	20.3716	20.0925	(87)
Th 2	20.1678	20.1700	20.1721	20.1822	20.1841	20.1928	20.1928	20.1945	20.1895	20.1841	20.1803	20.1763	(88)
util rest of house	0.9959	0.9917	0.9808	0.9259	0.7734	0.5328	0.3617	0.4127	0.6997	0.9457	0.9897	0.9966	(89)
MIT 2	19.3552	19.4804	19.6706	19.9565	20.1315	20.1889	20.1926	20.1939	20.1687	19.9561	19.6278	19.3469	(90)
Living area fraction	19.6873	19.8121	20.0025	20.2906	20.4781	20.5426	20.5483	20.5485	20.5173	20.2873	19.9559	19.6758	(91)
MIT	19.6873	19.8121	20.0025	20.2906	20.4781	20.5426	20.5483	20.5485	20.5173	20.2873	19.9559	19.6758	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6873	19.8121	20.0025	20.2906	20.4781	20.5426	20.5483	20.5485	20.5173	20.2873	19.9559	19.6758	(93)

8. Space heating requirement

Utilisation	0.9951	0.9906	0.9796	0.9287	0.7919	0.5644	0.3972	0.4507	0.7298	0.9481	0.9888	0.9959	(94)
Useful gains	341.1044	370.2077	384.8151	402.0907	364.5777	260.9754	175.0100	183.2109	272.9255	323.1657	327.8950	330.7387	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	705.9634	682.2142	616.0020	512.8075	394.2077	263.7580	175.2446	183.7288	286.1231	435.0354	580.2572	702.1848	(97)
Space heating kWh	271.4551	209.6683	172.0030	79.7160	22.0447	0.0000	0.0000	0.0000	0.0000	83.2310	181.7008	276.3559	(98a)
Space heating requirement - total per year (kWh/year)												1296.1750	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	271.4551	209.6683	172.0030	79.7160	22.0447	0.0000	0.0000	0.0000	0.0000	83.2310	181.7008	276.3559	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1296.1750	
Space heating per m2										(98c) / (4) =		25.4152	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b													
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9354	0.9730	0.9553	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	390.2562	319.5738	321.5518	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	503.7338	480.1170	441.9432	0.0000	0.0000	0.0000	0.0000	(102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	81.7039	119.4441	89.5712	0.0000	0.0000	0.0000	0.0000	(103)
Cooled fraction													(104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	20.4260	29.8610	22.3928	0.0000	0.0000	0.0000	0.0000	(106)
Space cooling requirement													(107)
Energy for space heating													(108)
Energy for space cooling													(109)
Total													(110)
Fabric Energy Efficiency (TFEE)													(111)

Full SAP Calculation Printout



Property Reference	Plot 20			Issued on Date	27/08/2025
Assessment Reference	Plot 20	Prop Type Ref			
Property	Flat 20, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	4.01	TER	12.66
Environmental	97 A	% DER < TER			68.33
CO ₂ Emissions (t/year)	0.17	DFEE	24.71	TFEE	26.84
Compliance Check	See BREL	% DFEE < TFEE			7.95
% DPER < TPER	37.13	DPER	42.12	TPER	66.99
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.9000	(17)
Infiltration rate	0.1950	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1511 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1927	0.1889	0.1851	0.1662	0.1625	0.1436	0.1436	0.1398	0.1511	0.1625	0.1700	0.1776 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3327	0.3289	0.3251	0.3062	0.3025	0.2836	0.2836	0.2798	0.2911	0.3025	0.3100	0.3176 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements A _{um} (A, m ²)			85.0600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.0850		(33)
Main dwelling							
Corridor			14.3900	0.0000	0.0000	180.0000	2590.2001 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13486.9804 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							264.4506 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal Bridges (36a) = 4.5512 (36)
 Total fabric heat loss (33) + (36) + (36a) = 20.6362 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.2698	13.1191	12.9684	12.2149	12.0642	11.3107	11.3107	11.1600	11.6121	12.0642	12.3656	12.6670 (38)
Average = Sum(39)m / 12 =	33.9060	33.7553	33.6046	32.8511	32.7004	31.9469	31.9469	31.7962	32.2483	32.7004	33.0018	33.3032 (39)
												32.8134
HLP (average)	0.6648	0.6619	0.6589	0.6441	0.6412	0.6264	0.6264	0.6235	0.6323	0.6412	0.6471	0.6530 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	0.6434 (40)
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.7196 (42)											
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (43)
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume	201.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.8694 (55)											
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2274.4719 (64)											
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	376.1328	384.7396	367.0660	351.6998	332.2354	318.9035	305.4404	307.0498	317.5847	330.0552	352.9786	368.2415 (73)

6. Solar gains

[Jan]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
-------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	110.4933	110.9865	111.4843	114.0413	114.5669	117.2690	117.2690	117.8248	116.1730	114.5669	113.5206	112.4932
alpha	8.3662	8.3991	8.4323	8.6028	8.6378	8.8179	8.8179	8.8550	8.7449	8.6378	8.5680	8.4995
util living area	0.9861	0.9752	0.9523	0.8614	0.6921	0.4792	0.3462	0.3777	0.5936	0.8675	0.9656	0.9881 (86)
MIT	20.5981	20.6846	20.7929	20.9340	20.9902	20.9996	21.0000	21.0000	20.9978	20.9407	20.7736	20.5916 (87)
Th 2	20.3720	20.3746	20.3773	20.3904	20.3931	20.4063	20.4063	20.4089	20.4010	20.3931	20.3878	20.3825 (88)
util rest of house	0.9823	0.9686	0.9400	0.8333	0.6504	0.4349	0.2995	0.3292	0.5432	0.8351	0.9555	0.9847 (89)
MIT 2	19.9121	20.0219	20.1562	20.3284	20.3857	20.4061	20.4063	20.4089	20.3997	20.3400	20.1439	19.9129 (90)
Living area fraction	0.9823	0.9686	0.9400	0.8333	0.6504	0.4349	0.2995	0.3292	0.5432	0.8351	0.9555	0.9847 (89)
MIT	20.2148	20.3143	20.4371	20.5956	20.6524	20.6680	20.6682	20.6697	20.6636	20.6050	20.4217	20.2123 (93)
Temperature adjustment												0.0000
adjusted MIT	20.2148	20.3143	20.4371	20.5956	20.6524	20.6680	20.6682	20.6697	20.6636	20.6050	20.4217	20.2123 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9812	0.9679	0.9413	0.8432	0.6684	0.4544	0.3201	0.3506	0.5654	0.8470	0.9562	0.9836 (94)	
Useful gains	381.2694	396.9113	388.4881	359.7566	289.4464	193.7510	129.9629	135.7513	211.0192	305.7828	352.4824	372.2171 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	539.6063	520.3129	468.3496	384.2123	292.7466	193.8524	129.9667	135.7595	211.6645	327.1680	439.6407	533.2618 (97)	
Space heating kWh	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (98a)	
Space heating requirement - total per year (kWh/year)												478.6907	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												478.6907	
Space heating per m2										(98c) / (4) =		9.3861 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	117.8027	82.9259	59.4170	17.6081	2.4553	0.0000	0.0000	0.0000	0.0000	15.9106	62.7540	119.8172 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)	
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)	
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)	
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													478.6907 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.8277
Water heating fuel used													661.5151 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400)	123.8676 (230a)
Total electricity for the above, kWh/year	123.8676 (231)
Electricity for lighting (calculated in Appendix L)	127.2803 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1391.3536 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	478.6907	0.1579	75.5727 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			168.9644 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			204.5168 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0100 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	478.6907	1.5845	758.4651 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1765.3178 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			2147.9314 (286)
Dwelling Primary energy Rate (DPER)			42.1200 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359		(27)						
External Wall	34.0600	5.9700	28.0900	0.1800	5.0562		(29a)						
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)						
Total net area of external elements Aum(A, m2)			85.0600				(31)						
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		17.5021		(33)						
Main dwelling													
Corridor			14.3900	0.0000	0.0000		(32)						
Party Wall			19.6900	0.0000	0.0000		(32)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							264.4506 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				3.1800	0.0500	0.1590							
E3 Sill				3.1800	0.0500	0.1590							
E4 Jamb				7.5200	0.0500	0.3760							
E18 Party wall between dwellings				4.7400	0.0600	0.2844							
E7 Party floor between dwellings (in blocks of flats)				14.3700	0.0700	1.0059							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.3800	0.0000	0.0000							
E14 Flat roof				14.3700	0.0800	1.1496							
P4 Party wall - Roof (insulation at ceiling level)				14.3800	0.1200	1.7256							
E16 Corner (normal)				2.3700	0.0900	0.2133							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.0728 (36)						
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	22.5749 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 23.3048	Feb 23.1743	Mar 23.0463	Apr 22.4454	May 22.3330	Jun 21.8096	Jul 21.8096	Aug 21.7127	Sep 22.0112	Oct 22.3330	Nov 22.5604	Dec 22.7982	(38)
Heat transfer coeff	45.8797	45.7491	45.6212	45.0203	44.9079	44.3845	44.3845	44.2876	44.5861	44.9079	45.1353	45.3731	(39)
Average = Sum(39)m / 12 =												45.0198	
HLP	Jan 0.8996	Feb 0.8970	Mar 0.8945	Apr 0.8828	May 0.8805	Jun 0.8703	Jul 0.8703	Aug 0.8684	Sep 0.8742	Oct 0.8805	Nov 0.8850	Dec 0.8897	(40)
HLP (average)												0.8827	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478	52.8478	(42a)
Hot water usage for baths													
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	22.8594	(42b)
Hot water usage for other uses													
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	32.2401	(42c)
Average daily hot water use (litres/day)												99.4866	(43)
Daily hot water use	Jan 108.2281	Feb 105.9178	Mar 103.1040	Apr 98.8243	May 95.3493	Jun 91.6132	Jul 90.1768	Aug 92.9784	Sep 95.9333	Oct 99.8556	Nov 104.2013	Dec 107.9473	(44)
Energy conte	171.4068	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194	(45)
Energy content (annual)										Total = Sum(45)m =		1652.4520	
Distribution loss (46)m = 0.15 x (45)m	25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143	(62)
WWHRS	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1975.7233	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 85.9785	Feb 85.9785	Mar 85.9785	Apr 85.9785	May 85.9785	Jun 85.9785	Jul 85.9785	Aug 85.9785	Sep 85.9785	Oct 85.9785	Nov 85.9785	Dec 85.9785	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383	(72)
Total internal gains	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
-----				5.9700	11.2829	0.6300	0.7000	-----		0.7700	-----		20.5858 (81)
Solar gains	20.5858	41.9031	75.4960	123.9861	166.6617	177.6790	166.2150	132.5085	91.9930	51.2089	25.9023	16.8114	(83)
Total gains	433.2595	463.1924	480.0235	514.6395	538.8636	534.4542	510.2861	477.7357	447.1280	420.8013	416.8344	421.8072	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	81.6567	81.8897	82.1193	83.2154	83.4238	84.4075	84.4075	84.5922	84.0258	83.4238	83.0034	82.5684
alpha	6.4438	6.4593	6.4746	6.5477	6.5616	6.6272	6.6272	6.6395	6.6017	6.5616	6.5336	6.5046
util living area	0.9888	0.9808	0.9622	0.8908	0.7367	0.5277	0.3823	0.4256	0.6687	0.9084	0.9757	0.9904 (86)
MIT	20.2901	20.4065	20.5800	20.8181	20.9564	20.9957	20.9996	20.9991	20.9818	20.8212	20.5349	20.2746 (87)
Th 2	20.1678	20.1700	20.1721	20.1822	20.1841	20.1928	20.1928	20.1945	20.1895	20.1841	20.1803	20.1763 (88)
util rest of house	0.9854	0.9751	0.9508	0.8617	0.6841	0.4629	0.3124	0.3515	0.5982	0.8773	0.9674	0.9874 (89)
MIT 2	19.3559	19.5038	19.7204	20.0079	20.1506	20.1906	20.1927	20.1942	20.1785	20.0184	19.6742	19.3431 (90)
Living area fraction	19.7680	19.9021	20.0996	20.3653	20.5061	20.5458	20.5487	20.5493	20.5329	20.3726	20.0539	0.4412 (91)
MIT	19.7680	19.9021	20.0996	20.3653	20.5061	20.5458	20.5487	20.5493	20.5329	20.3726	20.0539	19.7541 (92)
Temperature adjustment	19.7680	19.9021	20.0996	20.3653	20.5061	20.5458	20.5487	20.5493	20.5329	20.3726	20.0539	0.0000
adjusted MIT	19.7680	19.9021	20.0996	20.3653	20.5061	20.5458	20.5487	20.5493	20.5329	20.3726	20.0539	19.7541 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9834	0.9729	0.9496	0.8688	0.7055	0.4914	0.3433	0.3842	0.6288	0.8853	0.9659	0.9856 (94)
Useful gains	426.0572	450.6470	455.8414	447.1165	380.1703	262.6511	175.1629	183.5636	281.1377	372.5197	402.6061	415.7125 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	709.6677	686.3317	620.4324	516.1720	395.4631	263.9006	175.2596	183.7625	286.8166	438.8653	584.6805	705.7355 (97)
Space heating kWh	211.0062	158.3801	122.4557	49.7200	11.3778	0.0000	0.0000	0.0000	0.0000	49.3611	131.0936	215.7771 (98a)
Space heating requirement - total per year (kWh/year)												949.1717
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	211.0062	158.3801	122.4557	49.7200	11.3778	0.0000	0.0000	0.0000	0.0000	49.3611	131.0936	215.7771 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												949.1717
Space heating per m2										(98c) / (4) =		18.6112 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	211.0062	158.3801	122.4557	49.7200	11.3778	0.0000	0.0000	0.0000	0.0000	49.3611	131.0936	215.7771 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	228.6091	171.5927	132.6714	53.8678	12.3270	0.0000	0.0000	0.0000	0.0000	53.4790	142.0299	233.7780 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)
Efficiency of water heater	84.2515	83.8822	83.1843	81.7477	80.3483	79.8000	79.8000	79.8000	79.8000	81.7160	83.4453	79.8000 (216)
Fuel for water heating, kWh/month	229.9650	204.4081	219.5143	197.9006	196.1717	179.0842	177.6359	184.1325	185.5158	200.7041	207.3826	84.3245 (217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	227.4674 (219)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1028.3550	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2409.8822	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												141.4370	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-840.2676	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2825.4066	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1028.3550	0.2100	215.9546 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2409.8822	0.2100	506.0753 (264)
Space and water heating			722.0298 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4370	0.1443	20.4137 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832
PV Unit electricity exported	-425.6145	0.1255	-53.4200
Total			-108.9032 (269)
Total CO2, kg/year			645.4696 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1028.3550	1.1300	1162.0412 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2409.8822	1.1300	2723.1669 (278)
Space and water heating			3885.2080 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			3416.4777 (286)
Target Primary Energy Rate (TPER)			66.9900 (287)

Full SAP Calculation Printout



Property Reference	Plot 20				Issued on Date	27/08/2025
Assessment Reference	Plot 20		Prop Type Ref			
Property	Flat 20, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	87 B	DER	4.01	TER	12.66	
Environmental	97 A	% DER < TER				68.33
CO ₂ Emissions (t/year)	0.17	DFEE	24.71	TFEE	26.84	
Compliance Check	See BREL	% DFEE < TFEE				7.95
% DPER < TPER	37.13	DPER	42.12	TPER	66.99	
Assessor Details	Daniel Smith				Assessor ID	CJ06-0001
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9000 (17)
Infiltration rate	0.1950 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1511 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1927	0.1889	0.1851	0.1662	0.1625	0.1436	0.1436	0.1398	0.1511	0.1625	0.1700	0.1776 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3327	0.3289	0.3251	0.3062	0.3025	0.2836	0.2836	0.2798	0.2911	0.3025	0.3100	0.3176 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			85.0600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.0850		(33)
Main dwelling							
Corridor			14.3900	0.0000	0.0000	180.0000	2590.2001 (32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001 (32)
Party Floor 1			51.0000			40.0000	2040.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 13486.9804 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							264.4506 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.5512 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	20.6362 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	13.2698	13.1191	12.9684	12.2149	12.0642	11.3107	11.3107	11.1600	11.6121	12.0642	12.3656	12.6670 (38)
Average = Sum(39)m / 12 =	33.9060	33.7553	33.6046	32.8511	32.7004	31.9469	31.9469	31.7962	32.2483	32.7004	33.0018	33.3032 (39)
												32.8134
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6648	0.6619	0.6589	0.6441	0.6412	0.6264	0.6264	0.6235	0.6323	0.6412	0.6471	0.6530 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.6434
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
Hot water usage for baths	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for other uses	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Average daily hot water use (litres/day)	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
												117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
												2274.4719 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Pumps, fans	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Total internal gains	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118 (73)

6. Solar gains

[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northwest	5.9700	11.2829	0.2400	0.0000	0.7700	12.4480 (81)						
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	80.1261	55.6269	30.9653	15.6628	10.1656 (83)
Total gains	426.2064	437.1521	444.1760	447.9670	449.5284	433.9432	413.6868	396.1631	384.2230	382.1960	394.5963	413.2775 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	110.4933	110.9865	111.4843	114.0413	114.5669	117.2690	117.2690	117.8248	116.1730	114.5669	113.5206	112.4932
alpha	8.3662	8.3991	8.4323	8.6028	8.6378	8.8179	8.8179	8.8550	8.7449	8.6378	8.5680	8.4995
util living area	0.9753	0.9639	0.9305	0.8350	0.6689	0.4708	0.3398	0.3692	0.5771	0.8369	0.9496	0.9789 (86)
MIT	20.6695	20.7318	20.8374	20.9483	20.9924	20.9997	21.0000	21.0000	20.9982	20.9554	20.8149	20.6591 (87)
Th 2	20.3720	20.3746	20.3773	20.3904	20.3931	20.4063	20.4063	20.4089	20.4010	20.3931	20.3878	20.3825 (88)
util rest of house	0.9690	0.9550	0.9144	0.8050	0.6279	0.4273	0.2939	0.3217	0.5279	0.8019	0.9362	0.9734 (89)
MIT 2	20.0003	20.0790	20.2075	20.3427	20.3874	20.4061	20.4063	20.4089	20.4000	20.3541	20.1925	19.9967 (90)
Living area fraction									FLA = Living area / (4) =			0.4412 (91)
MIT	20.2955	20.3670	20.4854	20.6099	20.6543	20.6680	20.6682	20.6697	20.6639	20.6194	20.4671	20.2889 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2955	20.3670	20.4854	20.6099	20.6543	20.6680	20.6682	20.6697	20.6639	20.6194	20.4671	20.2889 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9681	0.9549	0.9174	0.8161	0.6457	0.4465	0.3142	0.3427	0.5496	0.8154	0.9381	0.9725 (94)
Useful gains	412.6306	417.4286	407.4897	365.6022	290.2512	193.7654	129.9635	135.7529	211.1561	311.6500	370.1779	401.9144 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	542.3438	522.0933	469.9736	384.6822	292.8090	193.8535	129.9668	135.7597	211.6751	327.6372	441.1377	535.8131 (97)
Space heating kWh	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (98a)
Space heating requirement - total per year (kWh/year)												391.5760
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												391.5760
Space heating per m2										(98c) / (4) =		7.6780 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												391.5760 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												123.8676 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	123.8676	(231)
Electricity for lighting (calculated in Appendix L)	127.2803	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1304.2389	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	391.5760	16.4900	64.5709 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	16.4900	109.0838 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258 (249)
Energy for lighting	127.2803	16.4900	20.9885 (250)
Additional standing charges			0.0000 (251)
Total energy cost			215.0690 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.8065 (257)
SAP value		86.9265
SAP rating (Section 12)		87 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	391.5760	0.1580	61.8830 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			155.2747 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			190.8271 (272)
CO2 emissions per m2			3.7400 (273)
EI value			97.3364
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9000 (17)
Infiltration rate	0.1950 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.1511 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1625	0.1587	0.1625	0.1473	0.1511	0.1285	0.1247	0.1247	0.1285	0.1436	0.1436	0.1473	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3025	0.2987	0.3025	0.2873	0.2911	0.2685	0.2647	0.2647	0.2685	0.2836	0.2836	0.2873	(25)

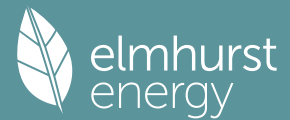
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002	(29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000	(30)
Total net area of external elements Aum(A, m2)			85.0600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	16.0850			(33)
Main dwelling								
Corridor			14.3900	0.0000	0.0000	180.0000	2590.2001	(32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001	(32)
Party Floor 1			51.0000			40.0000	2040.0000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								(28) ... (30) + (32) + (32a) ... (32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								13486.9804 (34)
List of Thermal Bridges								264.4506 (35)
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340		0.1081	
E3 Sill				3.1800	0.0260		0.0827	
E4 Jamb				7.5200	0.0300		0.2256	
E18 Party wall between dwellings				4.7400	0.0290		0.1375	
E7 Party floor between dwellings (in blocks of flats)				14.3700	-0.0180		-0.2587	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.3800	0.0000		0.0000	
E14 Flat roof				14.3700	0.1600		2.2992	
P4 Party wall - Roof (insulation at ceiling level)				14.3800	0.1280		1.8406	
E16 Corner (normal)				2.3700	0.0490		0.1161	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.5512 (36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	20.6362 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers													
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)
Hot water usage for baths													
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses													
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)													117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)
Distribution loss (46)m = 0.15 x (45)m													
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h													
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W

Northwest				5.9700	9.9768	0.2400	0.0000			0.7700			11.0070 (81)

Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343		9.6765 (83)
Total gains	424.7654	434.8040	441.8115	445.5056	443.8068	430.2373	407.8881	391.1005	382.7945	381.2600	393.1678		412.7883 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	114.5669	115.0973	114.5669	116.7185	116.1730	119.5243	120.1017	120.1017	119.5243	117.2690	117.2690	116.7185	
alpha	8.6378	8.6732	8.6378	8.7812	8.7449	8.9683	9.0068	9.0068	8.9683	8.8179	8.8179	8.7812	
util living area	0.9628	0.9465	0.9055	0.7799	0.5932	0.3934	0.2906	0.3190	0.5233	0.7910	0.9267	0.9685	(86)
MIT	20.7552	20.8092	20.8870	20.9734	20.9974	20.9999	21.0000	21.0000	20.9994	20.9745	20.8731	20.7414	(87)
Th 2	20.3931	20.3957	20.3931	20.4036	20.4010	20.4169	20.4195	20.4195	20.4169	20.4063	20.4063	20.4036	(88)
util rest of house	0.9536	0.9340	0.8853	0.7457	0.5509	0.3509	0.2462	0.2727	0.4760	0.7520	0.9086	0.9607	(89)
MIT 2	20.1241	20.1912	20.2790	20.3806	20.3993	20.4169	20.4195	20.4195	20.4165	20.3853	20.2772	20.1169	(90)
Living area fraction	20.4026	20.4638	20.5473	20.6421	20.6632	20.6741	20.6756	20.6756	20.6737	20.6452	20.5401	20.3924	(91)
MIT	20.4026	20.4638	20.5473	20.6421	20.6632	20.6741	20.6756	20.6756	20.6737	20.6452	20.5401	20.3924	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4026	20.4638	20.5473	20.6421	20.6632	20.6741	20.6756	20.6756	20.6737	20.6452	20.5401	20.3924	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9538	0.9355	0.8907	0.7597	0.5695	0.3696	0.2658	0.2932	0.4968	0.7681	0.9130	0.9605	(94)
Useful gains	405.1293	406.7721	393.5204	338.4467	252.7566	159.0300	108.4161	114.6539	190.1913	292.8504	358.9495	396.4777	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	500.3998	480.5580	436.4608	348.0059	253.5737	159.0434	108.4166	114.6552	190.3736	301.7465	407.0061	497.2701	(97)
Space heating kWh	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(98a)
Space heating requirement - total per year (kWh/year)												276.1127	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												276.1127	
Space heating per m2										(98c) / (4) =		5.4140	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

0.0000 (201)

Fraction of space heat from main system(s)

1.0000 (202)

Fraction of main heating from main system 2

0.0000 (203)

Fraction of total heating from main system 1

1.0000 (204)

Fraction of total heating from main system 2

0.0000 (205)

Efficiency of main space heating system 1 (in %)

100.0000 (206)

Efficiency of main space heating system 2 (in %)

0.0000 (207)

Efficiency of secondary/supplementary heating system, %

0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)

B 87
A 97

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 87
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£338	£338	£0
Space heating	£114	£114	£0
Water heating	£188	£188	£0
Lighting	£36	£36	£0
Total cost of fuels	£338	£338	£0
Total cost of uses	£338	£338	£0
Delivered energy	23 kWh/m ²	23 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	36 kWh/m ²	36 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		120.8700 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9000 (17)
Infiltration rate	0.1950 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1511 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1927	0.1889	0.1851	0.1662	0.1625	0.1436	0.1436	0.1398	0.1511	0.1625	0.1700	0.1776 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3327	0.3289	0.3251	0.3062	0.3025	0.2836	0.2836	0.2798	0.2911	0.3025	0.3100	0.3176 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							

Full SAP Calculation Printout



Window				5.9700	0.7752	4.6279		(27)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002	(29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000	(30)
Total net area of external elements Aum(A, m2)			85.0600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.0850			(33)
Main dwelling								
Corridor			14.3900	0.0000	0.0000	180.0000	2590.2001	(32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001	(32)
Party Floor 1			51.0000			40.0000	2040.0000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							13486.9804	(34)
List of Thermal Bridges							264.4506	(35)
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081	
E3 Sill					3.1800	0.0260	0.0827	
E4 Jamb					7.5200	0.0300	0.2256	
E18 Party wall between dwellings					4.7400	0.0290	0.1375	
E7 Party floor between dwellings (in blocks of flats)					14.3700	-0.0180	-0.2587	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					14.3800	0.0000	0.0000	
E14 Flat roof					14.3700	0.1600	2.2992	
P4 Party wall - Roof (insulation at ceiling level)					14.3800	0.1280	1.8406	
E16 Corner (normal)					2.3700	0.0490	0.1161	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.5512	(36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	20.6362 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	13.2698	13.1191	12.9684	12.2149	12.0642	11.3107	11.3107	11.1600	11.6121	12.0642	12.3656	12.6670	(38)
Average = Sum(39)m / 12 =	33.9060	33.7553	33.6046	32.8511	32.7004	31.9469	31.9469	31.7962	32.2483	32.7004	33.0018	33.3032	(39)
												32.8134	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6648	0.6619	0.6589	0.6441	0.6412	0.6264	0.6264	0.6235	0.6323	0.6412	0.6471	0.6530	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196	(42)
Hot water usage for mixer showers														
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)	
Hot water usage for baths														
	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)	
Hot water usage for other uses														
	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)	
Average daily hot water use (litres/day)													117.8284	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)	
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)	
Energy content (annual)										Total = Sum(45)m =		1957.1409		
Distribution loss (46)m = 0.15 x (45)m														
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)	
Water storage loss:														
Store volume													201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage														
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)	
								Total per year (kWh/year) = Sum(64)m =				2274.4719	(64)	
Electric shower(s)														
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													0.0000	(64a)
Heat gains from water heating, kWh/month														
	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)	
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)	
Water heating gains (Table 5)														
	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)	
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northwest	5.9700				11.2829	0.2400	0.0000	0.7700	12.4480 (81)			
Solar gains	12.4480	25.3382	45.6514	74.9727	100.7780	107.4400	100.5080	55.6269	30.9653	15.6628	10.1656	(83)
Total gains	426.2064	437.1521	444.1760	447.9670	449.5284	433.9432	413.6868	384.2230	382.1960	394.5963	413.2775	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	110.4933	110.9865	111.4843	114.0413	114.5669	117.2690	117.2690	117.8248	116.1730	114.5669	113.5206	112.4932
alpha	8.3662	8.3991	8.4323	8.6028	8.6378	8.8179	8.8179	8.8550	8.7449	8.6378	8.5680	8.4995
util living area	0.9753	0.9639	0.9305	0.8350	0.6689	0.4708	0.3398	0.3692	0.5771	0.8369	0.9496	0.9789 (86)
MIT	20.6695	20.7318	20.8374	20.9483	20.9924	20.9997	21.0000	21.0000	20.9982	20.9554	20.8149	20.6591 (87)
Th 2	20.3720	20.3746	20.3773	20.3904	20.3931	20.4063	20.4063	20.4089	20.4010	20.3931	20.3878	20.3825 (88)
util rest of house	0.9690	0.9550	0.9144	0.8050	0.6279	0.4273	0.2939	0.3217	0.5279	0.8019	0.9362	0.9734 (89)
MIT 2	20.0003	20.0790	20.2075	20.3427	20.3874	20.4061	20.4063	20.4089	20.4000	20.3541	20.1925	19.9967 (90)
Living area fraction	20.2955	20.3670	20.4854	20.6099	20.6543	20.6680	20.6682	20.6697	20.6639	20.6194	20.4671	0.4412 (91)
MIT	20.2955	20.3670	20.4854	20.6099	20.6543	20.6680	20.6682	20.6697	20.6639	20.6194	20.4671	20.2889 (92)
Temperature adjustment	20.2955	20.3670	20.4854	20.6099	20.6543	20.6680	20.6682	20.6697	20.6639	20.6194	20.4671	0.0000
adjusted MIT	20.2955	20.3670	20.4854	20.6099	20.6543	20.6680	20.6682	20.6697	20.6639	20.6194	20.4671	20.2889 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9681	0.9549	0.9174	0.8161	0.6457	0.4465	0.3142	0.3427	0.5496	0.8154	0.9381	0.9725 (94)
Useful gains	412.6306	417.4286	407.4897	365.6022	290.2512	193.7654	129.9635	135.7529	211.1561	311.6500	370.1779	401.9144 (95)
Ext temp.	4.3000	4.9000	6.5000	8.3000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	542.3438	522.0933	469.9736	384.6822	292.8090	193.8535	129.9668	135.7597	211.6751	327.6372	441.1377	535.8131 (97)
Space heating kWh	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (98a)
Space heating requirement - total per year (kWh/year)												391.5760
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												391.5760
Space heating per m2										(98c) / (4) =		7.6780 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	96.5066	70.3347	46.4880	13.7376	1.9030	0.0000	0.0000	0.0000	0.0000	11.8945	51.0910	99.6207 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													391.5760	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													343.8277	
Water heating fuel used													661.5151	(219)
Space cooling fuel													0.0000	(221)

Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													123.8676	(230a)
Total electricity for the above, kWh/year													123.8676	(231)
Electricity for lighting (calculated in Appendix L)													127.2803	(232)

Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1304.2389	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	391.5760	16.4900	64.5709	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	16.4900	109.0838	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258	(249)
Energy for lighting	127.2803	16.4900	20.9885	(250)
Additional standing charges			0.0000	(251)
Total energy cost			215.0690	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.8065	(257)
SAP value		86.9265	
SAP rating (Section 12)		87	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	391.5760	0.1580	61.8830	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			155.2747	(265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820	(267)
Energy for lighting	127.2803	0.1443	18.3705	(268)
Total CO2, kg/year			190.8271	(272)
CO2 emissions per m2			3.7400	(273)
EI value			97.3364	
EI rating			97	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 120.8700 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

Full SAP Calculation Printout



Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.9000 (17)
Infiltration rate 0.1950 (18)
Number of sides sheltered 3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1511 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1625	0.1587	0.1625	0.1473	0.1511	0.1285	0.1247	0.1247	0.1285	0.1436	0.1436	0.1473	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3025	0.2987	0.3025	0.2873	0.2911	0.2685	0.2647	0.2647	0.2685	0.2836	0.2836	0.2873	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002	(29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000	(30)
Total net area of external elements Aum(A, m2)			85.0600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	16.0850		(33)
Main dwelling								
Corridor			14.3900	0.0000	0.0000	180.0000	2590.2001	(32)
Party Wall			19.6900	0.0000	0.0000	180.0000	3544.2001	(32)
Party Floor 1			51.0000			40.0000	2040.0000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13486.9804 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 264.4506 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.5512 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 20.6362 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.0642	11.9135	12.0642	11.4614	11.6121	10.7079	10.5572	10.5572	10.7079	11.3107	11.3107	11.4614	(38)
Heat transfer coeff	32.7004	32.5497	32.7004	32.0976	32.2483	31.3441	31.1934	31.1934	31.3441	31.9469	31.9469	32.0976	(39)
Average = Sum(39)m / 12 =													31.9469

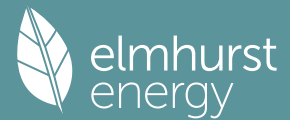
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6412	0.6382	0.6412	0.6294	0.6323	0.6146	0.6116	0.6116	0.6146	0.6264	0.6264	0.6294	(40)
HLP (average)													0.6264
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7196 (42)
Hot water usage for mixer showers 72.9452 71.8490 70.2515 67.1952 64.9397 62.4243 60.9946 62.5799 64.3178 67.0185 70.1405 72.6657 (42a)
Hot water usage for baths 22.9369 22.5963 22.1166 21.2321 20.5698 19.8354 19.4388 19.9151 20.4338 21.2196 22.1223 22.8594 (42b)
Hot water usage for other uses 32.2401 31.0678 29.8954 28.7230 27.5507 26.3783 26.3783 27.5507 28.7230 29.8954 31.0678 32.2401 (42c)
Average daily hot water use (litres/day) 117.8284 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)
Energy content (annual)										Total = Sum(45)m =			1957.1409
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													

Full SAP Calculation Printout



WWHRS	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c	Access factor Table 6d			Gains W
-----				-----	-----	-----		-----	-----			-----
Northwest				5.9700	9.9768	0.2400		0.0000	0.7700			11.0070 (81)
-----				-----	-----	-----		-----	-----			-----
Solar gains	11.0070	22.9902	43.2869	72.5114	95.0564	103.7342	94.7093	75.0635	54.1984	30.0293	14.2343	9.6765 (83)
Total gains	424.7654	434.8040	441.8115	445.5056	443.8068	430.2373	407.8881	391.1005	382.7945	381.2600	393.1678	412.7883 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	114.5669	115.0973	114.5669	116.7185	116.1730	119.5243	120.1017	120.1017	119.5243	117.2690	117.2690	116.7185	
alpha	8.6378	8.6732	8.6378	8.7812	8.7449	8.9683	9.0068	9.0068	8.9683	8.8179	8.8179	8.7812	
util living area	0.9628	0.9465	0.9055	0.7799	0.5932	0.3934	0.2906	0.3190	0.5233	0.7910	0.9267	0.9685	(86)
MIT	20.7552	20.8092	20.8870	20.9734	20.9974	20.9999	21.0000	21.0000	20.9994	20.9745	20.8731	20.7414	(87)
Th 2	20.3931	20.3957	20.3931	20.4036	20.4010	20.4169	20.4195	20.4195	20.4169	20.4063	20.4063	20.4036	(88)
util rest of house	0.9536	0.9340	0.8853	0.7457	0.5509	0.3509	0.2462	0.2727	0.4760	0.7520	0.9086	0.9607	(89)
MIT 2	20.1241	20.1912	20.2790	20.3806	20.3993	20.4169	20.4195	20.4195	20.4165	20.3853	20.2772	20.1169	(90)
Living area fraction	20.4026	20.4638	20.5473	20.6421	20.6632	20.6741	20.6756	20.6756	20.6737	20.6452	20.5401	20.3924	(91)
MIT	20.4026	20.4638	20.5473	20.6421	20.6632	20.6741	20.6756	20.6756	20.6737	20.6452	20.5401	20.3924	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4026	20.4638	20.5473	20.6421	20.6632	20.6741	20.6756	20.6756	20.6737	20.6452	20.5401	20.3924	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	405.1293	406.7721	393.5204	338.4467	252.7566	159.0300	108.4161	114.6539	190.1913	292.8504	358.9495	396.4777	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	500.3998	480.5580	436.4608	348.0059	253.5737	159.0434	108.4166	114.6552	190.3736	301.7465	407.0061	497.2701	(96)
Space heating kWh	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(97)
Space heating requirement - total per year (kWh/year)												276.1127	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	(98c)
Space heating kWh	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												276.1127	(99)
Space heating per m2												5.4140	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	70.8813	49.5841	31.9477	6.8827	0.6079	0.0000	0.0000	0.0000	0.0000	6.6188	34.6007	74.9895	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.1809	10.5203	10.1809	10.5203	10.1809	(231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												276.1127	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.8277	
Water heating fuel used												661.5151	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												123.8676	(230a)
Total electricity for the above, kWh/year												123.8676	(231)
Electricity for lighting (calculated in Appendix L)												127.2803	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1188.7756	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	276.1127	28.4300	78.4988	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	28.4300	188.0687	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156	(249)
Energy for lighting	127.2803	28.4300	36.1858	(250)
Additional standing charges			0.0000	(251)
Total energy cost			337.9689	(255)

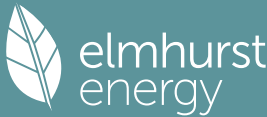
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	276.1127	0.1586	43.7877	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			137.1794	(265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820	(267)
Energy for lighting	127.2803	0.1443	18.3705	(268)
Total CO2, kg/year			172.7318	(272)

13a. Primary energy - Individual heating systems including micro-CHP

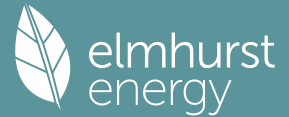
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	276.1127	1.5871	438.2135	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	1.5220	1006.8528	(278)
Space and water heating			1445.0662	(279)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			1827.6798 (286)

Full SAP Calculation Printout



Property Reference	Plot 21			Issued on Date	27/08/2025
Assessment Reference	Plot 21	Prop Type Ref			
Property	Flat 21, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	86 B	DER	4.26	TER	12.66
Environmental	97 A	% DER < TER			66.35
CO ₂ Emissions (t/year)	0.19	DFEE	26.01	TFEE	26.52
Compliance Check	See BREL	% DFEE < TFEE			1.95
% DPER < TPER	33.38	DPER	44.64	TPER	67.00
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9200 (17)
Infiltration rate	0.1960 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.8594	5.1306		(27)
Heatloss Floor 1			27.0200	0.1100	2.9722	20.0000	540.4000 (28b)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			112.0800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	19.5599	(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12946.5800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							253.8545 (35)
List of Thermal Bridges							

elmhurst
energy

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	13.3092	13.1578	13.0063	12.2489	12.0975	11.3401	11.3401	11.1886	11.6430	12.0975	12.4004	12.7033 (38)
Heat transfer coeff	37.6588	37.5074	37.3559	36.5985	36.4471	35.6897	35.6897	35.5382	35.9927	36.4471	36.7500	37.0530 (39)
Average = Sum(39)m / 12 =												36.5607
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.7384	0.7354	0.7325	0.7176	0.7146	0.6998	0.6998	0.6968	0.7057	0.7146	0.7206	0.7265 (40)
HLP (average)												0.7169
Days in mont.	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
12Total per year (kWh/year)												2274.4719 (64a)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	376.1328	384.7396	367.0660	351.6998	332.2354	318.9035	305.4404	307.0498	317.5847	330.0552	352.9786	368.2415 (73)

[Jan]				Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				5.9700	36.7938	0.4000	0.7000	0.7700	42.6227 (77)			
Solar gains	42.6227	72.6022	99.3375	123.0839	137.8643	136.8673	131.9547	120.9279	107.5615	80.2409	51.0521	36.4761 (83)

Full SAP Calculation Printout



Total gains 418.7555 457.3417 466.4035 474.7837 470.0996 455.7708 437.3951 427.9777 425.1461 410.2961 404.0307 404.7176 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	95.4961	95.8817	96.2705	98.2627	98.6711	100.7649	100.7649	101.1944	99.9168	98.6711	97.8577	97.0576	21.0000 (85)
alpha	7.3664	7.3921	7.4180	7.5508	7.5781	7.7177	7.7177	7.7463	7.6611	7.5781	7.5238	7.4705	
util living area	0.9827	0.9656	0.9360	0.8501	0.7031	0.4999	0.3589	0.3818	0.5802	0.8456	0.9586	0.9856	(86)
MIT	20.5125	20.6358	20.7640	20.9116	20.9810	20.9988	20.9999	20.9999	20.9962	20.9276	20.7220	20.4974	(87)
Th 2	20.3070	20.3096	20.3122	20.3253	20.3279	20.3410	20.3410	20.3436	20.3358	20.3279	20.3227	20.3175	(88)
util rest of house	0.9781	0.9570	0.9207	0.8199	0.6581	0.4490	0.3052	0.3274	0.5260	0.8098	0.9470	0.9817	(89)
MIT 2	19.7510	19.9056	20.0629	20.2419	20.3131	20.3403	20.3410	20.3436	20.3335	20.2634	20.0243	19.7409	(90)
Living area fraction													(91)
MIT	20.0877	20.2285	20.3729	20.5380	20.6084	20.6315	20.6323	20.6338	20.6265	20.5571	20.3328	20.0754	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0877	20.2285	20.3729	20.5380	20.6084	20.6315	20.6323	20.6338	20.6265	20.5571	20.3328	20.0754	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9764	0.9558	0.9222	0.8299	0.6772	0.4715	0.3290	0.3515	0.5499	0.8226	0.9472	0.9801	(94)
Useful gains	408.8656	437.1474	430.1072	394.0169	318.3413	214.9128	143.8948	150.4310	233.7825	337.5070	382.6843	396.6493	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	594.5458	574.9318	518.2348	425.9355	324.6864	215.2609	143.9129	150.4606	234.9055	362.9076	486.3053	588.2296	(97)
Space heating kWh	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(98a)
Space heating requirement - total per year (kWh/year)												560.0471	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												560.0471	
Space heating per m2										(98c) / (4) =		10.9813	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Fraction of main heating from main system 2													1.0000 (202)
Fraction of total heating from main system 1													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												560.0471	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.8277	
Water heating fuel used												661.5151	(219)
Space cooling fuel												0.0000	(221)

Full SAP Calculation Printout



Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	123.8676 (230a)
Total electricity for the above, kWh/year	123.8676 (231)
Electricity for lighting (calculated in Appendix L)	127.2803 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1472.7100 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	560.0471	0.1577	88.3427 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			181.7344 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			217.2868 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	560.0471	1.5839	887.0857 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1893.9385 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			2276.5521 (286)
Dwelling Primary energy Rate (DPER)			44.6400 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure Test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
Heatloss Floor 1			27.0200	0.1300	3.5126			(28b)
External Wall	34.0600	5.9700	28.0900	0.1800	5.0562			(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100			(30)
Total net area of external elements Aum(A, m2)			112.0800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.0147			(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000			(32)
Party Wall			19.7200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

253.8545 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	3.1800	0.0500	0.1590
E4 Jamb	7.5200	0.0500	0.3760
E18 Party wall between dwellings	4.7400	0.0600	0.2844
E9 Balcony between dwellings, wall insulation continuous	1.5900	0.0200	0.0318
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	14.3700	0.0700	1.0059
E14 Flat roof	14.3700	0.0800	1.1496
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1200	1.7256
E16 Corner (normal)	2.3700	0.0900	0.2133

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

5.1046 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 26.1193 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
23.3048	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982
Heat transfer coeff	49.4241	49.2935	49.1656	48.5647	48.4523	47.9289	47.9289	47.8320	48.1305	48.4523	48.6797	48.9175
Average = Sum(39)m / 12 =												48.5642

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.9691	0.9691	0.9665	0.9640	0.9522	0.9500	0.9398	0.9398	0.9379	0.9437	0.9500	0.9545	0.9592
HLP (average)												0.9522
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196
Hot water usage for mixer showers												(42)
53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478	(42a)
Hot water usage for baths												
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses												
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)												99.4866

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473	(44)
Energy conte	171.0426	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194
Energy content (annual)												1652.4520
Distribution loss (46)m = 0.15 x (45)m												
25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529	(46)

Water storage loss:

Store volume

150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):

1.3938 (48)

Temperature factor from Table 2b

0.5400 (49)

Enter (49) or (54) in (55)

0.7527 (55)

Total storage loss

23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (56)

If cylinder contains dedicated solar storage

23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 (57)

Primary loss 23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month

218.0017 192.9113 205.0619 180.3774 174.9534 157.7410 155.6559 161.7216 163.3872 182.0981 193.5456 215.6143 (62)

WWHRS -24.2527 -21.4493 -22.4605 -18.5982 -17.3328 -14.8318 -13.9025 -14.7839 -15.3456 -18.0907 -20.4946 -23.8036 (63a)

FV diverter -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 -0.0000 (63b)

Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Output from w/h 193.7490 171.4620 182.6014 161.7793 157.6206 142.9092 141.7534 146.9378 148.0416 164.0073 173.0510 191.8107 (64)

Total per year (kWh/year) = Sum(64a)m = 1975.7233 (64)

Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 94.2687 83.8181 89.9662 81.0559 79.9551 73.5293 73.5387 75.5556 75.4067 82.3307 85.4344 93.4749 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828
Water heating gains (Table 5)												

Full SAP Calculation Printout



Total internal gains	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383 (72)
	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
Southeast				5.9700	36.7938	0.6300	0.7000	0.7700			67.1307 (77)	
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	479.8044	535.6378	560.9840	584.5106	589.3381	572.3412	551.8997	535.6886	524.5442	495.9718	471.3392	462.4456 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	72.7636	72.9563	73.1461	74.0512	74.2230	75.0335	75.0335	75.1855	74.7192	74.2230	73.8762	73.5171
alpha	5.8509	5.8638	5.8764	5.9367	5.9482	6.0022	6.0022	6.0124	5.9813	5.9482	5.9251	5.9011
util living area	0.9820	0.9652	0.9355	0.8581	0.7214	0.5300	0.3814	0.4096	0.6174	0.8628	0.9612	0.9850 (86)
MIT	20.2397	20.4060	20.5958	20.8147	20.9452	20.9926	20.9991	20.9987	20.9822	20.8363	20.5188	20.2123 (87)
Th 2	20.1092	20.1113	20.1134	20.1233	20.1252	20.1338	20.1338	20.1354	20.1305	20.1252	20.1214	20.1175 (88)
util rest of house	0.9769	0.9559	0.9184	0.8243	0.6667	0.4609	0.3067	0.3332	0.5460	0.8235	0.9491	0.9807 (89)
MIT 2	19.2481	19.4560	19.6886	19.9486	20.0828	20.1299	20.1335	20.1350	20.1199	19.9785	19.6063	19.2204 (90)
Living area fraction	fLA = Living area / (4) =											0.4422 (91)
MIT	19.6866	19.8760	20.0897	20.3315	20.4641	20.5114	20.5163	20.5169	20.5012	20.3578	20.0098	19.6590 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6866	19.8760	20.0897	20.3315	20.4641	20.5114	20.5163	20.5169	20.5012	20.3578	20.0098	19.6590 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9740	0.9530	0.9179	0.8329	0.6886	0.4913	0.3398	0.3670	0.5770	0.8348	0.9474	0.9779 (94)
Useful gains	467.3071	510.4446	514.9344	486.8382	405.8207	281.2077	187.5110	196.6138	302.6880	414.0378	446.5245	452.2394 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	760.4668	738.2218	668.1477	555.1689	424.6426	283.3252	187.7024	196.9176	308.0915	472.7860	628.4436	756.2132 (97)
Space heating kWh	218.1108	153.0663	113.9907	49.1981	14.0035	0.0000	0.0000	0.0000	0.0000	43.7087	130.9817	226.1566 (98a)
Space heating requirement - total per year (kWh/year)												949.2163
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	218.1108	153.0663	113.9907	49.1981	14.0035	0.0000	0.0000	0.0000	0.0000	43.7087	130.9817	226.1566 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												949.2163
Space heating per m2												(98c) / (4) = 18.6121 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	218.1108	153.0663	113.9907	49.1981	14.0035	0.0000	0.0000	0.0000	0.0000	43.7087	130.9817	226.1566 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	236.3064	165.8356	123.5002	53.3024	15.1717	0.0000	0.0000	0.0000	0.0000	47.3550	141.9087	245.0233 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)
Efficiency of water heater	84.3260	83.8062	83.0344	81.7317	80.4654	79.8000	79.8000	79.8000	79.8000	81.5390	83.4434	79.8000 (216)
Fuel for water heating, kWh/month	229.7618	204.5934	219.9105	197.9395	195.8861	179.0842	177.6359	184.1325	185.5158	201.1398	207.3872	84.4301 (217)
Space cooling fuel requirement												227.1827 (219)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635 (233b)

Full SAP Calculation Printout



Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1028.4033	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													2410.1694	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													141.4370	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-840.2676	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													2825.7422	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1028.4033	0.2100	215.9647 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2410.1694	0.2100	506.1356 (264)
Space and water heating			722.1003 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4370	0.1443	20.4137 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832
PV Unit electricity exported	-425.6145	0.1255	-53.4200
Total			-108.9032 (269)
Total CO2, kg/year			645.5401 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1028.4033	1.1300	1162.0958 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2410.1694	1.1300	2723.4914 (278)
Space and water heating			3885.5872 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			3416.8568 (286)
Target Primary Energy Rate (TPER)			67.0000 (287)

Full SAP Calculation Printout



Property Reference	Plot 21			Issued on Date	27/08/2025
Assessment Reference	Plot 21	Prop Type Ref			
Property	Flat 21, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	86 B	DER	4.26	TER	12.66
Environmental	97 A	% DER < TER			66.35
CO ₂ Emissions (t/year)	0.19	DFEE	26.01	TFEE	26.52
Compliance Check	See BREL	% DFEE < TFEE			1.95
% DPER < TPER	33.38	DPER	44.64	TPER	67.00
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		120.8700 (1b) - (3b)
Dwelling volume			120.8700 (4)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9200 (17)
Infiltration rate	0.3615 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2801 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3572	0.3502	0.3432	0.3082	0.3011	0.2661	0.2661	0.2591	0.2801	0.3011	0.3152	0.3292 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5638	0.5613	0.5589	0.5475	0.5453	0.5354	0.5354	0.5336	0.5392	0.5453	0.5497	0.5542 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.8594	5.1306		(27)
Heatloss Floor 1			27.0200	0.1100	2.9722	20.0000	540.4000 (28b)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			112.0800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.5599		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32a)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12946.5800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							253.8545 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081
E3 Sill					3.1800	0.0260	0.0827

Full SAP Calculation Printout



E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E9 Balcony between dwellings, wall insulation continuous	1.5900	0.1500	0.2385
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7897 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.3496 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.4878	22.3890	22.2922	21.8373	21.7522	21.3561	21.3561	21.2827	21.5087	21.7522	21.9244	22.1044 (38)
Average = Sum(39)m / 12 =	46.8374	46.7386	46.6418	46.1869	46.1018	45.7057	45.7057	45.6323	45.8583	46.1018	46.2740	46.4540 (39)
												46.1865
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9184	0.9164	0.9145	0.9056	0.9040	0.8962	0.8962	0.8948	0.8992	0.9040	0.9073	0.9109 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												50.5753 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995 (44)
Distribution loss (46)m = 0.15 x (45)m	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725 (45)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	74.2789	64.9543	67.9494	58.1281	55.0625	48.3014	47.1000	49.9566	51.5229	58.9581	64.4121	73.3316 (64)
12Total per year (kWh/year)												714 (64)
Electric shower(s)	42.4850	37.8545	41.3357	39.4461	40.1863	38.3339	39.6117	40.1863	39.4461	41.3357	40.5584	42.4850 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.2649 (64a)
Heat gains from water heating, kWh/month	29.1910	25.7022	27.3213	24.3936	23.8122	21.6588	21.6779	22.5357	22.7423	25.0735	26.2426	28.9542 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169 (72)
Total internal gains	324.6838	334.5534	319.8076	311.5186	296.2212	287.2957	276.8459	276.4442	284.5528	292.1140	308.2842	317.7546 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	W/m2	Specific data	factor	W						
				or Table 6b	Table 6c							
Southeast	5.9700	36.7938	0.4000	0.7000	0.7700	42.6227 (77)						
Solar gains	42.6227	72.6022	99.3375	123.0839	137.8643	136.8673	131.9547	120.9279	107.5615	80.2409	51.0521	36.4761 (83)
Total gains	367.3065	407.1555	419.1450	434.6025	434.0855	424.1630	408.8006	397.3721	392.1143	372.3548	359.3364	354.2307 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	76.7820	76.9443	77.1041	77.8634	78.0071	78.6833	78.6833	78.8098	78.4215	78.0071	77.7169	77.4158
alpha	6.1188	6.1296	6.1403	6.1909	6.2005	6.2456	6.2456	6.2540	6.2281	6.2005	6.1811	6.1611
util living area	0.9948	0.9892	0.9792	0.9439	0.8557	0.6671	0.4889	0.5236	0.7550	0.9444	0.9877	0.9958 (86)
MIT	20.0968	20.2419	20.4234	20.6772	20.8755	20.9792	20.9973	20.9960	20.9557	20.7223	20.3740	20.0719 (87)
Th 2	20.1519	20.1535	20.1552	20.1627	20.1641	20.1707	20.1707	20.1720	20.1682	20.1641	20.1613	20.1583 (88)
util rest of house	0.9931	0.9859	0.9724	0.9255	0.8113	0.5901	0.3984	0.4318	0.6831	0.9225	0.9833	0.9945 (89)
MIT 2	19.3335	19.4783	19.6579	19.9065	20.0815	20.1614	20.1700	20.1708	20.1455	19.9525	19.6161	19.3140 (90)
Living area fraction									fLA = Living area / (4) =			0.4422 (91)
MIT	19.6710	19.8159	19.9964	20.2472	20.4326	20.5230	20.5358	20.5357	20.5037	20.2929	19.9512	19.6491 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6710	19.8159	19.9964	20.2472	20.4326	20.5230	20.5358	20.5357	20.5037	20.2929	19.9512	19.6491 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9920	0.9843	0.9709	0.9276	0.8267	0.6237	0.4386	0.4725	0.7135	0.9264	0.9819	0.9934 (94)
Useful gains	364.3529	400.7487	406.9481	403.1317	358.8493	264.5472	179.2908	187.7750	279.7649	344.9491	352.8437	351.9008 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	719.9395	697.1500	629.4951	524.0942	402.5887	270.7135	179.8902	188.7203	293.6645	446.8589	594.6779	717.6740 (97)
Space heating kWh	264.5564	199.1817	165.5750	87.0930	32.5421	0.0000	0.0000	0.0000	0.0000	75.8209	174.1207	272.1353 (98a)
Space heating requirement - total per year (kWh/year)												1271.0250
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	264.5564	199.1817	165.5750	87.0930	32.5421	0.0000	0.0000	0.0000	0.0000	75.8209	174.1207	272.1353 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1271.0250
Space heating per m2										(98c) / (4) =		24.9221 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	429.6333	338.2220	346.8056	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8865	0.9476	0.9354	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	380.8638	320.5017	324.3978	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	456.2489	440.3069	428.7121	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	54.2773	89.1351	77.6099	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	13.5693	22.2838	19.4025	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												55.2556 (107)
Energy for space heating												24.9221 (99)
Energy for space cooling												1.0834 (108)
Total												26.0055 (109)
Fabric Energy Efficiency (DFEE)												26.0 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling		Area (m2)	Storey height (m)	Volume (m3)
Ground floor	51.0000 (1b)	x	2.3700 (2b)	= 120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1655 (8)
Pressure test	Yes
Pressure Test Method	Blower Door

Full SAP Calculation Printout



Measured/design AP50 5.0000 (17)
Infiltration rate 0.4155 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			5.9700	1.1450	6.8359		(27)
Heatloss Floor 1			27.0200	0.1300	3.5126		(28b)
External Wall	34.0600	5.9700	28.0900	0.1800	5.0562		(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)
Total net area of external elements Aum(A, m2)							
			112.0800				(31)
Fabric heat loss, W/K = Sum (A x U)							
					(26)...(30) + (32) =	21.0147	(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000		(32)
Party Wall			19.7200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 253.8545 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	3.1800	0.0500	0.1590
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	7.5200	0.0500	0.3760
E4 Jamb	4.7400	0.0600	0.2844
E18 Party wall between dwellings	1.5900	0.0200	0.0318
E9 Balcony between dwellings, wall insulation continuous	14.3800	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3700	0.0700	1.0059
E7 Party floor between dwellings (in blocks of flats)	14.3700	0.0800	1.1496
E14 Flat roof	14.3800	0.1200	1.7256
P4 Party wall - Roof (insulation at ceiling level)	2.3700	0.0900	0.2133
E16 Corner (normal)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			
			5.1046 (36)
Point Thermal bridges			
			(36a) = 0.0000
Total fabric heat loss			
			(33) + (36) + (36a) = 26.1193 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982 (38)
Heat transfer coeff	49.4241	49.2935	49.1656	48.5647	48.4523	47.9289	47.9289	47.8320	48.1305	48.4523	48.6797	48.9175 (39)
Average = Sum(39)m / 12 =												48.5642
HLP	0.9691	0.9665	0.9640	0.9522	0.9500	0.9398	0.9398	0.9379	0.9437	0.9500	0.9545	Dec 0.9592 (40)
HLP (average)												0.9522
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (42a)
Hot water usage for baths												
22.9369 22.5963 22.1166 21.2321 20.5698 19.8354 19.4388 19.9151 20.4338 21.2196 22.1223												22.8594 (42b)
Hot water usage for other uses												
32.2401 31.0678 29.8954 28.7230 27.5507 26.3783 26.3783 27.5507 28.7230 29.8954 31.0678												32.2401 (42c)
Average daily hot water use (litres/day)												50.5753 (43)
Daily hot water use	55.1770	53.6640	52.0120	49.9551	48.1205	46.2137	45.8170	47.4658	49.1568	51.1149	53.1900	55.0995 (44)
Energy conte	87.3869	76.4169	79.9404	68.3860	64.7794	56.8252	55.4117	58.7725	60.6152	69.3625	75.7789	86.2725 (45)
Energy content (annual)												Total = Sum(45)m = 839.9482
Distribution loss (46)m = 0.15 x (45)m												
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (46)
Water storage loss:												
Total storage loss												
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (57)
Primary loss												
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (59)
Combi loss												
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (61)
Total heat required for water heating calculated for each month												
74.2789 64.9543 67.9494 58.1281 55.0625 48.3014 47.1000 49.9566 51.5229 58.9581 64.4121												73.3316 (62)
WWHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (63a)
PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (63b)
Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (63c)
FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												0.0000 (63d)
Output from w/h												
74.2789 64.9543 67.9494 58.1281 55.0625 48.3014 47.1000 49.9566 51.5229 58.9581 64.4121												73.3316 (64)
Total per year (kWh/year) = Sum(64)m =												713.9560 (64)
12Total per year (kWh/year)												
Electric shower(s)												714 (64)
42.4850 37.8545 41.3357 39.4461 40.1863 38.3339 39.6117 40.1863 39.4461 41.3357 40.5584												42.4850 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.2649 (64a)
Heat gains from water heating, kWh/month												
29.1910 25.7022 27.3213 24.3936 23.8122 21.6588 21.6779 22.5357 22.7423 25.0735 26.2426												28.9542 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)												
	39.2352	38.2473	36.7221	33.8800	32.0056	30.0817	29.1370	30.2900	31.5865	33.7009	36.4481	38.9169 (72)
Total internal gains	322.2036	331.8074	317.3273	308.9557	293.7410	284.7328	274.3657	273.9640	281.9899	289.6338	305.7214	315.2744 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.9700		36.7938		0.6300		0.7000		0.7700		67.1307 (77)	
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	389.3343	446.1558	473.7838	502.8129	510.8772	500.2988	482.1943	464.4254	451.3992	416.0131	386.1285	372.7243 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	72.7636	72.9563	73.1461	74.0512	74.2230	75.0335	75.0335	75.1855	74.7192	74.2230	73.8762	73.5171
alpha	5.8509	5.8638	5.8764	5.9367	5.9482	6.0022	6.0022	6.0124	5.9813	5.9482	5.9251	5.9011
util living area	0.9935	0.9848	0.9677	0.9134	0.7973	0.6001	0.4356	0.4710	0.7006	0.9242	0.9842	0.9948 (86)
MIT	20.0586	20.2392	20.4533	20.7236	20.9068	20.9860	20.9982	20.9972	20.9658	20.7428	20.3616	20.0301 (87)
Th 2	20.1092	20.1113	20.1134	20.1233	20.1252	20.1338	20.1338	20.1354	20.1305	20.1252	20.1214	20.1175 (88)
util rest of house	0.9914	0.9801	0.9577	0.8880	0.7455	0.5246	0.3508	0.3840	0.6259	0.8965	0.9786	0.9932 (89)
MIT 2	19.2605	19.4402	19.6503	19.9111	20.0662	20.1278	20.1334	20.1347	20.1138	19.9344	19.5704	19.2392 (90)
Living area fraction	19.6134	19.7935	20.0054	20.2704	20.4379	20.5072	20.5158	20.5160	20.4905	20.2918	19.9202	19.5889 (92)
MIT	19.6134	19.7935	20.0054	20.2704	20.4379	20.5072	20.5158	20.5160	20.4905	20.2918	19.9202	19.5889 (93)
Temperature adjustment												0.0000
adjusted MIT	19.6134	19.7935	20.0054	20.2704	20.4379	20.5072	20.5158	20.5160	20.4905	20.2918	19.9202	19.5889 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9900	0.9781	0.9563	0.8927	0.7650	0.5577	0.3884	0.4225	0.6579	0.9025	0.9770	0.9920 (94)
Useful gains	385.4250	436.4008	453.0762	448.8599	390.8314	279.0187	187.2800	196.2250	296.9710	375.4363	377.2477	369.7289 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	756.8498	734.1521	663.9991	552.1977	423.3700	283.1269	187.6782	196.8778	307.5785	469.5912	624.0847	752.7856 (97)
Space heating kWh	276.3401	200.0889	156.9266	74.4032	24.2087	0.0000	0.0000	0.0000	0.0000	70.0512	177.7226	284.9943 (98a)
Space heating requirement - total per year (kWh/year)												1264.7356
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	276.3401	200.0889	156.9266	74.4032	24.2087	0.0000	0.0000	0.0000	0.0000	70.0512	177.7226	284.9943 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1264.7356
Space heating per m ²										(98c) / (4) =		24.7987 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	450.5316	354.6738	363.5230	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9264	0.9681	0.9585	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	417.3913	343.3566	348.4473	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	548.0174	528.7562	509.6803	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	94.0508	137.9373	119.9574	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.5127	34.4843	29.9893	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												87.9864 (107)
Energy for space heating												24.7987 (99)
Energy for space cooling												1.7252 (108)
Total												26.5240 (109)
Fabric Energy Efficiency (TFEE)												26.5 (109)

Full SAP Calculation Printout



Property Reference	Plot 21			Issued on Date	27/08/2025
Assessment Reference	Plot 21	Prop Type Ref			
Property	Flat 21, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	86 B	DER	4.26	TER	12.66
Environmental	97 A	% DER < TER			66.35
CO ₂ Emissions (t/year)	0.19	DFEE	26.01	TFEE	26.52
Compliance Check	See BREL	% DFEE < TFEE			1.95
% DPER < TPER	33.38	DPER	44.64	TPER	67.00
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

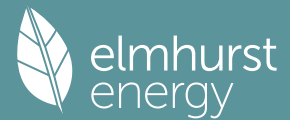
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9200 (17)
Infiltration rate	0.1960 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.8594	5.1306		(27)
Heatloss Floor 1			27.0200	0.1100	2.9722	20.0000	540.4000 (28b)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			112.0800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	19.5599	(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12946.5800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							253.8545 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E9 Balcony between dwellings, wall insulation continuous	1.5900	0.1500	0.2385
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7897 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.3496 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	13.3092	13.1578	13.0063	12.2489	12.0975	11.3401	11.3401	11.1886	11.6430	12.0975	12.4004	12.7033	(38)
Heat transfer coeff	37.6588	37.5074	37.3559	36.5985	36.4471	35.6897	35.6897	35.5382	35.9927	36.4471	36.7500	37.0530	(39)
Average = Sum(39)m / 12 =												36.5607	
HLP	0.7384	0.7354	0.7325	0.7176	0.7146	0.6998	0.6998	0.6968	0.7057	0.7146	0.7206	0.7265	(40)
HLP (average)												0.7169	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)												117.8284	(43)
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)
Energy content (annual)										Total = Sum(45)m =		1957.1409	
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2274.4719	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (see Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.8243	96.1269	86.8243	89.7184	86.8243	89.7184	86.8243	86.8243	89.7184	86.8243	89.7184	86.8243	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	376.1328	384.7396	367.0660	351.6998	332.2354	318.9035	305.4404	307.0498	317.5847	330.0552	352.9786	368.2415	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast					5.9700	36.7938	0.4000	0.7000		0.7700		42.6227 (77)
Solar gains	42.6227	72.6022	99.3375	123.0839	137.8643	136.8673	131.9547	120.9279	107.5615	80.2409	51.0521	36.4761 (83)

Full SAP Calculation Printout



Total gains 418.7555 457.3417 466.4035 474.7837 470.0996 455.7708 437.3951 427.9777 425.1461 410.2961 404.0307 404.7176 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	95.4961	95.8817	96.2705	98.2627	98.6711	100.7649	100.7649	101.1944	99.9168	98.6711	97.8577	97.0576	21.0000 (85)
alpha	7.3664	7.3921	7.4180	7.5508	7.5781	7.7177	7.7177	7.7463	7.6611	7.5781	7.5238	7.4705	
util living area	0.9827	0.9656	0.9360	0.8501	0.7031	0.4999	0.3589	0.3818	0.5802	0.8456	0.9586	0.9856	(86)
MIT	20.5125	20.6358	20.7640	20.9116	20.9810	20.9988	20.9999	20.9999	20.9962	20.9276	20.7220	20.4974	(87)
Th 2	20.3070	20.3096	20.3122	20.3253	20.3279	20.3410	20.3410	20.3436	20.3358	20.3279	20.3227	20.3175	(88)
util rest of house	0.9781	0.9570	0.9207	0.8199	0.6581	0.4490	0.3052	0.3274	0.5260	0.8098	0.9470	0.9817	(89)
MIT 2	19.7510	19.9056	20.0629	20.2419	20.3131	20.3403	20.3410	20.3436	20.3335	20.2634	20.0243	19.7409	(90)
Living area fraction										fLA = Living area / (4) =			0.4422 (91)
MIT	20.0877	20.2285	20.3729	20.5380	20.6084	20.6315	20.6323	20.6338	20.6265	20.5571	20.3328	20.0754	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0877	20.2285	20.3729	20.5380	20.6084	20.6315	20.6323	20.6338	20.6265	20.5571	20.3328	20.0754	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9764	0.9558	0.9222	0.8299	0.6772	0.4715	0.3290	0.3515	0.5499	0.8226	0.9472	0.9801	(94)
Useful gains	408.8656	437.1474	430.1072	394.0169	318.3413	214.9128	143.8948	150.4310	233.7825	337.5070	382.6843	396.6493	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	594.5458	574.9318	518.2348	425.9355	324.6864	215.2609	143.9129	150.4606	234.9055	362.9076	486.3053	588.2296	(97)
Space heating kWh	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(98a)
Space heating requirement - total per year (kWh/year)												560.0471	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												560.0471	
Space heating per m2										(98c) / (4) =			10.9813 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Fraction of main heating from main system 2													1.0000 (202)
Fraction of total heating from main system 1													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	138.1461	92.5911	65.5669	22.9814	4.7207	0.0000	0.0000	0.0000	0.0000	18.8981	74.6071	142.5357	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203	(231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													560.0471 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.8277
Water heating fuel used													661.5151 (219)
Space cooling fuel													0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	123.8676 (230a)
Total electricity for the above, kWh/year	123.8676 (231)
Electricity for lighting (calculated in Appendix L)	127.2803 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1472.7100 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	560.0471	0.1577	88.3427 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			181.7344 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			217.2868 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	560.0471	1.5839	887.0857 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1893.9385 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			2276.5521 (286)
Dwelling Primary energy Rate (DPER)			44.6400 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	x 2.3700 (2b)	= 120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 120.8700 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1655 (8)
Pressure Test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4155 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3220 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4105	0.4025	0.3944	0.3542	0.3461	0.3059	0.3059	0.2978	0.3220	0.3461	0.3622	0.3783 (22b)
Effective ac	0.5843	0.5810	0.5778	0.5627	0.5599	0.5468	0.5468	0.5444	0.5518	0.5599	0.5656	0.5716 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
Heatloss Floor 1			27.0200	0.1300	3.5126			(28b)
External Wall	34.0600	5.9700	28.0900	0.1800	5.0562			(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100			(30)
Total net area of external elements Aum(A, m2)			112.0800					(31)
Fabric heat loss, W/K = Sum (A x U)					21.0147			(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000			(32)
Party Wall			19.7200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

253.8545 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590
E3 Sill	3.1800	0.0500	0.1590
E4 Jamb	7.5200	0.0500	0.3760
E18 Party wall between dwellings	4.7400	0.0600	0.2844
E9 Balcony between dwellings, wall insulation continuous	1.5900	0.0200	0.0318
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	14.3700	0.0700	1.0059
E14 Flat roof	14.3700	0.0800	1.1496
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1200	1.7256
E16 Corner (normal)	2.3700	0.0900	0.2133

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

5.1046 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 26.1193 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
23.3048	23.3048	23.1743	23.0463	22.4454	22.3330	21.8096	21.8096	21.7127	22.0112	22.3330	22.5604	22.7982
Heat transfer coeff	49.4241	49.2935	49.1656	48.5647	48.4523	47.9289	47.9289	47.8320	48.1305	48.4523	48.6797	48.9175
Average = Sum(39)m / 12 =												48.5642

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.9691	0.9691	0.9665	0.9640	0.9522	0.9500	0.9398	0.9398	0.9379	0.9437	0.9500	0.9545	0.9592
HLP (average)												0.9522
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers												
53.0510	52.2538	51.0920	48.8692	47.2288	45.3995	44.3597	45.5127	46.7765	48.7407	51.0112	52.8478	(42a)
Hot water usage for baths												
22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses												
32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)												
											99.4866	(43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
108.2281	105.9178	103.1040	98.8243	95.3493	91.6132	90.1768	92.9784	95.9333	99.8556	104.2013	107.9473	107.9473
Energy conte	171.0426	150.8256	158.4670	135.2856	128.3585	112.6492	109.0610	115.1267	118.2954	135.5032	148.4538	169.0194
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
25.7110	22.6238	23.7701	20.2928	19.2538	16.8974	16.3591	17.2690	17.7443	20.3255	22.2681	25.3529	25.3529

Water storage loss:

Store volume

150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b

1.3938 (48)

Enter (49) or (54) in (55)

0.5400 (49)

Total storage loss

0.7527 (55)

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------

Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624
--------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------

Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

Total heat required for water heating calculated for each month

218.0017	192.9113	205.0619	180.3774	174.9534	157.7410	155.6559	161.7216	163.3872	182.0981	193.5456	215.6143	215.6143
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

WWHRS	-24.2527	-21.4493	-22.4605	-18.5982	-17.3328	-14.8318	-13.9025	-14.7839	-15.3456	-18.0907	-20.4946	-23.8036
-------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

FV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
-------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------

Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

Output from w/h	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107
-----------------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

Total per year (kWh/year) = Sum(64)m = 1975.7233 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

Total Energy used by instantaneous electric shower(s) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

94.2687	83.8181	89.9662	81.0559	79.9551	73.5293	73.5387	75.5556	75.4067	82.3307	85.4344	93.4749	93.4749
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785	85.9785
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.3441	93.3809	84.3441	87.1555	84.3441	87.1555	84.3441	84.3441	87.1555	84.3441	87.1555	84.3441
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8308	151.3856	147.4676	139.1267	128.5978	118.7021	112.0911	110.5364	114.4543	122.7953	133.3242	143.2199
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979	31.5979
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828
Water heating gains (Table 5)												

Full SAP Calculation Printout



Total internal gains	126.7052	124.7293	120.9223	112.5777	107.4666	102.1240	98.8423	101.5532	104.7315	110.6596	118.6588	125.6383 (72)
	412.6737	421.2893	404.5275	390.6534	372.2019	356.7752	344.0711	345.2271	355.1349	369.5925	390.9321	404.9957 (73)

6. Solar gains

[Jan]	Area		Solar flux		Specific data		FF		Access		Gains	
	m2		Table 6a		or Table 6b		or Table 6c		factor		W	
			W/m2						Table 6d			
Southeast	5.9700		36.7938		0.6300		0.7000		0.7700		67.1307 (77)	
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	479.8044	535.6378	560.9840	584.5106	589.3381	572.3412	551.8997	535.6886	524.5442	495.9718	471.3392	462.4456 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	72.7636	72.9563	73.1461	74.0512	74.2230	75.0335	75.0335	75.1855	74.7192	74.2230	73.8762	73.5171
alpha	5.8509	5.8638	5.8764	5.9367	5.9482	6.0022	6.0022	6.0124	5.9813	5.9482	5.9251	5.9011
util living area	0.9820	0.9652	0.9355	0.8581	0.7214	0.5300	0.3814	0.4096	0.6174	0.8628	0.9612	0.9850 (86)
MIT	20.2397	20.4060	20.5958	20.8147	20.9452	20.9926	20.9991	20.9987	20.9822	20.8363	20.5188	20.2123 (87)
Th 2	20.1092	20.1113	20.1134	20.1233	20.1252	20.1338	20.1338	20.1354	20.1305	20.1252	20.1214	20.1175 (88)
util rest of house	0.9769	0.9559	0.9184	0.8243	0.6667	0.4609	0.3067	0.3332	0.5460	0.8235	0.9491	0.9807 (89)
MIT 2	19.2481	19.4560	19.6886	19.9486	20.0828	20.1299	20.1335	20.1350	20.1199	19.9785	19.6063	19.2204 (90)
Living area fraction	fLA = Living area / (4) =											0.4422 (91)
MIT	19.6866	19.8760	20.0897	20.3315	20.4641	20.5114	20.5163	20.5169	20.5012	20.3578	20.0098	19.6590 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6866	19.8760	20.0897	20.3315	20.4641	20.5114	20.5163	20.5169	20.5012	20.3578	20.0098	19.6590 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9740	0.9530	0.9179	0.8329	0.6886	0.4913	0.3398	0.3670	0.5770	0.8348	0.9474	0.9779 (94)
Useful gains	467.3071	510.4446	514.9344	486.8382	405.8207	281.2077	187.5110	196.6138	302.6880	414.0378	446.5245	452.2394 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	760.4668	738.2218	668.1477	555.1689	424.6426	283.3252	187.7024	196.9176	308.0915	472.7860	628.4436	756.2132 (97)
Space heating kWh	218.1108	153.0663	113.9907	49.1981	14.0035	0.0000	0.0000	0.0000	0.0000	43.7087	130.9817	226.1566 (98a)
Space heating requirement - total per year (kWh/year)												949.2163
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	218.1108	153.0663	113.9907	49.1981	14.0035	0.0000	0.0000	0.0000	0.0000	43.7087	130.9817	226.1566 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												949.2163
Space heating per m2												(98c) / (4) = 18.6121 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	218.1108	153.0663	113.9907	49.1981	14.0035	0.0000	0.0000	0.0000	0.0000	43.7087	130.9817	226.1566 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	236.3064	165.8356	123.5002	53.3024	15.1717	0.0000	0.0000	0.0000	0.0000	47.3550	141.9087	245.0233 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	193.7490	171.4620	182.6014	161.7793	157.6206	142.9092	141.7534	146.9378	148.0416	164.0073	173.0510	191.8107 (64)
Efficiency of water heater	84.3260	83.8062	83.0344	81.7317	80.4654	79.8000	79.8000	79.8000	79.8000	81.5390	83.4434	79.8000 (216)
Fuel for water heating, kWh/month	229.7618	204.5934	219.9105	197.9395	195.8861	179.0842	177.6359	184.1325	185.5158	201.1398	207.3872	84.4301 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.5250	14.0592	12.6588	9.2744	7.1638	5.8529	6.5350	8.4945	11.0335	14.4766	16.3512	18.0121 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.5762	-25.6952	-38.2889	-44.6951	-49.6478	-46.9026	-46.3684	-43.0829	-37.4887	-30.1536	-19.6603	-15.0934 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.3152	-15.6326	-31.5198	-47.9895	-64.0710	-64.5721	-63.7727	-53.6774	-38.9532	-22.5239	-9.8237	-5.7635 (233b)

Full SAP Calculation Printout



Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1028.4033	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													2410.1694	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													141.4370	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-840.2676	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													2825.7422	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1028.4033	0.2100	215.9647 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2410.1694	0.2100	506.1356 (264)
Space and water heating			722.1003 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4370	0.1443	20.4137 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	0.1338	-55.4832
PV Unit electricity exported	-425.6145	0.1255	-53.4200
Total			-108.9032 (269)
Total CO2, kg/year			645.5401 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1028.4033	1.1300	1162.0958 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2410.1694	1.1300	2723.4914 (278)
Space and water heating			3885.5872 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4370	1.5338	216.9408 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-414.6531	1.4945	-619.6912
PV Unit electricity exported	-425.6145	0.4607	-196.0808
Total			-815.7720 (283)
Total Primary energy kWh/year			3416.8568 (286)
Target Primary Energy Rate (TPER)			67.0000 (287)

Full SAP Calculation Printout



Property Reference	Plot 21			Issued on Date	27/08/2025
Assessment Reference	Plot 21	Prop Type Ref			
Property	Flat 21, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	86 B	DER	4.26	TER	12.66
Environmental	97 A	% DER < TER			66.35
CO ₂ Emissions (t/year)	0.19	DFEE	26.01	TFEE	26.52
Compliance Check	See BREL	% DFEE < TFEE			1.95
% DPER < TPER	33.38	DPER	44.64	TPER	67.00
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		120.8700 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

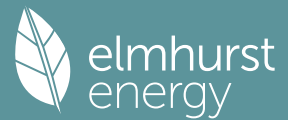
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9200 (17)
Infiltration rate	0.1960 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.8594	5.1306		(27)
Heatloss Floor 1			27.0200	0.1100	2.9722	20.0000	540.4000 (28b)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			112.0800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	19.5599	(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12946.5800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							253.8545 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E9 Balcony between dwellings, wall insulation continuous	1.5900	0.1500	0.2385
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7897 (36)
Point Thermal Bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.3496 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	13.3092	13.1578	13.0063	12.2489	12.0975	11.3401	11.3401	11.1886	11.6430	12.0975	12.4004	12.7033	(38)
Heat transfer coeff	37.6588	37.5074	37.3559	36.5985	36.4471	35.6897	35.6897	35.5382	35.9927	36.4471	36.7500	37.0530	(39)
Average = Sum(39)m / 12 =												36.5607	
HLP	0.7384	0.7354	0.7325	0.7176	0.7146	0.6998	0.6998	0.6968	0.7057	0.7146	0.7206	0.7265	(40)
HLP (average)												0.7169	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657	(42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594	(42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401	(42c)
Average daily hot water use (litres/day)												117.8284	(43)
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652	(44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494	(45)
Energy content (annual)										Total = Sum(45)m =		1957.1409	
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
								Total per year (kWh/year) = Sum(64)m =				2274.4719	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000	(64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	(71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038	(72)
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118	(73)

6. Solar gains

[Jan]												Gains	
			Area		Solar flux		g		FF		Access		W
			m2		Table 6a		Specific data		Specific data		factor		
					W/m2		or Table 6b		or Table 6c		Table 6d		
Southeast			5.9700		36.7938		0.4000		0.7000		0.7700		42.6227 (77)
Solar gains	42.6227	72.6022	99.3375	123.0839	137.8643	136.8673	131.9547	120.9279	107.5615	80.2409	51.0521	36.4761	(83)
Total gains	456.3811	484.4160	497.8621	496.0782	486.6146	463.3704	445.1335	436.9649	436.1575	431.4715	429.9857	439.5880	(84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	95.4961	95.8817	96.2705	98.2627	98.6711	100.7649	100.7649	101.1944	99.9168	98.6711	97.8577	97.0576
alpha	7.3664	7.3921	7.4180	7.5508	7.5781	7.7177	7.7177	7.7463	7.6611	7.5781	7.5238	7.4705
util living area	0.9723	0.9540	0.9149	0.8272	0.6823	0.4919	0.3527	0.3740	0.5661	0.8189	0.9438	0.9769 (86)
MIT	20.5847	20.6819	20.8065	20.9269	20.9843	20.9989	20.9999	20.9999	20.9967	20.9420	20.7636	20.5661 (87)
Th 2	20.3070	20.3096	20.3122	20.3253	20.3279	20.3410	20.3410	20.3436	20.3358	20.3279	20.3227	20.3175 (88)
util rest of house	0.9653	0.9432	0.8963	0.7955	0.6377	0.4417	0.2999	0.3207	0.5130	0.7811	0.9292	0.9711 (89)
MIT 2	19.8401	19.9610	20.1114	20.2573	20.3159	20.3404	20.3410	20.3436	20.3338	20.2772	20.0731	19.8262 (90)
Living area fraction									fLA = Living area / (4) =			0.4422 (91)
MIT	20.1693	20.2798	20.4187	20.5534	20.6114	20.6316	20.6323	20.6338	20.6269	20.5712	20.3785	20.1533 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1693	20.2798	20.4187	20.5534	20.6114	20.6316	20.6323	20.6338	20.6269	20.5712	20.3785	20.1533 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9638	0.9427	0.8994	0.8066	0.6568	0.4639	0.3233	0.3443	0.5364	0.7953	0.9305	0.9695 (94)
Useful gains	439.8486	456.6598	447.7890	400.1506	319.5875	214.9536	143.8971	150.4355	233.9705	343.1640	400.0949	426.1662 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	597.6212	576.8552	519.9469	426.4963	324.7957	215.2645	143.9131	150.4611	234.9218	363.4205	487.9835	591.1181 (97)
Space heating kWh	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (98a)
Space heating requirement - total per year (kWh/year)												475.7583
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												475.7583
Space heating per m2										(98c) / (4) =		9.3286 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												475.7583 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	123.8676 (230a)
Total electricity for the above, kWh/year	123.8676 (231)
Electricity for lighting (calculated in Appendix L)	127.2803 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1388.4212 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	475.7583	16.4900	78.4525 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	16.4900	109.0838 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258 (249)
Energy for lighting	127.2803	16.4900	20.9885 (250)
Additional standing charges			0.0000 (251)
Total energy cost			228.9507 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.8586 (257)
SAP value		86.0827
SAP rating (Section 12)		86 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	475.7583	0.1579	75.1037 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			168.4953 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			204.0477 (272)
CO2 emissions per m2			4.0000 (273)
EI value			97.1518
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9200 (17)
Infiltration rate	0.1960 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor												(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.1519 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
	0.1633	0.1595	0.1633	0.1481	0.1519	0.1291	0.1253	0.1253	0.1291	0.1443	0.1443	0.1481 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3033	0.2995	0.3033	0.2881	0.2919	0.2691	0.2653	0.2653	0.2691	0.2843	0.2843	0.2881 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.8594	5.1306			(27)
Heatloss Floor 1			27.0200	0.1100	2.9722	20.0000	540.4000	(28b)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002	(29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000	(30)
Total net area of external elements Aum(A, m2)			112.0800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 19.5599			(33)
Main dwelling								
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999	(32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999	(32)
Party Floor 1			23.9800			40.0000	959.2000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 12946.5800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							253.8545	(35)
List of Thermal Bridges								
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081	
E3 Sill					3.1800	0.0260	0.0827	
E4 Jamb					7.5200	0.0300	0.2256	
E18 Party wall between dwellings					4.7400	0.0290	0.1375	
E9 Balcony between dwellings, wall insulation continuous					1.5900	0.1500	0.2385	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					14.3800	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)					14.3700	-0.0180	-0.2587	
E14 Flat roof					14.3700	0.1600	2.2992	
P4 Party wall - Roof (insulation at ceiling level)					14.3800	0.1280	1.8406	
E16 Corner (normal)					2.3700	0.0490	0.1161	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7897	(36)
Point Thermal bridges							0.0000	(36a) =
Total fabric heat loss						(33) + (36) + (36a) =	24.3496	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Energy content (annual)										Total = Sum(45)m = 1957.1409		
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

Full SAP Calculation Printout



Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	--------------

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118 (73)

6. Solar gains

[Jan]				Area	Solar flux	g		FF		Access		Gains
				m2	Table 6a	Specific data		Specific data		factor		W
					W/m2	or Table 6b		or Table 6c		Table 6d		
Southeast				5.9700	32.4665	0.4000		0.7000		0.7700		37.6098 (77)
Solar gains	37.6098	65.7164	93.9535	118.7762	129.8057	131.9448	124.1380	113.0542	104.5405	77.6213	46.2943	34.6521 (83)
Total gains	451.3683	477.5302	492.4781	491.7704	478.5561	458.4480	437.3168	429.0911	433.1365	428.8520	425.2278	437.7639 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	98.6711	99.0829	98.6711	100.3391	99.9168	102.5051	102.9496	102.9496	102.5051	100.7649	100.7649	100.3391
alpha	7.5781	7.6055	7.5781	7.6893	7.6611	7.8337	7.8633	7.8633	7.8337	7.7177	7.7177	7.6893
util living area	0.9623	0.9389	0.8925	0.7783	0.6108	0.4130	0.3035	0.3256	0.5169	0.7780	0.9252	0.9683 (86)
MIT	20.6729	20.7588	20.8571	20.9578	20.9936	20.9998	21.0000	21.0000	20.9986	20.9636	20.8245	20.6541 (87)
Th 2	20.3279	20.3305	20.3279	20.3384	20.3358	20.3515	20.3541	20.3541	20.3515	20.3410	20.3410	20.3384 (88)
util rest of house	0.9530	0.9250	0.8703	0.7420	0.5636	0.3635	0.2519	0.2731	0.4652	0.7364	0.9066	0.9603 (89)
MIT 2	19.9670	20.0722	20.1837	20.3013	20.3313	20.3514	20.3541	20.3541	20.3507	20.3108	20.1611	19.9532 (90)
Living area fraction									fLA = Living area / (4) =			0.4422 (91)
MIT	20.2791	20.3758	20.4815	20.5916	20.6242	20.6381	20.6397	20.6397	20.6372	20.5995	20.4544	20.2631 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2791	20.3758	20.4815	20.5916	20.6242	20.6381	20.6397	20.6397	20.6372	20.5995	20.4544	20.2631 (93)

8. Space heating requirement

Utilisation	0.9523	0.9260	0.8757	0.7563	0.5843	0.3854	0.2748	0.2963	0.4881	0.7532	0.9101	0.9593 (94)
Useful gains	429.8297	442.2039	431.2508	371.9084	279.5976	176.6929	120.1537	127.1369	211.4079	323.0258	387.0028	419.9586 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	553.2347	532.6662	484.0701	386.7824	281.6126	176.7551	120.1570	127.1432	211.8073	335.4639	451.6322	550.6317 (97)
Space heating kWh	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208 (98a)
Space heating requirement - total per year (kWh/year)												357.1179
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												357.1179
Space heating per m2										(98c) / (4) =		7.0023 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)

Full SAP Calculation Printout



Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater												343.8277 (216)
(217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (217)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												357.1179 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.8277
Water heating fuel used												661.5151 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												123.8676 (230a)
Total electricity for the above, kWh/year												123.8676 (231)
Electricity for lighting (calculated in Appendix L)												127.2803 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1269.7808 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	357.1179	28.4300	101.5286 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	28.4300	188.0687 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156 (249)
Energy for lighting	127.2803	28.4300	36.1858 (250)
Additional standing charges			0.0000 (251)
Total energy cost			360.9987 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	357.1179	0.1584	56.5660 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	661.5151	0.1412	93.3917 (264)
Space and water heating			149.9576 (265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820 (267)
Energy for lighting	127.2803	0.1443	18.3705 (268)
Total CO2, kg/year			185.5100 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	357.1179	1.5864	566.5163 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1573.3690 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			1955.9826 (286)

SAP 10 EPC IMPROVEMENTS

Full SAP Calculation Printout



Plot 21

Current energy efficiency rating:
Current environmental impact rating:

B 86
A 97

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures
(none)

Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating: B 86
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current £361	Potential £361	Saving £0
Electricity			
Space heating	£137	£137	£0
Water heating	£188	£188	£0
Lighting	£36	£36	£0
Total cost of fuels	£361	£361	£0
Total cost of uses	£361	£361	£0
Delivered energy	25 kWh/m²	25 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	38 kWh/m²	38 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.0000 (1b)	2.3700 (2b)	120.8700 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.9200 (17)
Infiltration rate		0.1960 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1519 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1937	0.1899	0.1861	0.1671	0.1633	0.1443	0.1443	0.1405	0.1519	0.1633	0.1709	0.1785 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3337	0.3299	0.3261	0.3071	0.3033	0.2843	0.2843	0.2805	0.2919	0.3033	0.3109	0.3185 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.9700	0.8594	5.1306		(27)
Heatloss Floor 1			27.0200	0.1100	2.9722	20.0000	540.4000 (28b)
External Wall	34.0600	5.9700	28.0900	0.1900	5.3371	150.0000	4213.5002 (29a)
External Roof 1	51.0000		51.0000	0.1200	6.1200	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m2)			112.0800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		19.5599		(33)
Main dwelling							
Corridor			14.3600	0.0000	0.0000	180.0000	2584.7999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			23.9800			40.0000	959.2000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k) (28)... (30) + (32) + (32a)... (32e) = 12946.5800 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 253.8545 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	4.7400	0.0290	0.1375
E9 Balcony between dwellings, wall insulation continuous	1.5900	0.1500	0.2385
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.3800	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	14.3700	-0.0180	-0.2587
E14 Flat roof	14.3700	0.1600	2.2992
P4 Party wall - Roof (insulation at ceiling level)	14.3800	0.1280	1.8406
E16 Corner (normal)	2.3700	0.0490	0.1161

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 24.3496 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	13.3092	13.1578	13.0063	12.2489	12.0975	11.3401	11.3401	11.1886	11.6430	12.0975	12.4004	12.7033 (38)
Heat transfer coeff	37.6588	37.5074	37.3559	36.5985	36.4471	35.6897	35.6897	35.5382	35.9927	36.4471	36.7500	37.0530 (39)
Average = Sum(39)m / 12 =												36.5607

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.7384	0.7354	0.7325	0.7176	0.7146	0.6998	0.6998	0.6968	0.7057	0.7146	0.7206	0.7265 (40)
HLP (average)												0.7169
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy conte	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Energy content (annual)										Total = Sum(45)m =		1957.1409
Distribution loss (46)m = 0.15 x (45)m	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
								Total per year (kWh/year) = Sum(64)m =				2274.4719 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
								Total Energy used by instantaneous electric shower(s) = Sum(64a)m =				0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180		8.7334	11.7219	14.8837	17.3714	18.5186 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)												

Full SAP Calculation Printout



Total internal gains	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118 (73)

6. Solar gains

[Jan]	Area m2			Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast	5.9700			36.7938		0.4000		0.7000		0.7700		42.6227 (77)
Solar gains	42.6227	72.6022	99.3375	123.0839	137.8643	136.8673	131.9547	120.9279	107.5615	80.2409	51.0521	36.4761 (83)
Total gains	456.3811	484.4160	497.8621	496.0782	486.6146	463.3704	445.1335	436.9649	436.1575	431.4715	429.9857	439.5880 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	95.4961	95.8817	96.2705	98.2627	98.6711	100.7649	100.7649	101.1944	99.9168	98.6711	97.8577	97.0576
alpha	7.3664	7.3921	7.4180	7.5508	7.5781	7.7177	7.7177	7.7463	7.6611	7.5781	7.5238	7.4705
util living area	0.9723	0.9540	0.9149	0.8272	0.6823	0.4919	0.3527	0.3740	0.5661	0.8189	0.9438	0.9769 (86)
MIT	20.5847	20.6819	20.8065	20.9269	20.9843	20.9989	20.9999	20.9999	20.9967	20.9420	20.7636	20.5661 (87)
Th 2	20.3070	20.3096	20.3122	20.3253	20.3279	20.3410	20.3410	20.3436	20.3358	20.3279	20.3227	20.3175 (88)
util rest of house	0.9653	0.9432	0.8963	0.7955	0.6377	0.4417	0.2999	0.3207	0.5130	0.7811	0.9292	0.9711 (89)
MIT 2	19.8401	19.9610	20.1114	20.2573	20.3159	20.3404	20.3410	20.3436	20.3338	20.2772	20.0731	19.8262 (90)
Living area fraction	fLA = Living area / (4) =											0.4422 (91)
MIT	20.1693	20.2798	20.4187	20.5534	20.6114	20.6316	20.6323	20.6338	20.6269	20.5712	20.3785	20.1533 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1693	20.2798	20.4187	20.5534	20.6114	20.6316	20.6323	20.6338	20.6269	20.5712	20.3785	20.1533 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9638	0.9427	0.8994	0.8066	0.6568	0.4639	0.3233	0.3443	0.5364	0.7953	0.9305	0.9695 (94)
Useful gains	439.8486	456.6598	447.7890	400.1506	319.5875	214.9536	143.8971	150.4355	233.9705	343.1640	400.0949	426.1662 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	597.6212	576.8552	519.9469	426.4963	324.7957	215.2645	143.9131	150.4611	234.9218	363.4205	487.9835	591.1181 (97)
Space heating kWh	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (98a)
Space heating requirement - total per year (kWh/year)												475.7583
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												475.7583
Space heating per m2	(98c) / (4) =											9.3286 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	117.3828	80.7713	53.6855	18.9689	3.8750	0.0000	0.0000	0.0000	0.0000	15.0709	63.2798	122.7242 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Efficiency of water heater (217)m	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277 (216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.5203	10.1809	10.5203	10.1809	10.5203 (231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												475.7583	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.8277	
Water heating fuel used												661.5151	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400) mechanical ventilation fans (SFP = 0.8400)												123.8676	(230a)
Total electricity for the above, kWh/year												123.8676	(231)
Electricity for lighting (calculated in Appendix L)												127.2803	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1388.4212	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	475.7583	16.4900	78.4525	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	16.4900	109.0838	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	123.8676	16.4900	20.4258	(249)
Energy for lighting	127.2803	16.4900	20.9885	(250)
Additional standing charges			0.0000	(251)
Total energy cost			228.9507	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.8586	(257)
SAP value		86.0827	
SAP rating (Section 12)		86	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	475.7583	0.1579	75.1037	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			168.4953	(265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820	(267)
Energy for lighting	127.2803	0.1443	18.3705	(268)
Total CO2, kg/year			204.0477	(272)
CO2 emissions per m2			4.0000	(273)
EI value			97.1518	
EI rating			97	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	51.0000	2.3700	120.8700	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.0000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.8700	(5)

2. Ventilation rate

Full SAP Calculation Printout



												m3 per hour	
Number of open chimneys												0 * 80 = 0.0000 (6a)	
Number of open flues												0 * 20 = 0.0000 (6b)	
Number of chimneys / flues attached to closed fire												0 * 10 = 0.0000 (6c)	
Number of flues attached to solid fuel boiler												0 * 20 = 0.0000 (6d)	
Number of flues attached to other heater												0 * 35 = 0.0000 (6e)	
Number of blocked chimneys												0 * 20 = 0.0000 (6f)	
Number of intermittent extract fans												0 * 10 = 0.0000 (7a)	
Number of passive vents												0 * 10 = 0.0000 (7b)	
Number of flueless gas fires												0 * 40 = 0.0000 (7c)	
												Air changes per hour	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) = 0.0000 (8)	
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												3.9200 (17)	
Infiltration rate												0.1960 (18)	
Number of sides sheltered												3 (19)	
												(20) = 1 - [0.075 x (19)] = 0.7750 (20)	
Shelter factor												(21) = (18) x (20) = 0.1519 (21)	
Infiltration rate adjusted to include shelter factor													
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)	
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)	
	0.1633	0.1595	0.1633	0.1481	0.1519	0.1291	0.1253	0.1253	0.1291	0.1443	0.1443	0.1481 (22b)	
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000 (23a)	
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)	
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)	
Effective ac	0.3033	0.2995	0.3033	0.2881	0.2919	0.2691	0.2653	0.2653	0.2691	0.2843	0.2843	0.2881 (25)	

3. Heat losses and heat loss parameter													

Element			Gross	Openings		NetArea		U-value		A x U		K-value	A x K
			m2	m2		m2		W/m2K		W/K		kJ/m2K	kJ/K
Main dwelling													
Window						5.9700		0.8594		5.1306			(27)
Heatloss Floor 1						27.0200		0.1100		2.9722		20.0000	540.4000 (28b)
External Wall			34.0600	5.9700		28.0900		0.1900		5.3371		150.0000	4213.5002 (29a)
External Roof 1			51.0000			51.0000		0.1200		6.1200		9.0000	459.0000 (30)
Total net area of external elements Aum(A, m2)						112.0800							(31)
Fabric heat loss, W/K = Sum (A x U)						(26)...(30) + (32) =		19.5599					(33)
Main dwelling													
Corridor						14.3600		0.0000		0.0000		180.0000	2584.7999 (32)
Party Wall						19.7200		0.0000		0.0000		180.0000	3549.5999 (32)
Party Floor 1						23.9800						40.0000	959.2000 (32d)
Internal Wall 1						71.1200						9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)												(28)...(30) + (32) + (32a)...(32e) = 12946.5800 (34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												253.8545 (35)	
List of Thermal Bridges													
K1 Element					Length	Psi-value				Total			
E2 Other lintels (including other steel lintels)					3.1800	0.0340				0.1081			
E3 Sill					3.1800	0.0260				0.0827			
E4 Jamb					7.5200	0.0300				0.2256			
E18 Party wall between dwellings					4.7400	0.0290				0.1375			
E9 Balcony between dwellings, wall insulation continuous					1.5900	0.1500				0.2385			
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					14.3800	0.0000				0.0000			
E7 Party floor between dwellings (in blocks of flats)					14.3700	-0.0180				-0.2587			
E14 Flat roof					14.3700	0.1600				2.2992			
P4 Party wall - Roof (insulation at ceiling level)					14.3800	0.1280				1.8406			
E16 Corner (normal)					2.3700	0.0490				0.1161			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												4.7897 (36)	
Point Thermal bridges												(36a) = 0.0000	
Total fabric heat loss												(33) + (36) + (36a) = 24.3496 (37)	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	12.0975	11.9460	12.0975	11.4916	11.6430	10.7342	10.5827	10.5827	10.7342	11.3401	11.3401	11.4916 (38)	
Average = Sum(39)m / 12 =	36.4471	36.2956	36.4471	35.8412	35.9927	35.0838	34.9324	34.9324	35.0838	35.6897	35.6897	35.8412 (39)	
												35.6897	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.7146	0.7117	0.7146	0.7028	0.7057	0.6879	0.6849	0.6849	0.6879	0.6998	0.6998	0.7028 (40)	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7196 (42)
Hot water usage for mixer showers	72.9452	71.8490	70.2515	67.1952	64.9397	62.4243	60.9946	62.5799	64.3178	67.0185	70.1405	72.6657 (42a)
Hot water usage for baths	22.9369	22.5963	22.1166	21.2321	20.5698	19.8354	19.4388	19.9151	20.4338	21.2196	22.1223	22.8594 (42b)
Hot water usage for other uses	32.2401	31.0678	29.8954	28.7230	27.5507	26.3783	26.3783	27.5507	28.7230	29.8954	31.0678	32.2401 (42c)
Average daily hot water use (litres/day)												117.8284 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	128.1222	125.5130	122.2635	117.1503	113.0601	108.6380	106.8117	110.0457	113.4745	118.1334	123.3305	127.7652 (44)
Energy content (annual)	202.9143	178.7288	187.9145	160.3729	152.2007	133.5832	129.1794	136.2596	139.9254	160.3059	175.7069	200.0494 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1957.1409
	30.4371	26.8093	28.1872	24.0559	22.8301	20.0375	19.3769	20.4389	20.9888	24.0459	26.3560	30.0074 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)

Full SAP Calculation Printout



Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008 (64)
Total per year (kWh/year) = Sum(64)m =												2274.4719 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	67.4690	59.4273	62.4816	53.3240	50.6067	44.4164	42.9522	45.3063	46.5252	53.3017	58.4225	66.5164 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743	103.1743 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.0178	16.0033	13.0147	9.8530	7.3652	6.2180	6.7188	8.7334	11.7219	14.8837	17.3714	18.5186 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.6281	225.9486	220.1009	207.6517	191.9369	177.1673	167.3002	164.9796	170.8274	183.2765	198.9913	213.7610 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370	47.0370 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828	-68.7828 (71)
Water heating gains (Table 5)	90.6841	88.4335	83.9806	74.0611	68.0198	61.6894	57.7314	60.8956	64.6183	71.6421	81.1424	89.4038 (72)
Total internal gains	413.7585	411.8138	398.5246	372.9943	348.7504	326.5031	313.1788	316.0370	328.5960	351.2307	378.9335	403.1118 (73)

6. Solar gains

[Jan]												
	Area	Solar flux		g		FF		Access		Gains		
	m2	Table 6a		Specific data		Specific data		factor		W		
		W/m2		or Table 6b		or Table 6c		Table 6d				
Southeast	5.9700	32.4665		0.4000		0.7000		0.7700		37.6098		(77)
Solar gains	37.6098	65.7164	93.9535	118.7762	129.8057	131.9448	124.1380	113.0542	104.5405	77.6213	46.2943	34.6521 (83)
Total gains	451.3683	477.5302	492.4781	491.7704	478.5561	458.4480	437.3168	429.0911	433.1365	428.8520	425.2278	437.7639 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	98.6711	99.0829	98.6711	100.3391	99.9168	102.5051	102.9496	102.9496	102.5051	100.7649	100.7649	100.3391
alpha	7.5781	7.6055	7.5781	7.6893	7.6611	7.8337	7.8633	7.8633	7.8337	7.7177	7.7177	7.6893
util living area	0.9623	0.9389	0.8925	0.7783	0.6108	0.4130	0.3035	0.3256	0.5169	0.7780	0.9252	0.9683 (86)
MIT	20.6729	20.7588	20.8571	20.9578	20.9936	20.9998	21.0000	21.0000	20.9986	20.9636	20.8245	20.6541 (87)
Th 2	20.3279	20.3305	20.3279	20.3384	20.3358	20.3515	20.3541	20.3541	20.3515	20.3410	20.3410	20.3384 (88)
util rest of house	0.9530	0.9250	0.8703	0.7420	0.5636	0.3635	0.2519	0.2731	0.4652	0.7364	0.9066	0.9603 (89)
MIT 2	19.9670	20.0722	20.1837	20.3013	20.3313	20.3514	20.3541	20.3541	20.3507	20.3108	20.1611	19.9532 (90)
Living area fraction	20.2791	20.3758	20.4815	20.5916	20.6242	20.6381	20.6397	20.6397	20.6372	20.5995	20.4544	20.2631 (92)
MIT Temperature adjustment	20.2791	20.3758	20.4815	20.5916	20.6242	20.6381	20.6397	20.6397	20.6372	20.5995	20.4544	20.2631 (93)
adjusted MIT	20.2791	20.3758	20.4815	20.5916	20.6242	20.6381	20.6397	20.6397	20.6372	20.5995	20.4544	20.2631 (93)

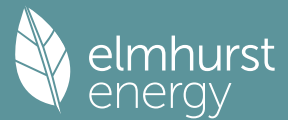
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9523	0.9260	0.8757	0.7563	0.5843	0.3854	0.2748	0.2963	0.4881	0.7532	0.9101	0.9593 (94)
Useful gains	429.8297	442.2039	431.2508	371.9084	279.5976	176.6929	120.1537	127.1369	211.4079	323.0258	387.0028	419.9586 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	553.2347	532.6662	484.0701	386.7824	281.6126	176.7551	120.1570	127.1432	211.8073	335.4639	451.6322	550.6317 (97)
Space heating kWh	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208 (98a)
Space heating requirement - total per year (kWh/year)												357.1179
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												357.1179
Space heating per m2												(98c) / (4) = 7.0023 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
---	--	--	--	--	--	--	--	--	--	--	--	--------------

Full SAP Calculation Printout



Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	91.8133	60.7907	39.2975	10.7093	1.4992	0.0000	0.0000	0.0000	0.0000	9.2539	46.5332	97.2208	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)

Water heating													
Water heating requirement	229.8657	203.0720	214.8659	186.4549	179.1521	159.6652	156.1308	163.2110	166.0074	187.2573	201.7889	227.0008	(64)
Efficiency of water heater	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	343.8277	(216)
Fuel for water heating, kWh/month	66.8549	59.0622	62.4923	54.2292	52.1052	46.4375	45.4096	47.4688	48.2822	54.4625	58.6890	66.0217	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.5203	9.5022	10.5203	10.1809	10.5203	10.1809	10.5203	10.1809	10.5203	10.1809	10.5203	10.1809	(231)
Lighting	15.7709	12.6520	11.3917	8.3461	6.4467	5.2670	5.8809	7.6443	9.9291	13.0276	14.7146	16.2092	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												357.1179	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.8277	
Water heating fuel used												661.5151	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												123.8676	(230a)
Total electricity for the above, kWh/year												123.8676	(231)
Electricity for lighting (calculated in Appendix L)												127.2803	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1269.7808	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	357.1179	28.4300	101.5286	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	661.5151	28.4300	188.0687	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	123.8676	28.4300	35.2156	(249)
Energy for lighting	127.2803	28.4300	36.1858	(250)
Additional standing charges			0.0000	(251)
Total energy cost			360.9987	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	357.1179	0.1584	56.5660	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	661.5151	0.1412	93.3917	(264)
Space and water heating			149.9576	(265)
Pumps, fans and electric keep-hot	123.8676	0.1387	17.1820	(267)
Energy for lighting	127.2803	0.1443	18.3705	(268)
Total CO2, kg/year			185.5100	(272)

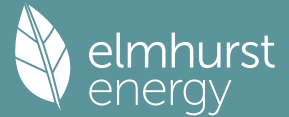
13a. Primary energy - Individual heating systems including micro-CHP

Full SAP Calculation Printout



	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	357.1179	1.5864	566.5163 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	661.5151	1.5220	1006.8528 (278)
Space and water heating			1573.3690 (279)
Pumps, fans and electric keep-hot	123.8676	1.5128	187.3869 (281)
Energy for lighting	127.2803	1.5338	195.2267 (282)
Total Primary energy kWh/year			1955.9826 (286)

Full SAP Calculation Printout



Property Reference	Plot 22			Issued on Date	27/08/2025
Assessment Reference	Plot 22	Prop Type Ref			
Property	Flat 22, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.16	TER	11.12
Environmental	98 A	% DER < TER			71.58
CO ₂ Emissions (t/year)	0.14	DFEE	17.51	TFEE	18.55
Compliance Check	See BREL	% DFEE < TFEE			5.61
% DPER < TPER	42.84	DPER	33.57	TPER	58.73
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7600 (17)
Infiltration rate	0.1880 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1457 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.9999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13966.8797 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							279.3376 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6200	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
E14 Flat roof	5.9700	0.1600	0.9552	
P4 Party wall - Roof (insulation at ceiling level)	22.6200	0.1280	2.8954	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.2970 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		16.4791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694 (38)
Average = Sum(39)m / 12 =	29.2182	29.0758	28.9333	28.2211	28.0787	27.3665	27.3665	27.2240	27.6514	28.0787	28.3636	28.6484 (39)
												28.1855
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5844	0.5815	0.5787	0.5644	0.5616	0.5473	0.5473	0.5445	0.5530	0.5616	0.5673	0.5730 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											
		36.7938										
			0.2400									
				0.0000								
					0.7700							
						40.5930						
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	132.7833	133.4338	134.0907	137.4746	138.1720	141.7679	141.7679	142.5096	140.3073	138.1720	136.7842	135.4241
alpha	9.8522	9.8956	9.9394	10.1650	10.2115	10.4512	10.4512	10.5006	10.3538	10.2115	10.1189	10.0283
util living area	0.9656	0.9269	0.8663	0.7278	0.5689	0.3942	0.2824	0.3000	0.4596	0.7196	0.9078	0.9710 (86)
MIT	20.8026	20.8853	20.9469	20.9909	20.9992	21.0000	21.0000	21.0000	20.9999	20.9931	20.9248	20.7928 (87)
Th 2	20.4441	20.4467	20.4492	20.4621	20.4647	20.4776	20.4776	20.4802	20.4725	20.4647	20.4595	20.4544 (88)
util rest of house	0.9573	0.9123	0.8440	0.6981	0.5365	0.3621	0.2489	0.2661	0.4245	0.6852	0.8885	0.9638 (89)
MIT 2	20.2265	20.3260	20.3972	20.4544	20.4642	20.4776	20.4776	20.4802	20.4724	20.4592	20.3844	20.2241 (90)
Living area fraction									fLA = Living area / (4) =			0.4466 (91)
MIT	20.4838	20.5758	20.6427	20.6940	20.7031	20.7109	20.7109	20.7124	20.7080	20.6976	20.6258	20.4781 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4838	20.5758	20.6427	20.6940	20.7031	20.7109	20.7109	20.7124	20.7080	20.6976	20.6258	20.4781 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9580	0.9159	0.8521	0.7110	0.5509	0.3764	0.2639	0.2812	0.4402	0.7003	0.8947	0.9642 (94)
Useful gains	393.7024	410.2635	388.5828	329.5155	252.5349	167.2304	112.5014	117.3996	182.6994	281.0856	354.4663	383.1176 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	472.8625	455.7854	409.1955	332.8399	252.7955	167.2342	112.5015	117.3998	182.7204	283.5281	383.6391	466.3410 (97)
Space heating kWh	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182 (98a)
Space heating requirement - total per year (kWh/year)												192.1489
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												192.1489
Space heating per m2										(98c) / (4) =		3.8430 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												192.1489 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1753
Water heating fuel used												655.5490 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												121.4388 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1093.6840	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	192.1489	0.1599	30.7201 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			123.2674 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			158.0885 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.1600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	192.1489	1.5917	305.8528 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1303.6169 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1678.3644 (286)
Dwelling Primary energy Rate (DPER)			33.5700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1688 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.4188		(18)
Number of sides sheltered	3		(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings	NetArea		U-value	A x U		K-value	A x K			
Main dwelling	m2		m2	m2		W/m2K	W/K		kJ/m2K	kJ/K			
TER Opening Type				5.9700		1.1450	6.8359			(27)			
External Wall	14.1500		5.9700	8.1800		0.1800	1.4724			(29a)			
External Roof 1	50.0000			50.0000		0.1100	5.5000			(30)			
Total net area of external elements Aum(A, m2)				64.1500						(31)			
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		13.8083			(33)				
Main dwelling													
Corridor				33.8900		0.0000	0.0000			(32)			
Party Wall				19.7200		0.0000	0.0000			(32)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K										279.3376 (35)			
List of Thermal Bridges													
K1 Element						Length	Psi-value	Total					
E2 Other lintels (including other steel lintels)						3.1800	0.0500	0.1590					
E3 Sill						3.1800	0.0500	0.1590					
E4 Jamb						7.5200	0.0500	0.3760					
E18 Party wall between dwellings						4.7400	0.0600	0.2844					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						22.6200	0.0000	0.0000					
E7 Party floor between dwellings (in blocks of flats)						5.9700	0.0700	0.4179					
E14 Flat roof						5.9700	0.0800	0.4776					
P4 Party wall - Roof (insulation at ceiling level)						22.6200	0.1200	2.7144					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)										4.5883 (36)			
Point Thermal bridges										(36a) = 0.0000			
Total fabric heat loss										(33) + (36) + (36a) = 18.3966 (37)			
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	
Heat transfer coeff	41.2971	41.1671	41.0397	40.4411	40.3291	39.8078	39.8078	39.7113	40.0086	40.3291	40.5557	40.7925	(39)
Average = Sum(39)m / 12 =												40.4406	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
	0.8259	0.8233	0.8208	0.8088	0.8066	0.7962	0.7962	0.7942	0.8002	0.8066	0.8111	0.8159	
HLP (average)												0.8088	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													
Hot water usage for mixer showers													
	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)												98.5597 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)												Total = Sum(45)m = 1637.0557	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)
Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):													
Temperature factor from Table 2b													
Enter (49) or (54) in (55)												0.5400 (49)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
Total per year (kWh/year)												1962.4258 (64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast	5.9700				36.7938	0.6300	0.7000	0.7700	67.1307 (77)			
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	93.9458	94.2424	94.5351	95.9343	96.2007	97.4605	97.4605	97.6974	96.9713	96.2007	95.6633	95.1078
alpha	7.2631	7.2828	7.3023	7.3956	7.4134	7.4974	7.4974	7.5132	7.4648	7.4134	7.3776	7.3405
util living area	0.9784	0.9534	0.9076	0.7951	0.6331	0.4483	0.3200	0.3439	0.5289	0.8015	0.9466	0.9824 (86)
MIT	20.5320	20.6730	20.8113	20.9400	20.9893	20.9993	21.0000	20.9999	20.9976	20.9461	20.7452	20.5089 (87)
Th 2	20.2309	20.2331	20.2353	20.2457	20.2476	20.2567	20.2567	20.2583	20.2532	20.2476	20.2437	20.2396 (88)
util rest of house	0.9722	0.9414	0.8859	0.7580	0.5851	0.3966	0.2660	0.2885	0.4727	0.7583	0.9309	0.9772 (89)
MIT 2	19.7071	19.8806	20.0447	20.1928	20.2400	20.2563	20.2567	20.2583	20.2519	20.2029	19.9791	19.6859 (90)
Living area fraction	20.0755	20.2344	20.3870	20.5265	20.5746	20.5881	20.5886	20.5895	fLA = Living area / (4) =	20.5348	20.3212	0.4466 (91)
Temperature adjustment	20.0755	20.2344	20.3870	20.5265	20.5746	20.5881	20.5886	20.5895	20.5849	20.5348	20.3212	0.0000
adjusted MIT	20.0755	20.2344	20.3870	20.5265	20.5746	20.5881	20.5886	20.5895	20.5849	20.5348	20.3212	20.0534 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9708	0.9414	0.8905	0.7722	0.6062	0.4197	0.2901	0.3133	0.4978	0.7754	0.9327	0.9757 (94)
Useful gains	460.3705	498.8018	494.6818	447.2760	354.1824	238.1665	158.7673	166.3523	258.7234	380.7343	434.6981	445.9002 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	651.4822	631.2747	569.9193	470.1886	357.9062	238.3739	158.7778	166.3710	259.4523	400.6625	536.1945	646.7014 (97)
Space heating kWh	142.1871	89.0218	55.9767	16.4971	2.7705	0.0000	0.0000	0.0000	0.0000	14.8266	73.0774	149.3960 (98a)
Space heating requirement - total per year (kWh/year)												543.7531
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	142.1871	89.0218	55.9767	16.4971	2.7705	0.0000	0.0000	0.0000	0.0000	14.8266	73.0774	149.3960 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												543.7531
Space heating per m2										(98c) / (4) =		10.8751 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	142.1871	89.0218	55.9767	16.4971	2.7705	0.0000	0.0000	0.0000	0.0000	14.8266	73.0774	149.3960	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	154.0489	96.4483	60.6464	17.8733	3.0016	0.0000	0.0000	0.0000	0.0000	16.0635	79.1738	161.8592	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
Efficiency of water heater													(216)
(217)m	83.3920	82.6770	81.7545	80.5602	79.9409	79.8000	79.8000	79.8000	79.8000	80.4804	82.2883	79.8000	(217)
Fuel for water heating, kWh/month	230.6910	205.9296	221.8034	199.4683	195.8774	177.9421	176.5248	182.9609	184.3137	202.4260	208.8496	228.0352	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	589.1150 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2414.8220 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2404.5240 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	589.1150	0.2100	123.7141 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2414.8220	0.2100	507.1126 (264)
Space and water heating			630.8268 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			555.9586 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	589.1150	1.1300	665.6999 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2414.8220	1.1300	2728.7488 (278)
Space and water heating			3394.4487 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2936.4323 (286)
Target Primary Energy Rate (TPER)			58.7300 (287)

Full SAP Calculation Printout



Property Reference	Plot 22			Issued on Date	27/08/2025
Assessment Reference	Plot 22	Prop Type Ref			
Property	Flat 22, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.16	TER	11.12
Environmental	98 A	% DER < TER			71.58
CO ₂ Emissions (t/year)	0.14	DFEE	17.51	TFEE	18.55
Compliance Check	See BREL	% DFEE < TFEE			5.61
% DPER < TPER	42.84	DPER	33.57	TPER	58.73
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume			118.5000 (4)
			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7600 (17)
Infiltration rate	0.3568 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2765 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3525	0.3456	0.3387	0.3042	0.2972	0.2627	0.2627	0.2558	0.2765	0.2972	0.3111	0.3249 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5621	0.5597	0.5574	0.5463	0.5442	0.5345	0.5345	0.5327	0.5382	0.5442	0.5484	0.5528 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 12.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.9999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13966.8797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							279.3376 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6200	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075
E14 Flat roof	5.9700	0.1600	0.9552
P4 Party wall - Roof (insulation at ceiling level)	22.6200	0.1280	2.8954
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.2970 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	16.4791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	21.9826	21.8882	21.7957	21.3613	21.2800	20.9016	20.9016	20.8315	21.0473	21.2800	21.4444	21.6163 (38)
Average = Sum(39)m / 12 =	38.4616	38.3673	38.2748	37.8403	37.7591	37.3807	37.3807	37.3106	37.5264	37.7591	37.9235	38.0954 (39)
												37.8399
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7692	0.7673	0.7655	0.7568	0.7552	0.7476	0.7476	0.7462	0.7505	0.7552	0.7585	0.7619 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.7244 (42b)
Hot water usage for other uses												31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss (46)m = 0.15 x (45)m												832.1197
Water storage loss:												
Total storage loss												0.0000 (46)
If cylinder contains dedicated solar storage												0.0000 (56)
Primary loss												0.0000 (57)
Combi loss												0.0000 (59)
Total heat required for water heating calculated for each month												0.0000 (61)
WWHRS												73.5866 (62)
PV diverter												64.3489 (63a)
Solar input												67.3161 (63b)
FGHRS												57.5864 (63c)
Output from w/h												54.5493 (64)
12Total per year (kWh/year)												47.8512 (64)
Electric shower(s)												46.6610 (64)
Heat gains from water heating, kWh/month												49.4910 (64)
	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												478.7637 (64a)
	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (73)

6. Solar gains

[Jan]												Gains		
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		W	

Southeast					5.9700	36.7938		0.2400		0.0000		0.7700		40.5930 (77)

Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)		
Total gains	360.0081	398.2120	409.2103	423.6459	422.6872	412.9395	397.9965	387.1093	382.3458	363.7852	351.8865	347.3425 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



tau	100.8717	101.1198	101.3641	102.5279	102.7486	103.7886	103.7886	103.9836	103.3855	102.7486	102.3031	101.8414
alpha	7.7248	7.7413	7.7576	7.8352	7.8499	7.9192	7.9192	7.9322	7.8924	7.8499	7.8202	7.7894
util living area	0.9949	0.9879	0.9735	0.9181	0.7901	0.5761	0.4130	0.4430	0.6668	0.9179	0.9855	0.9961 (86)
MIT	20.4048	20.5299	20.6716	20.8553	20.9639	20.9972	20.9998	20.9997	20.9916	20.8765	20.6215	20.3832 (87)
Th 2	20.2801	20.2817	20.2833	20.2909	20.2923	20.2990	20.2990	20.3002	20.2964	20.2923	20.2895	20.2865 (88)
util rest of house	0.9933	0.9840	0.9649	0.8943	0.7428	0.5146	0.3474	0.3758	0.6034	0.8896	0.9802	0.9948 (89)
MIT 2	19.7416	19.8661	20.0052	20.1814	20.2704	20.2978	20.2989	20.3001	20.2926	20.2034	19.9635	19.7258 (90)
Living area fraction									FLA = Living area / (4) =			0.4466 (91)
MIT	20.0378	20.1626	20.3028	20.4824	20.5801	20.6101	20.6119	20.6125	20.6048	20.5040	20.2574	20.0194 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0378	20.1626	20.3028	20.4824	20.5801	20.6101	20.6119	20.6125	20.6048	20.5040	20.2574	20.0194 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9926	0.9833	0.9652	0.9013	0.7627	0.5420	0.3767	0.4058	0.6316	0.8989	0.9799	0.9942 (94)
Useful gains	357.3440	391.5449	394.9740	381.8248	322.3865	223.8337	149.9279	157.0990	241.4964	326.9904	344.8038	345.3142 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	605.3016	585.5834	528.3001	438.2811	335.3040	224.6633	149.9690	157.1723	244.1011	373.9672	498.9731	602.6465 (97)
Space heating kWh	184.4805	130.3939	99.1946	40.6486	9.6106	0.0000	0.0000	0.0000	0.0000	34.9507	111.0019	191.4552 (98a)
Space heating requirement - total per year (kWh/year)												801.7359
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	184.4805	130.3939	99.1946	40.6486	9.6106	0.0000	0.0000	0.0000	0.0000	34.9507	111.0019	191.4552 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												801.7359
Space heating per m2										(98c) / (4) =		16.0347 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	351.3783	276.6169	283.5605	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9628	0.9888	0.9847	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	338.3078	273.5050	279.2142	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	444.3213	428.8194	417.8150	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	76.3297	115.5539	103.1191	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	19.0824	28.8885	25.7798	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												73.7507 (107)
Energy for space heating												16.0347 (99)
Energy for space cooling												1.4750 (108)
Total												17.5097 (109)
Fabric Energy Efficiency (DFEE)												17.5 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	118.5000 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1688 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4188 (18)
Number of sides sheltered		3 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	14.1500	5.9700	8.1800	0.1800	1.4724			(29a)
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)
Total net area of external elements Aum(A, m2)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	13.8083		(33)
Main dwelling								
Corridor			33.8900	0.0000	0.0000			(32)
Party Wall			19.7200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 279.3376 (35)

List of Thermal Bridges													
K1 Element							Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)							3.1800	0.0500	0.1590				
E3 Sill							3.1800	0.0500	0.1590				
E4 Jamb							7.5200	0.0500	0.3760				
E18 Party wall between dwellings							4.7400	0.0600	0.2844				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							22.6200	0.0000	0.0000				
E7 Party floor between dwellings (in blocks of flats)							5.9700	0.0700	0.4179				
E14 Flat roof							5.9700	0.0800	0.4776				
P4 Party wall - Roof (insulation at ceiling level)							22.6200	0.1200	2.7144				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												4.5883	(36)
Point Thermal bridges												0.0000	(36a) =
Total fabric heat loss												18.3966	(33) + (36) + (36a) = (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Average = Sum(39)m / 12 =	41.2971	41.1671	41.0397	40.4411	40.3291	39.8078	39.8078	39.7113	40.0086	40.3291	40.5557	40.7925	(39)
												40.4406	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8259	0.8233	0.8208	0.8088	0.8066	0.7962	0.7962	0.7942	0.8002	0.8066	0.8111	0.8159	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42c)
Average daily hot water use (litres/day)	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859	(44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Distribution loss	(46)m = 0.15 x (45)m												832.1197
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481	(64)
12Total per year (kWh/year)													707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893	(64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710	82.5203	85.2710	82.5203 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Total internal gains	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085 (72)
	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444 (73)

6. Solar gains

[Jan]												Gains
	Area				Solar flux		g		FF		Access	W
	m2				Table 6a		Specific data		Specific data		factor	
					W/m2		or Table 6b		or Table 6c		Table 6d	
Southeast	5.9700				36.7938		0.6300		0.7000		0.7700	67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	384.1061	440.7145	468.6200	497.7593	506.0844	495.6347	477.7143	459.9616	446.7946	411.3050	381.1515	367.6136 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	93.9458	94.2424	94.5351	95.9343	96.2007	97.4605	97.4605	97.6974	96.9713	96.2007	95.6633	95.1078
alpha	7.2631	7.2828	7.3023	7.3956	7.4134	7.4974	7.4974	7.5132	7.4648	7.4134	7.3776	7.3405
util living area	0.9936	0.9822	0.9569	0.8732	0.7185	0.5123	0.3665	0.3969	0.6113	0.8896	0.9812	0.9952 (86)
MIT	20.3612	20.5230	20.6956	20.8863	20.9762	20.9982	20.9999	20.9998	20.9939	20.8886	20.6055	20.3362 (87)
Th 2	20.2309	20.2331	20.2353	20.2457	20.2476	20.2567	20.2567	20.2583	20.2532	20.2476	20.2437	20.2396 (88)
util rest of house	0.9915	0.9768	0.9442	0.8421	0.6680	0.4537	0.3047	0.3331	0.5481	0.8553	0.9745	0.9936 (89)
MIT 2	19.6563	19.8166	19.9837	20.1632	20.2338	20.2560	20.2566	20.2583	20.2505	20.1700	19.9076	19.6391 (90)
Living area fraction	fLA = Living area / (4) = 0.4466 (91)											
MIT	19.9711	20.1321	20.3016	20.4861	20.5653	20.5875	20.5886	20.5894	20.5825	20.4909	20.2193	19.9504 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.9711	20.1321	20.3016	20.4861	20.5653	20.5875	20.5886	20.5894	20.5825	20.4909	20.2193	19.9504 (93)

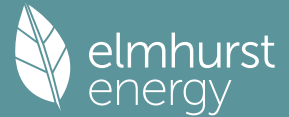
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9907	0.9759	0.9454	0.8526	0.6898	0.4799	0.3323	0.3616	0.5762	0.8672	0.9742	0.9928 (94)
Useful gains	380.5269	430.1013	443.0453	424.3957	349.0939	237.8357	158.7487	166.3168	257.4590	356.6867	371.3224	364.9780 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	647.1728	627.0604	566.4147	468.5548	357.5316	238.3480	158.7761	166.3678	259.3546	398.8922	532.0618	642.5003 (97)
Space heating kWh	198.3845	132.3565	91.7869	31.7945	6.2776	0.0000	0.0000	0.0000	0.0000	31.4009	115.7323	206.4766 (98a)
Space heating requirement - total per year (kWh/year)												814.2100
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	198.3845	132.3565	91.7869	31.7945	6.2776	0.0000	0.0000	0.0000	0.0000	31.4009	115.7323	206.4766 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												814.2100
Space heating per m2										(98c) / (4) =		16.2842 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan 4.3000	Feb 4.9000	Mar 6.5000	Apr 8.9000	May 11.7000	Jun 14.6000	Jul 16.6000	Aug 16.4000	Sep 14.1000	Oct 10.6000	Nov 7.1000	Dec 4.2000
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	374.1934	294.5778	301.8057	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9802	0.9942	0.9915	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	366.7996	292.8590	299.2506	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	543.7112	524.6170	505.5189	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	127.3764	172.4280	153.4636	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	fc = cooled area / (4) =											1.0000 (105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	31.8441	43.1070	38.3659	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												113.3170 (107)
Energy for space cooling												16.2842 (99)
Total												2.2663 (108)
Fabric Energy Efficiency (TFEE)												18.5505 (109)
												18.6 (109)

Full SAP Calculation Printout



Property Reference	Plot 22			Issued on Date	27/08/2025
Assessment Reference	Plot 22	Prop Type Ref			
Property	Flat 22, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.16	TER	11.12
Environmental	98 A	% DER < TER			71.58
CO ₂ Emissions (t/year)	0.14	DFEE	17.51	TFEE	18.55
Compliance Check	See BREL	% DFEE < TFEE			5.61
% DPER < TPER	42.84	DPER	33.57	TPER	58.73
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7600 (17)
Infiltration rate	0.1880 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1457 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.9999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13966.8797 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							279.3376 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6200	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
E14 Flat roof	5.9700	0.1600	0.9552	
P4 Party wall - Roof (insulation at ceiling level)	22.6200	0.1280	2.8954	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.2970 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		16.4791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694 (38)
Average = Sum(39)m / 12 =	29.2182	29.0758	28.9333	28.2211	28.0787	27.3665	27.3665	27.2240	27.6514	28.0787	28.3636	28.6484 (39)
												28.1855
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5844	0.5815	0.5787	0.5644	0.5616	0.5473	0.5473	0.5445	0.5530	0.5616	0.5673	0.5730 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)												2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											
		36.7938										
			0.2400									
				0.0000								
					0.7700							
						40.5930						
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	132.7833	133.4338	134.0907	137.4746	138.1720	141.7679	141.7679	142.5096	140.3073	138.1720	136.7842	135.4241	
alpha	9.8522	9.8956	9.9394	10.1650	10.2115	10.4512	10.4512	10.5006	10.3538	10.2115	10.1189	10.0283	
util living area	0.9656	0.9269	0.8663	0.7278	0.5689	0.3942	0.2824	0.3000	0.4596	0.7196	0.9078	0.9710 (86)	
MIT	20.8026	20.8853	20.9469	20.9909	20.9992	21.0000	21.0000	21.0000	20.9999	20.9931	20.9248	20.7928 (87)	
Th 2	20.4441	20.4467	20.4492	20.4621	20.4647	20.4776	20.4776	20.4802	20.4725	20.4647	20.4595	20.4544 (88)	
util rest of house	0.9573	0.9123	0.8440	0.6981	0.5365	0.3621	0.2489	0.2661	0.4245	0.6852	0.8885	0.9638 (89)	
MIT 2	20.2265	20.3260	20.3972	20.4544	20.4642	20.4776	20.4776	20.4802	20.4724	20.4592	20.3844	20.2241 (90)	
Living area fraction									fLA = Living area / (4) =				0.4466 (91)
MIT	20.4838	20.5758	20.6427	20.6940	20.7031	20.7109	20.7109	20.7124	20.7080	20.6976	20.6258	20.4781 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.4838	20.5758	20.6427	20.6940	20.7031	20.7109	20.7109	20.7124	20.7080	20.6976	20.6258	20.4781 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9580	0.9159	0.8521	0.7110	0.5509	0.3764	0.2639	0.2812	0.4402	0.7003	0.8947	0.9642 (94)
Useful gains	393.7024	410.2635	388.5828	329.5155	252.5349	167.2304	112.5014	117.3996	182.6994	281.0856	354.4663	383.1176 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	472.8625	455.7854	409.1955	332.8399	252.7955	167.2342	112.5015	117.3998	182.7204	283.5281	383.6391	466.3410 (97)
Space heating kWh	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182 (98a)
Space heating requirement - total per year (kWh/year)												192.1489
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												192.1489
Space heating per m2										(98c) / (4) =		3.8430 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	58.8951	30.5907	15.3358	2.3936	0.1939	0.0000	0.0000	0.0000	0.0000	1.8172	21.0044	61.9182	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(221)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													192.1489 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													121.4388 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1093.6840	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	192.1489	0.1599	30.7201 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			123.2674 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			158.0885 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.1600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	192.1489	1.5917	305.8528 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1303.6169 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1678.3644 (286)
Dwelling Primary energy Rate (DPER)			33.5700 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume			118.5000 (4)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross		Openings	NetArea		U-value	A x U		K-value	A x K			
Main dwelling	m2		m2	m2		W/m2K	W/K		kJ/m2K	kJ/K			
TER Opening Type				5.9700		1.1450	6.8359			(27)			
External Wall	14.1500		5.9700	8.1800		0.1800	1.4724			(29a)			
External Roof 1	50.0000			50.0000		0.1100	5.5000			(30)			
Total net area of external elements Aum(A, m2)				64.1500						(31)			
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		13.8083			(33)				
Main dwelling													
Corridor				33.8900		0.0000	0.0000			(32)			
Party Wall				19.7200		0.0000	0.0000			(32)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K										279.3376 (35)			
List of Thermal Bridges													
K1 Element						Length	Psi-value	Total					
E2 Other lintels (including other steel lintels)						3.1800	0.0500	0.1590					
E3 Sill						3.1800	0.0500	0.1590					
E4 Jamb						7.5200	0.0500	0.3760					
E18 Party wall between dwellings						4.7400	0.0600	0.2844					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						22.6200	0.0000	0.0000					
E7 Party floor between dwellings (in blocks of flats)						5.9700	0.0700	0.4179					
E14 Flat roof						5.9700	0.0800	0.4776					
P4 Party wall - Roof (insulation at ceiling level)						22.6200	0.1200	2.7144					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)										4.5883 (36)			
Point Thermal bridges										(36a) = 0.0000			
Total fabric heat loss										(33) + (36) + (36a) = 18.3966 (37)			
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	
Heat transfer coeff	41.2971	41.1671	41.0397	40.4411	40.3291	39.8078	39.8078	39.7113	40.0086	40.3291	40.5557	40.7925	(39)
Average = Sum(39)m / 12 =												40.4406	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
	0.8259	0.8233	0.8208	0.8088	0.8066	0.7962	0.7962	0.7942	0.8002	0.8066	0.8111	0.8159	
HLP (average)												0.8088	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
4. Water heating energy requirements (kWh/year)													
Assumed occupancy												1.6901 (42)	
Hot water usage for mixer showers													
	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)												98.5597 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)
Energy conte	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)
Energy content (annual)	Total = Sum(45)m =											1637.0557	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)
Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
Total per year (kWh/year)												1962.4258 (64)	
Electric shower(s)												1962 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month													
	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)
5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast	5.9700				36.7938	0.6300	0.7000	0.7700	67.1307 (77)			
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499 (83)
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	519.7249	491.0135	466.0631	456.9938 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	93.9458	94.2424	94.5351	95.9343	96.2007	97.4605	97.4605	97.6974	96.9713	96.2007	95.6633	95.1078
alpha	7.2631	7.2828	7.3023	7.3956	7.4134	7.4974	7.4974	7.5132	7.4648	7.4134	7.3776	7.3405
util living area	0.9784	0.9534	0.9076	0.7951	0.6331	0.4483	0.3200	0.3439	0.5289	0.8015	0.9466	0.9824 (86)
MIT	20.5320	20.6730	20.8113	20.9400	20.9893	20.9993	21.0000	20.9999	20.9976	20.9461	20.7452	20.5089 (87)
Th 2	20.2309	20.2331	20.2353	20.2457	20.2476	20.2567	20.2567	20.2583	20.2532	20.2476	20.2437	20.2396 (88)
util rest of house	0.9722	0.9414	0.8859	0.7580	0.5851	0.3966	0.2660	0.2885	0.4727	0.7583	0.9309	0.9772 (89)
MIT 2	19.7071	19.8806	20.0447	20.1928	20.2400	20.2563	20.2567	20.2583	20.2519	20.2029	19.9791	19.6859 (90)
Living area fraction	20.0755	20.2344	20.3870	20.5265	20.5746	20.5881	20.5886	20.5895	fLA = Living area / (4) =	20.5348	20.3212	0.4466 (91)
Temperature adjustment	20.0755	20.2344	20.3870	20.5265	20.5746	20.5881	20.5886	20.5895	20.5849	20.5348	20.3212	0.0000
adjusted MIT	20.0755	20.2344	20.3870	20.5265	20.5746	20.5881	20.5886	20.5895	20.5849	20.5348	20.3212	20.0534 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9708	0.9414	0.8905	0.7722	0.6062	0.4197	0.2901	0.3133	0.4978	0.7754	0.9327	0.9757 (94)
Useful gains	460.3705	498.8018	494.6818	447.2760	354.1824	238.1665	158.7673	166.3523	258.7234	380.7343	434.6981	445.9002 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	651.4822	631.2747	569.9193	470.1886	357.9062	238.3739	158.7778	166.3710	259.4523	400.6625	536.1945	646.7014 (97)
Space heating kWh	142.1871	89.0218	55.9767	16.4971	2.7705	0.0000	0.0000	0.0000	0.0000	14.8266	73.0774	149.3960 (98a)
Space heating requirement - total per year (kWh/year)												543.7531
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	142.1871	89.0218	55.9767	16.4971	2.7705	0.0000	0.0000	0.0000	0.0000	14.8266	73.0774	149.3960 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												543.7531
Space heating per m2										(98c) / (4) =		10.8751 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	142.1871	89.0218	55.9767	16.4971	2.7705	0.0000	0.0000	0.0000	0.0000	14.8266	73.0774	149.3960	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	154.0489	96.4483	60.6464	17.8733	3.0016	0.0000	0.0000	0.0000	0.0000	16.0635	79.1738	161.8592	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)
Efficiency of water heater													79.8000 (216)
(217)m	83.3920	82.6770	81.7545	80.5602	79.9409	79.8000	79.8000	79.8000	79.8000	80.4804	82.2883	83.5211	(217)
Fuel for water heating, kWh/month	230.6910	205.9296	221.8034	199.4683	195.8774	177.9421	176.5248	182.9609	184.3137	202.4260	208.8496	228.0352	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	589.1150 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2414.8220 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	138.3788 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-823.7918 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2404.5240 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	589.1150	0.2100	123.7141 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2414.8220	0.2100	507.1126 (264)
Space and water heating			630.8268 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			555.9586 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	589.1150	1.1300	665.6999 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2414.8220	1.1300	2728.7488 (278)
Space and water heating			3394.4487 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2936.4323 (286)
Target Primary Energy Rate (TPER)			58.7300 (287)

Full SAP Calculation Printout



Property Reference	Plot 22			Issued on Date	27/08/2025
Assessment Reference	Plot 22	Prop Type Ref			
Property	Flat 22, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.16	TER	11.12
Environmental	98 A	% DER < TER			71.58
CO ₂ Emissions (t/year)	0.14	DFEE	17.51	TFEE	18.55
Compliance Check	See BREL	% DFEE < TFEE			5.61
% DPER < TPER	42.84	DPER	33.57	TPER	58.73
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling				
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			
Dwelling volume				

2. Ventilation rate

	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7600	(17)
Infiltration rate	0.1880	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1457 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m ²)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.1821			(33)
Main dwelling								
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999	(32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.9999	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								13966.8797 (34)
List of Thermal Bridges								279.3376 (35)
K1 Element				Length	Psi-value		Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	4.7400	0.0290	0.1375	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.6200	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
E14 Flat roof	5.9700	0.1600	0.9552	
P4 Party wall - Roof (insulation at ceiling level)	22.6200	0.1280	2.8954	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.2970 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 16.4791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694 (38)
Average = Sum(39)m / 12 =	29.2182	29.0758	28.9333	28.2211	28.0787	27.3665	27.3665	27.2240	27.6514	28.0787	28.3636	28.6484 (39)
												28.1855
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5844	0.5815	0.5787	0.5644	0.5616	0.5473	0.5473	0.5445	0.5530	0.5616	0.5673	0.5730 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
								Total per year (kWh/year) = Sum(64)m =				2256.2377 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains												
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	132.7833	133.4338	134.0907	137.4746	138.1720	141.7679	141.7679	142.5096	140.3073	138.1720	136.7842	135.4241	21.0000 (85)
alpha	9.8522	9.8956	9.9394	10.1650	10.2115	10.4512	10.4512	10.5006	10.3538	10.2115	10.1189	10.0283	
util living area	0.9413	0.9014	0.8272	0.6982	0.5490	0.3872	0.2771	0.2934	0.4474	0.6859	0.8758	0.9501	(86)
MIT	20.8574	20.9135	20.9646	20.9937	20.9994	21.0000	21.0000	21.0000	20.9999	20.9954	20.9468	20.8465	(87)
Th 2	20.4441	20.4467	20.4492	20.4621	20.4647	20.4776	20.4776	20.4802	20.4725	20.4647	20.4595	20.4544	(88)
util rest of house	0.9291	0.8840	0.8030	0.6689	0.5177	0.3556	0.2442	0.2603	0.4132	0.6523	0.8535	0.9394	(89)
MIT 2	20.2910	20.3575	20.4154	20.4568	20.4643	20.4776	20.4776	20.4802	20.4724	20.4611	20.4077	20.2880	(90)
Living area fraction													
MIT	20.5440	20.6058	20.6607	20.6965	20.7033	20.7109	20.7109	20.7124	20.7080	20.6997	20.6485	20.5374	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.5440	20.6058	20.6607	20.6965	20.7033	20.7109	20.7109	20.7124	20.7080	20.6997	20.6485	20.5374	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9314	0.8892	0.8125	0.6818	0.5317	0.3698	0.2589	0.2751	0.4285	0.6671	0.8616	0.9411	(94)
Useful gains	417.6821	422.4581	396.0524	330.5956	252.6123	167.2310	112.5014	117.3997	182.7045	281.9843	363.7490	406.6881	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	474.6193	456.6595	409.7149	332.9115	252.8006	167.2342	112.5015	117.3998	182.7207	283.5874	384.2825	468.0417	(97)
Space heating kWh	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471	(98a)
Space heating requirement - total per year (kWh/year)												138.9411	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												138.9411	
Space heating per m2										(98c) / (4) =		2.7788	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater												344.1753	(216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												138.9411	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1040.4762	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	138.9411	16.4900	22.9114	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	124.5474	16.4900	20.5379	(250)
Additional standing charges			0.0000	(251)
Total energy cost			171.5745	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.6502	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	89.4606	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	138.9411	0.1600	22.2295	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			114.7767	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			149.5978	(272)
CO2 emissions per m2			2.9900	(273)
EI value			97.8899	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	(1b) x 2.3700	(2b) =	118.5000 (1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =
Dwelling volume				118.5000 (5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
Air changes per hour			
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.7600	(17)
Infiltration rate		0.1880	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1457	(21)

Full SAP Calculation Printout



Wind speed	Jan 4.3000	Feb 4.2000	Mar 4.3000	Apr 3.9000	May 4.0000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.4000	Oct 3.8000	Nov 3.8000	Dec 3.9000	(22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1566	0.1530	0.1566	0.1421	0.1457	0.1238	0.1202	0.1202	0.1238	0.1384	0.1384	0.1421	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.2966	0.2930	0.2966	0.2821	0.2857	0.2638	0.2602	0.2602	0.2638	0.2784	0.2784	0.2821	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)			64.1500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.1821			(33)
Main dwelling								
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999	(32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13966.8797 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 279.3376 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	3.1800	0.0340	0.1081	
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827	
E3 Sill	7.5200	0.0300	0.2256	
E4 Jamb	4.7400	0.0290	0.1375	
E18 Party wall between dwellings	22.6200	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075	
E7 Party floor between dwellings (in blocks of flats)	5.9700	0.1600	0.9552	
E14 Flat roof	22.6200	0.1280	2.8954	
P4 Party wall - Roof (insulation at ceiling level)				4.2970 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000
Point Thermal Bridges				(36a) =
Total fabric heat loss				(33) + (36) + (36a) = 16.4791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 11.5996	Feb 11.4572	Mar 11.5996	Apr 11.0299	May 11.1723	Jun 10.3177	Jul 10.1752	Aug 10.1752	Sep 10.3177	Oct 10.8874	Nov 10.8874	Dec 11.0299	(38)
Heat transfer coeff	28.0787	27.9362	28.0787	27.5089	27.6514	26.7967	26.6543	26.6543	26.7967	27.3665	27.3665	27.5089	(39)
Average = Sum(39)m / 12 =													27.3665

HLP	Jan 0.5616	Feb 0.5587	Mar 0.5616	Apr 0.5502	May 0.5530	Jun 0.5359	Jul 0.5331	Aug 0.5331	Sep 0.5359	Oct 0.5473	Nov 0.5473	Dec 0.5502	(40)
HLP (average)													0.5473
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)

Daily hot water use	Jan 126.9285	Feb 124.3436	Mar 121.1244	Apr 116.0589	May 112.0068	Jun 107.6259	Jul 105.8165	Aug 109.0204	Sep 112.4173	Oct 117.0328	Nov 122.1814	Dec 126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)										Total = Sum(45)m =			1938.9067
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)

Water storage loss:

Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)

If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)

Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.9700		32.4665		0.2400		0.0000		0.7700		35.8189 (77)	
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	138.1720	138.8765	138.1720	141.0338	140.3073	144.7822	145.5559	145.5559	144.7822	141.7679	141.7679	141.0338	
alpha	10.2115	10.2584	10.2115	10.4023	10.3538	10.6521	10.7037	10.7037	10.6521	10.4512	10.4512	10.4023	
util living area	0.9136	0.8639	0.7849	0.6385	0.4849	0.3233	0.2372	0.2543	0.4049	0.6361	0.8333	0.9248 (86)	
MIT	20.9106	20.9506	20.9806	20.9976	20.9999	21.0000	21.0000	21.0000	21.0000	20.9981	20.9712	20.9022 (87)	
Th 2	20.4647	20.4673	20.4647	20.4750	20.4725	20.4880	20.4906	20.4906	20.4880	20.4776	20.4776	20.4750 (88)	
util rest of house	0.8975	0.8431	0.7589	0.6093	0.4538	0.2926	0.2054	0.2219	0.3725	0.6030	0.8077	0.9102 (89)	
MIT 2	20.3720	20.4183	20.4468	20.4731	20.4724	20.4880	20.4906	20.4906	20.4880	20.4762	20.4508	20.3724 (90)	
Living area fraction	fLA = Living area / (4) =												0.4466 (91)
MIT	20.6125	20.6560	20.6852	20.7074	20.7079	20.7167	20.7181	20.7181	20.7166	20.7092	20.6832	20.6090 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.6125	20.6560	20.6852	20.7074	20.7079	20.7167	20.7181	20.7181	20.7166	20.7092	20.6832	20.6090 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9022	0.8506	0.7698	0.6223	0.4677	0.3063	0.2196	0.2364	0.3870	0.6177	0.8180	0.9141 (94)
Useful gains	400.2725	398.5441	371.2840	299.2107	218.6209	137.1094	93.7723	99.1032	163.9021	259.5694	341.6432	393.4308 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	435.5714	417.8149	378.6470	300.0503	218.6655	137.1097	93.7723	99.1032	163.9062	260.2346	352.5673	432.1370 (97)
Space heating kWh	26.2624	12.9500	5.4781	0.6046	0.0332	0.0000	0.0000	0.0000	0.0000	0.4949	7.8653	28.7975 (98a)
Space heating requirement - total per year (kWh/year)												82.4860
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	26.2624	12.9500	5.4781	0.6046	0.0332	0.0000	0.0000	0.0000	0.0000	0.4949	7.8653	28.7975 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												82.4860
Space heating per m ²												(98c) / (4) = 1.6497 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	26.2624	12.9500	5.4781	0.6046	0.0332	0.0000	0.0000	0.0000	0.0000	0.4949	7.8653	28.7975 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	26.2624	12.9500	5.4781	0.6046	0.0332	0.0000	0.0000	0.0000	0.0000	0.4949	7.8653	28.7975 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	

Water heating
Water heating requirement

Full SAP Calculation Printout



Efficiency of water heater	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												82.4860	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												984.0211	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	82.4860	28.4300	23.4508 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	28.4300	186.3726 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250 (249)
Energy for lighting	124.5474	28.4300	35.4088 (250)
Additional standing charges			0.0000 (251)
Total energy cost			279.7572 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	82.4860	0.1604	13.2307 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			105.7780 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			140.5990 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	82.4860	1.5937	131.4554 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1129.2195 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1503.9670 (286)

SAP 10 EPC IMPROVEMENTS

Plot 22

Current energy efficiency rating: B 89
Current environmental impact rating: A 98

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

Electricity	Current £280	Potential £280	Saving £0
Space heating	£58	£58	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£280	£280	£0
Total cost of uses	£279	£279	£0
Delivered energy	20 kWh/m ²	20 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	30 kWh/m ²	30 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.0000 (1b)	x 2.3700 (2b)	= 118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

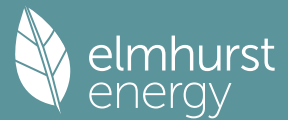
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure Test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.7600 (17)
Infiltration rate		0.1880 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1457 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1858	0.1821	0.1785	0.1603	0.1566	0.1384	0.1384	0.1348	0.1457	0.1566	0.1639	0.1712 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												72.0000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3258	0.3221	0.3185	0.3003	0.2966	0.2784	0.2784	0.2748	0.2857	0.2966	0.3039	0.3112 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)

Full SAP Calculation Printout



External Roof 1	50.0000	50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)	64.1500						(31)
Fabric heat loss, W/K = Sum (A x U)		(26)...(30) + (32) =	12.1821				(33)
Main dwelling							
Corridor	33.8900	0.0000	0.0000	180.0000	6100.1999		(32)
Party Wall	19.7200	0.0000	0.0000	180.0000	3549.5999		(32)
Party Floor 1	50.0000			40.0000	2000.0000		(32d)
Internal Wall 1	71.1200			9.0000	640.0800		(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
(28)...(30) + (32) + (32a)...(32e) = 13966.8797 (34)
279.3376 (35)

List of Thermal Bridges		Length	Psi-value	Total	
K1 Element		3.1800	0.0340	0.1081	
E2 Other lintels (including other steel lintels)		3.1800	0.0260	0.0827	
E3 Sill		7.5200	0.0300	0.2256	
E4 Jamb		4.7400	0.0290	0.1375	
E18 Party wall between dwellings		22.6200	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)		5.9700	-0.0180	-0.1075	
E7 Party floor between dwellings (in blocks of flats)		5.9700	0.1600	0.9552	
E14 Flat roof		22.6200	0.1280	2.8954	
P4 Party wall - Roof (insulation at ceiling level)					4.2970 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)					0.0000
Point Thermal bridges				(36a) =	
Total fabric heat loss				(33) + (36) + (36a) =	16.4791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.7391	12.5967	12.4543	11.7421	11.5996	10.8874	10.8874	10.7450	11.1723	11.5996	11.8845	12.1694 (38)
Average = Sum(39)m / 12 =	29.2182	29.0758	28.9333	28.2211	28.0787	27.3665	27.3665	27.2240	27.6514	28.0787	28.3636	28.6484 (39)
												28.1855
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5844	0.5815	0.5787	0.5644	0.5616	0.5473	0.5473	0.5445	0.5530	0.5616	0.5673	0.5730 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths												
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses												
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)												Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m												
30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)												
89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains												
407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

Full SAP Calculation Printout



[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast				5.9700	36.7938	0.2400	0.0000		0.7700		40.5930 (77)	
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198 (84)

7. Mean internal temperature (heating season)												

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	132.7833	133.4338	134.0907	137.4746	138.1720	141.7679	141.7679	142.5096	140.3073	138.1720	136.7842	135.4241
alpha	9.8522	9.8956	9.9394	10.1650	10.2115	10.4512	10.4512	10.5006	10.3538	10.2115	10.1189	10.0283
util living area	0.9413	0.9014	0.8272	0.6982	0.5490	0.3872	0.2771	0.2934	0.4474	0.6859	0.8758	0.9501 (86)
MIT	20.8574	20.9135	20.9646	20.9937	20.9994	21.0000	21.0000	21.0000	20.9999	20.9954	20.9468	20.8465 (87)
Th 2	20.4441	20.4467	20.4492	20.4621	20.4647	20.4776	20.4776	20.4802	20.4725	20.4647	20.4595	20.4544 (88)
util rest of house	0.9291	0.8840	0.8030	0.6689	0.5177	0.3556	0.2442	0.2603	0.4132	0.6523	0.8535	0.9394 (89)
MIT 2	20.2910	20.3575	20.4154	20.4568	20.4643	20.4776	20.4776	20.4802	20.4724	20.4611	20.4077	20.2880 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	20.5440	20.6058	20.6607	20.6965	20.7033	20.7109	20.7109	20.7124	20.7080	20.6997	20.6485	20.5374 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5440	20.6058	20.6607	20.6965	20.7033	20.7109	20.7109	20.7124	20.7080	20.6997	20.6485	20.5374 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9314	0.8892	0.8125	0.6818	0.5317	0.3698	0.2589	0.2751	0.4285	0.6671	0.8616	0.9411 (94)
Useful gains	417.6821	422.4581	396.0524	330.5956	252.6123	167.2310	112.5014	117.3997	182.7045	281.9843	363.7490	406.6881 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	474.6193	456.6595	409.7149	332.9115	252.8006	167.2342	112.5015	117.3998	182.7207	283.5874	384.2825	468.0417 (97)
Space heating kWh	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471 (98a)
Space heating requirement - total per year (kWh/year)												138.9411
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												138.9411
Space heating per m2										(98c) / (4) =		2.7788 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP												

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	42.3613	22.9833	10.1649	1.6675	0.1401	0.0000	0.0000	0.0000	0.0000	1.1927	14.7841	45.6471 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												

Full SAP Calculation Printout



(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												138.9411	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1040.4762	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	138.9411	16.4900	22.9114	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	124.5474	16.4900	20.5379	(250)
Additional standing charges			0.0000	(251)
Total energy cost			171.5745	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.6502	(257)
SAP value		89.4606	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	138.9411	0.1600	22.2295	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			114.7767	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			149.5978	(272)
CO2 emissions per m2			2.9900	(273)
EI value			97.8899	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0000	2.3700	118.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			
Dwelling volume			118.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)

Full SAP Calculation Printout



Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.7600 (17)
Infiltration rate 0.1880 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1457 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1566	0.1530	0.1566	0.1421	0.1457	0.1238	0.1202	0.1202	0.1238	0.1384	0.1384	0.1421 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2966	0.2930	0.2966	0.2821	0.2857	0.2638	0.2602	0.2602	0.2638	0.2784	0.2784	0.2821 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	14.1500	5.9700	8.1800	0.1900	1.5542	150.0000	1226.9999 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m2)			64.1500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 12.1821		(33)
Main dwelling							
Corridor			33.8900	0.0000	0.0000	180.0000	6100.1999 (32)
Party Wall			19.7200	0.0000	0.0000	180.0000	3549.5999 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13966.8797 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 279.3376 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	3.1800	0.0340	0.1081
E2 Other lintels (including other steel lintels)	3.1800	0.0260	0.0827
E3 Sill	7.5200	0.0300	0.2256
E4 Jamb	4.7400	0.0290	0.1375
E18 Party wall between dwellings	22.6200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9700	-0.0180	-0.1075
E7 Party floor between dwellings (in blocks of flats)	5.9700	0.1600	0.9552
E14 Flat roof	22.6200	0.1280	2.8954
P4 Party wall - Roof (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.2970 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 16.4791 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	11.5996	11.4572	11.5996	11.0299	11.1723	10.3177	10.1752	10.1752	10.3177	10.8874	10.8874	11.0299 (38)
Heat transfer coeff	28.0787	27.9362	28.0787	27.5089	27.6514	26.7967	26.6543	26.6543	26.7967	27.3665	27.3665	27.5089 (39)
Average = Sum(39)m / 12 =												27.3665

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.5616	0.5587	0.5616	0.5502	0.5530	0.5359	0.5331	0.5331	0.5359	0.5473	0.5473	0.5502 (40)
HLP (average)												0.5473
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6901 (42)

Hot water usage for mixer showers													71.9889 (42a)
Hot water usage for baths													22.6476 (42b)
Hot water usage for other uses													31.9383 (42c)
Average daily hot water use (litres/day)													116.7306 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)	
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)	
Energy content (annual)													Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)	
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)	
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	

Full SAP Calculation Printout



FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
	Total per year (kWh/year) = Sum(64)m =											2256.2377 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
Southeast				5.9700	32.4665	0.2400	0.0000	0.7700		35.8189 (77)		
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	138.1720	138.8765	138.1720	141.0338	140.3073	144.7822	145.5559	145.5559	144.7822	141.7679	141.7679	141.0338		
alpha	10.2115	10.2584	10.2115	10.4023	10.3538	10.6521	10.7037	10.7037	10.6521	10.4512	10.4512	10.4023		
util living area	0.9136	0.8639	0.7849	0.6385	0.4849	0.3233	0.2372	0.2543	0.4049	0.6361	0.8333	0.9248	(86)	
MIT	20.9106	20.9506	20.9806	20.9976	20.9999	21.0000	21.0000	21.0000	21.0000	20.9981	20.9712	20.9022	(87)	
Th 2	20.4647	20.4673	20.4647	20.4750	20.4725	20.4880	20.4906	20.4906	20.4880	20.4776	20.4776	20.4750	(88)	
util rest of house	0.8975	0.8431	0.7589	0.6093	0.4538	0.2926	0.2054	0.2219	0.3725	0.6030	0.8077	0.9102	(89)	
MIT 2	20.3720	20.4183	20.4468	20.4731	20.4724	20.4880	20.4906	20.4906	20.4880	20.4762	20.4508	20.3724	(90)	
Living area fraction									FLA = Living area / (4) =			0.4466	(91)	
MIT	20.6125	20.6560	20.6852	20.7074	20.7079	20.7167	20.7181	20.7181	20.7166	20.7092	20.6832	20.6090	(92)	
Temperature adjustment												0.0000		
adjusted MIT	20.6125	20.6560	20.6852	20.7074	20.7079	20.7167	20.7181	20.7181	20.7166	20.7092	20.6832	20.6090	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	400.2725	398.5441	371.2840	299.2107	218.6209	137.1094	93.7723	99.1032	163.9021	259.5694	341.6432	393.4308	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	435.5714	417.8149	378.6470	300.0503	218.6655	137.1097	93.7723	99.1032	163.9062	260.2346	352.5673	432.1370	(97)
Space heating kWh	26.2624	12.9500	5.4781	0.6046	0.0332	0.0000	0.0000	0.0000	0.0000	0.4949	7.8653	28.7975	(98a)
Space heating requirement - total per year (kWh/year)												82.4860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	26.2624	12.9500	5.4781	0.6046	0.0332	0.0000	0.0000	0.0000	0.0000	0.4949	7.8653	28.7975	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												82.4860	
Space heating per m2										(98c) / (4) =		1.6497	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	26.2624	12.9500	5.4781	0.6046	0.0332	0.0000	0.0000	0.0000	0.0000	0.4949	7.8653	28.7975	(98)
Space heating efficiency (main heating system 1)													

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	82.4860	1.5937	131.4554 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1129.2195 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1503.9670 (286)

Full SAP Calculation Printout



Property Reference	Plot 23			Issued on Date	27/08/2025
Assessment Reference	Plot 23	Prop Type Ref			
Property	Flat 23, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.19	TER	11.10
Environmental	98 A	% DER < TER			71.26
CO ₂ Emissions (t/year)	0.14	DFEE	17.65	TFEE	18.47
Compliance Check	See BREL	% DFEE < TFEE			4.39
% DPER < TPER	42.25	DPER	33.86	TPER	58.63
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8700 (17)
Infiltration rate	0.1935 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1912	0.1875	0.1837	0.1650	0.1612	0.1425	0.1425	0.1387	0.1500	0.1612	0.1687	0.1762 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3312	0.3275	0.3237	0.3050	0.3012	0.2825	0.2825	0.2787	0.2900	0.3012	0.3087	0.3162 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 14095.5802 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							281.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031	
P4 Party wall - Roof (insulation at ceiling level)	23.1200	0.1280	2.9594	
E14 Flat roof	5.7300	0.1600	0.9168	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.4715 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 16.5453 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.9517	12.8051	12.6584	11.9254	11.7788	11.0458	11.0458	10.8992	11.3390	11.7788	12.0720	12.3652 (38)
Average = Sum(39)m / 12 =	29.4969	29.3503	29.2037	28.4707	28.3241	27.5910	27.5910	27.4444	27.8842	28.3241	28.6173	28.9105 (39)
												28.4340
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5899	0.5870	0.5841	0.5694	0.5665	0.5518	0.5518	0.5489	0.5577	0.5665	0.5723	0.5782 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	132.7406	133.4037	134.0734	137.5254	138.2372	141.9099	141.9099	142.6679	140.4176	138.2372	136.8208	135.4332
alpha	9.8494	9.8936	9.9382	10.1684	10.2158	10.4607	10.4607	10.5112	10.3612	10.2158	10.1214	10.0289
util living area	0.9676	0.9305	0.8714	0.7336	0.5738	0.3975	0.2848	0.3024	0.4635	0.7254	0.9119	0.9727 (86)
MIT	20.7963	20.8803	20.9440	20.9903	20.9992	21.0000	21.0000	21.0000	20.9999	20.9926	20.9214	20.7867 (87)
Th 2	20.4391	20.4417	20.4444	20.4576	20.4603	20.4736	20.4736	20.4762	20.4682	20.4603	20.4550	20.4497 (88)
util rest of house	0.9597	0.9162	0.8493	0.7035	0.5409	0.3648	0.2507	0.2680	0.4278	0.6905	0.8929	0.9659 (89)
MIT 2	20.2142	20.3157	20.3894	20.4493	20.4597	20.4735	20.4736	20.4762	20.4682	20.4544	20.3763	20.2123 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.4772	20.5708	20.6400	20.6937	20.7034	20.7114	20.7114	20.7129	20.7084	20.6975	20.6226	20.4718 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.4772	20.5708	20.6400	20.6937	20.7034	20.7114	20.7114	20.7129	20.7084	20.6975	20.6226	20.4718 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9603	0.9197	0.8573	0.7168	0.5557	0.3795	0.2661	0.2836	0.4439	0.7060	0.8990	0.9662 (94)
Useful gains	394.6516	411.9806	390.9710	332.1859	254.7294	168.6154	113.4377	118.3639	184.2482	283.3661	356.1651	383.9138 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	477.1771	459.9421	412.9393	335.7757	255.0130	168.6196	113.4378	118.3640	184.2710	286.0036	386.9793	470.4261 (97)
Space heating kWh	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651 (98a)
Space heating requirement - total per year (kWh/year)	201.2829											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	201.2829											
Space heating per m2	(98c) / (4) = 4.0257 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000 (213)											
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	201.2829 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	344.1753											
Water heating fuel used	655.5490 (219)											
Space cooling fuel	0.0000 (221)											

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1102.8180 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	201.2829	0.1598	32.1715 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			124.7188 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			159.5399 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.1900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	201.2829	1.5916	320.3593 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1318.1235 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1692.8710 (286)
Dwelling Primary energy Rate (DPER)			33.8600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

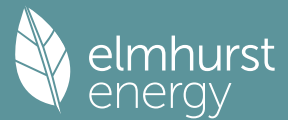
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)					
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)					
Total net area of external elements Aum(A, m2)			63.5800					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		13.7057			(33)					
Main dwelling													
Corridor			34.1800	0.0000	0.0000			(32)					
Party Wall			20.6200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							281.9116	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E18 Party wall between dwellings				2.3700	0.0600		0.1422						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.1200	0.0000		0.0000						
E7 Party floor between dwellings (in blocks of flats)				5.7300	0.0700		0.4011						
P4 Party wall - Roof (insulation at ceiling level)				23.1200	0.1200		2.7744						
E14 Flat roof				5.7300	0.0800		0.4584						
E25 Staggered party wall between dwellings				2.3700	0.0600		0.1422						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6123	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	18.3180	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	41.2185	41.0885	40.9611	40.3625	40.2505	39.7292	39.7292	39.6327	39.9300	40.2505	40.4771	40.7139	(39)
Average = Sum(39)m / 12 =												40.3620	
HLP	Jan 0.8244	Feb 0.8218	Mar 0.8192	Apr 0.8073	May 0.8050	Jun 0.7946	Jul 0.7946	Aug 0.7927	Sep 0.7986	Oct 0.8050	Nov 0.8095	Dec 0.8143	(40)
HLP (average)												0.8072	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers	52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	(42a)	
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)	
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)	
Average daily hot water use (litres/day)													98.5597	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	(44)	
Energy content (annual)	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Distribution loss (46)m = 0.15 x (45)m	25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.4258	(64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month	93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 84.5050	Feb 84.5050	Mar 84.5050	Apr 84.5050	May 84.5050	Jun 84.5050	Jul 84.5050	Aug 84.5050	Sep 84.5050	Oct 84.5050	Nov 84.5050	Dec 84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast	5.9700				36.7938	0.6300		0.7000	0.7700	67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	57.4499 (83)
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	491.0135	456.9938 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	94.9922	95.2928	95.5893	97.0068	97.2767	98.5532	98.5532	98.7932	98.0575	97.2767	96.7322	96.1695
alpha	7.3328	7.3529	7.3726	7.4671	7.4851	7.5702	7.5702	7.5862	7.5372	7.4851	7.4488	7.4113
util living area	0.9788	0.9538	0.9079	0.7948	0.6322	0.4475	0.3194	0.3432	0.5280	0.8012	0.9470	0.9827 (86)
MIT	20.5386	20.6785	20.8154	20.9421	20.9899	20.9993	21.0000	20.9999	20.9978	20.9479	20.7497	20.5156 (87)
Th 2	20.2323	20.2345	20.2367	20.2471	20.2490	20.2580	20.2580	20.2597	20.2545	20.2490	20.2451	20.2410 (88)
util rest of house	0.9727	0.9418	0.8861	0.7575	0.5843	0.3959	0.2656	0.2880	0.4720	0.7579	0.9313	0.9776 (89)
MIT 2	19.7161	19.8882	20.0505	20.1961	20.2418	20.2577	20.2580	20.2597	20.2533	20.2059	19.9855	19.6950 (90)
Living area fraction	20.0877	20.2453	20.3961	20.5331	20.5798	20.5928	20.5932	20.5941	20.5897	20.5412	20.3308	20.0658 (92)
MIT	20.0877	20.2453	20.3961	20.5331	20.5798	20.5928	20.5932	20.5941	20.5897	20.5412	20.3308	20.0658 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0877	20.2453	20.3961	20.5331	20.5798	20.5928	20.5932	20.5941	20.5897	20.5412	20.3308	20.0658 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9713	0.9420	0.8910	0.7721	0.6056	0.4192	0.2899	0.3130	0.4973	0.7754	0.9333	0.9762 (94)
Useful gains	460.6159	499.1229	494.9559	447.2209	353.8568	237.8953	158.6381	166.2073	258.4455	380.7105	434.9769	446.1166 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	650.7444	630.5143	569.1987	469.5425	357.4153	238.0881	158.6477	166.2243	259.1322	400.1367	535.5434	645.9584 (97)
Space heating kWh	141.4556	88.2950	55.2367	16.0715	2.6475	0.0000	0.0000	0.0000	0.0000	14.4531	72.4079	148.6823 (98a)
Space heating requirement - total per year (kWh/year)												539.2496
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	141.4556	88.2950	55.2367	16.0715	2.6475	0.0000	0.0000	0.0000	0.0000	14.4531	72.4079	148.6823 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												539.2496
Space heating per m2										(98c) / (4) =		10.7850 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	141.4556	88.2950	55.2367	16.0715	2.6475	0.0000	0.0000	0.0000	0.0000	14.4531	72.4079	148.6823 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	153.2563	95.6609	59.8447	17.4123	2.8684	0.0000	0.0000	0.0000	0.0000	15.6588	78.4484	161.0859 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater	83.3809	82.6610	81.7342	80.5422	79.9347	79.8000	79.8000	79.8000	79.8000	80.4645	82.2717	79.8000 (216)
Fuel for water heating, kWh/month	230.7218	205.9695	221.8584	199.5128	195.8925	177.9421	176.5248	182.9609	184.3137	202.4659	208.8915	228.0637 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	584.2357	1.1300	660.1864 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2415.1178	1.1300	2729.0831 (278)
Space and water heating			3389.2695 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2931.2530 (286)
Target Primary Energy Rate (TPER)			58.6300 (287)

Full SAP Calculation Printout



Property Reference	Plot 23			Issued on Date	27/08/2025
Assessment Reference	Plot 23	Prop Type Ref			
Property	Flat 23, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.19	TER	11.10
Environmental	98 A	% DER < TER			71.26
CO ₂ Emissions (t/year)	0.14	DFEE	17.65	TFEE	18.47
Compliance Check	See BREL	% DFEE < TFEE			4.39
% DPER < TPER	42.25	DPER	33.86	TPER	58.63
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (1b) - (3b)
Dwelling volume			118.5000 (4)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8700 (17)
Infiltration rate	0.3623 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2808 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3580	0.3510	0.3439	0.3088	0.3018	0.2667	0.2667	0.2597	0.2808	0.3018	0.3159	0.3299 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5641	0.5616	0.5591	0.5477	0.5455	0.5356	0.5356	0.5337	0.5394	0.5455	0.5499	0.5544 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	12.0738	(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14095.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							281.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340	0.1081	
E3 Sill				3.1800	0.0260	0.0827	
E4 Jamb				7.5200	0.0300	0.2256	

Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(39)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	22.0581	21.9608	21.8654	21.4175	21.3337	20.9435	20.9435	20.8713	21.0938	21.3337	21.5032	21.6804 (39)
Heat transfer coeff												
	38.6033	38.5060	38.4107	37.9627	37.8789	37.4888	37.4888	37.4165	37.6391	37.8789	38.0485	38.2257 (39)
Average = Sum(39)m / 12 =												37.9623
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.7721	0.7701	0.7682	0.7593	0.7576	0.7498	0.7498	0.7483	0.7528	0.7576	0.7610	0.7645 (40)
HLP (average)												0.7592
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

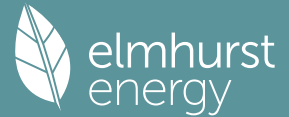
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												50.1040 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859 (44)
Energy content (annual)	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											707.3017 (64)
Electric shower(s)	42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											478.7637 (64a)
Heat gains from water heating, kWh/month	28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542 (72)
Total internal gains	319.4151	329.0671	314.6032	306.4232	291.3879	282.5897	272.3254	271.9398	279.9063	287.3654	303.2654	312.6034 (73)

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast					5.9700	36.7938		0.2400		0.0000		0.7700		40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)		
Total gains	360.0081	398.2120	409.2103	423.6459	422.6872	412.9395	397.9965	387.1093	382.3458	363.7852	351.8865	347.3425 (84)		

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	101.4275	101.6838	101.9363	103.1390	103.3672	104.4430	104.4430	104.6446	104.0260	103.3672	102.9066	102.4295
alpha	7.7618	7.7789	7.7958	7.8759	7.8911	7.9629	7.9629	7.9763	7.9351	7.8911	7.8604	7.8286
util living area	0.9952	0.9883	0.9743	0.9198	0.7923	0.5778	0.4142	0.4442	0.6688	0.9195	0.9860	0.9962 (86)
MIT	20.4050	20.5296	20.6710	20.8549	20.9638	20.9972	20.9998	20.9997	20.9917	20.8762	20.6214	20.3840 (87)
Th 2	20.2776	20.2793	20.2810	20.2888	20.2902	20.2971	20.2971	20.2983	20.2944	20.2902	20.2873	20.2842 (88)
util rest of house	0.9936	0.9846	0.9659	0.8961	0.7449	0.5159	0.3482	0.3767	0.6050	0.8915	0.9808	0.9950 (89)
MIT 2	19.7394	19.8634	20.0023	20.1791	20.2683	20.2959	20.2970	20.2983	20.2907	20.2012	19.9613	19.7242 (90)
Living area fraction	20.0401	20.1644	20.3044	20.4844	20.5825	20.6128	20.6145	20.6152	20.6074	20.5062	20.2595	20.0223 (91)
MIT	20.0401	20.1644	20.3044	20.4844	20.5825	20.6128	20.6145	20.6152	20.6074	20.5062	20.2595	20.0223 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0401	20.1644	20.3044	20.4844	20.5825	20.6128	20.6145	20.6152	20.6074	20.5062	20.2595	20.0223 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9929	0.9839	0.9663	0.9032	0.7651	0.5439	0.3780	0.4072	0.6338	0.9008	0.9806	0.9944 (94)
Useful gains	357.4585	391.7888	395.4043	382.6332	323.4021	224.5824	150.4600	157.6443	242.3126	327.6917	345.0480	345.4040 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	607.6213	587.7713	530.2370	439.7758	336.4612	225.4113	150.5005	157.7168	244.9313	375.2353	500.6994	604.8176 (97)
Space heating kWh	186.1211	131.7002	100.3155	41.1427	9.7159	0.0000	0.0000	0.0000	0.0000	35.3724	112.0690	193.0037 (98a)
Space heating requirement - total per year (kWh/year)												809.4407
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	186.1211	131.7002	100.3155	41.1427	9.7159	0.0000	0.0000	0.0000	0.0000	35.3724	112.0690	193.0037 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												809.4407
Space heating per m2										(98c) / (4) =		16.1888 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	352.3945	277.4169	284.3656	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9627	0.9888	0.9847	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	339.2338	274.3000	280.0078	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	444.3213	428.8194	417.8150	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	75.6630	114.9625	102.5286	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			0.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	18.9157	28.7406	25.6321	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												73.2885 (107)
Energy for space heating												16.1888 (99)
Energy for space cooling												1.4658 (108)
Total												17.6546 (109)
Fabric Energy Efficiency (DFEE)												17.7 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour
Pressure test	20.0000 / (5) = 0.1688 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	5.0000 (17)
	0.4188 (18)

Full SAP Calculation Printout



Number of sides sheltered

3 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.7750 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.3246 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			5.9700	1.1450	6.8359			(27)
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)
Total net area of external elements Aum(A, m2)			63.5800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		13.7057			(33)
Main dwelling								
Corridor			34.1800	0.0000	0.0000			(32)
Party Wall			20.6200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

281.9116 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.1800	0.0500	0.1590	
E3 Sill	3.1800	0.0500	0.1590	
E4 Jamb	7.5200	0.0500	0.3760	
E18 Party wall between dwellings	2.3700	0.0600	0.1422	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	5.7300	0.0700	0.4011	
P4 Party wall - Roof (insulation at ceiling level)	23.1200	0.1200	2.7744	
E14 Flat roof	5.7300	0.0800	0.4584	
E25 Staggered party wall between dwellings	2.3700	0.0600	0.1422	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

4.6123 (36)

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 18.3180 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.9005	22.7705	22.6431	22.0445	21.9326	21.4112	21.4112	21.3147	21.6120	21.9326	22.1591	22.3960	(38)
Heat transfer coeff	41.2185	41.0885	40.9611	40.3625	40.2505	39.7292	39.7292	39.6327	39.9300	40.2505	40.4771	40.7139	(39)
Average = Sum(39)m / 12 =													40.3620

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8244	0.8218	0.8192	0.8073	0.8050	0.7946	0.7946	0.7927	0.7986	0.8050	0.8095	0.8143	(40)
HLP (average)													0.8072
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476		(42b)
Hot water usage for other uses													
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383		(42c)
Average daily hot water use (litres/day)													50.1040 (43)
Daily hot water use													
54.6627	53.1639	51.5272	49.4895	47.6720	45.7830	45.3900	47.0234	48.6986	50.6385	52.6942	54.5859		(44)
Energy conte	86.5724	75.7046	79.1954	67.7487	64.1757	56.2956	54.8953	58.2247	60.0502	68.7160	75.0726	85.4684	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													832.1197
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
73.5866	64.3489	67.3161	57.5864	54.5493	47.8512	46.6610	49.4910	51.0427	58.4086	63.8117	72.6481		(64)
Total per year (kWh/year)													707.3017 (64)
Electric shower(s)													
42.0893	37.5019	40.9507	39.0787	39.8120	37.9768	39.2427	39.8120	39.0787	40.9507	40.1807	42.0893		(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													478.7637 (64a)
Heat gains from water heating, kWh/month													
28.9190	25.4627	27.0667	24.1663	23.5903	21.4570	21.4759	22.3258	22.5304	24.8398	25.9981	28.6844		(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	38.8696	37.8910	36.3800	33.5643	31.7074	29.8014	28.8655	30.0077	31.2922	33.3869	36.1085	38.5542	(72)
Total internal gains	316.9754	326.3660	312.1635	303.9022	288.9482	280.0687	269.8857	269.5001	277.3853	284.9257	300.7444	310.1637	(73)

6. Solar gains

[Jan]														
					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W

Southeast					5.9700	36.7938		0.6300		0.7000		0.7700		67.1307 (77)

Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	126.3794	80.4071	57.4499	(83)	
Total gains	384.1061	440.7145	468.6200	497.7593	506.0844	495.6347	477.7143	459.9616	446.7946	411.3050	381.1515	367.6136	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	94.9922	95.2928	95.5893	97.0068	97.2767	98.5532	98.5532	98.7932	98.0575	97.2767	96.7322	96.1695		
alpha	7.3328	7.3529	7.3726	7.4671	7.4851	7.5702	7.5702	7.5862	7.5372	7.4851	7.4488	7.4113		
util living area	0.9938	0.9826	0.9574	0.8733	0.7178	0.5114	0.3658	0.3961	0.6104	0.8898	0.9816	0.9953	(86)	
MIT	20.3689	20.5295	20.7007	20.8892	20.9772	20.9984	20.9999	20.9998	20.9942	20.8913	20.6110	20.3441	(87)	
Th 2	20.2323	20.2345	20.2367	20.2471	20.2490	20.2580	20.2580	20.2597	20.2545	20.2490	20.2451	20.2410	(88)	
util rest of house	0.9918	0.9771	0.9446	0.8421	0.6673	0.4529	0.3042	0.3325	0.5473	0.8553	0.9749	0.9938	(89)	
MIT 2	19.6647	19.8238	19.9895	20.1669	20.2358	20.2574	20.2580	20.2597	20.2520	20.1735	19.9138	19.6476	(90)	
Living area fraction	19.9828	20.1426	20.3108	20.4932	20.5708	20.5922	20.5932	20.5941	20.5873	20.4978	20.2288	19.9623	(92)	
MIT	19.9828	20.1426	20.3108	20.4932	20.5708	20.5922	20.5932	20.5941	20.5873	20.4978	20.2288	19.9623	(93)	
Temperature adjustment												0.0000		
adjusted MIT	19.9828	20.1426	20.3108	20.4932	20.5708	20.5922	20.5932	20.5941	20.5873	20.4978	20.2288	19.9623	(93)	

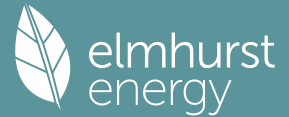
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9910	0.9764	0.9460	0.8529	0.6894	0.4794	0.3320	0.3613	0.5757	0.8676	0.9747	0.9931	(94)	
Useful gains	380.6325	430.3057	443.3211	424.5429	348.9063	237.5825	158.6210	166.1744	257.2334	356.8481	371.5043	365.0627	(95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Heat loss rate W	646.4230	626.2973	565.7052	467.9313	357.0529	238.0637	158.6461	166.2214	259.0391	398.3905	531.4162	641.7446	(97)	
Space heating kWh	197.7481	131.7063	91.0537	31.2397	6.0611	0.0000	0.0000	0.0000	0.0000	30.9075	115.1366	205.8513	(98a)	
Space heating requirement - total per year (kWh/year)												809.7044		
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)												0.0000		
Space heating kWh	197.7481	131.7063	91.0537	31.2397	6.0611	0.0000	0.0000	0.0000	0.0000	30.9075	115.1366	205.8513	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												809.7044		
Space heating per m2										(98c) / (4) =		16.1941	(99)	

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b														
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000		
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9810	0.9945	0.9920	0.0000	0.0000	0.0000	0.0000	(100)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	366.3626	292.3724	298.7838	0.0000	0.0000	0.0000	0.0000	(101)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	543.7112	524.6170	505.5189	0.0000	0.0000	0.0000	0.0000	(102)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	127.6910	172.7900	153.8109	0.0000	0.0000	0.0000	0.0000	(103)	
Cooled fraction													(104)	
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(105)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	31.9227	43.1975	38.4527	0.0000	0.0000	0.0000	0.0000	(106)	
Space cooling requirement													(107)	
Energy for space heating													(108)	
Energy for space cooling													(109)	
Total													(110)	
Fabric Energy Efficiency (TFEE)													(111)	

Full SAP Calculation Printout



Property Reference	Plot 23			Issued on Date	27/08/2025
Assessment Reference	Plot 23	Prop Type Ref			
Property	Flat 23, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	89 B	DER	3.19	TER	11.10
Environmental	98 A	% DER < TER			71.26
CO ₂ Emissions (t/year)	0.14	DFEE	17.65	TFEE	18.47
Compliance Check	See BREL	% DFEE < TFEE			4.39
% DPER < TPER	42.25	DPER	33.86	TPER	58.63
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8700 (17)
Infiltration rate	0.1935 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1912	0.1875	0.1837	0.1650	0.1612	0.1425	0.1425	0.1387	0.1500	0.1612	0.1687	0.1762 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3312	0.3275	0.3237	0.3050	0.3012	0.2825	0.2825	0.2787	0.2900	0.3012	0.3087	0.3162 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 14095.5802 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							281.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081	
E3 Sill	3.1800	0.0260	0.0827	
E4 Jamb	7.5200	0.0300	0.2256	
E18 Party wall between dwellings	2.3700	0.0290	0.0687	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031	
P4 Party wall - Roof (insulation at ceiling level)	23.1200	0.1280	2.9594	
E14 Flat roof	5.7300	0.1600	0.9168	
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.4715 (36)
Point Thermal Bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 16.5453 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.9517	12.8051	12.6584	11.9254	11.7788	11.0458	11.0458	10.8992	11.3390	11.7788	12.0720	12.3652 (38)
Average = Sum(39)m / 12 =	29.4969	29.3503	29.2037	28.4707	28.3241	27.5910	27.5910	27.4444	27.8842	28.3241	28.6173	28.9105 (39)
												28.4340
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5899	0.5870	0.5841	0.5694	0.5665	0.5518	0.5518	0.5489	0.5577	0.5665	0.5723	0.5782 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6901 (42)
Hot water usage for mixer showers												
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Energy content (annual)										Total = Sum(45)m =		1938.9067
Distribution loss (46)m = 0.15 x (45)m												
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage												
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2256.2377 (64)
Electric shower(s)												2256 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050	84.5050 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.9600	94.0629	84.9600	87.7920	84.9600	87.7920	84.9600	84.9600	87.7920	84.9600	87.7920	84.9600 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376 (68)
Pumps, fans	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)												
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	370.3847	378.7858	361.4214	346.2300	327.0665	313.9030	300.6535	302.2603	312.6305	324.9531	347.5434	362.6200 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	5.9700											40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392 (83)
Total gains	410.9777	447.9307	456.0285	463.4528	458.3658	444.2528	426.3246	417.4297	415.0699	401.3730	396.1644	397.3591 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	132.7406	133.4037	134.0734	137.5254	138.2372	141.9099	141.9099	142.6679	140.4176	138.2372	136.8208	135.4332	
alpha	9.8494	9.8936	9.9382	10.1684	10.2158	10.4607	10.4607	10.5112	10.3612	10.2158	10.1214	10.0289	
util living area	0.9676	0.9305	0.8714	0.7336	0.5738	0.3975	0.2848	0.3024	0.4635	0.7254	0.9119	0.9727 (86)	
MIT	20.7963	20.8803	20.9440	20.9903	20.9992	21.0000	21.0000	21.0000	20.9999	20.9926	20.9214	20.7867 (87)	
Th 2	20.4391	20.4417	20.4444	20.4576	20.4603	20.4736	20.4736	20.4762	20.4682	20.4603	20.4550	20.4497 (88)	
util rest of house	0.9597	0.9162	0.8493	0.7035	0.5409	0.3648	0.2507	0.2680	0.4278	0.6905	0.8929	0.9659 (89)	
MIT 2	20.2142	20.3157	20.3894	20.4493	20.4597	20.4735	20.4736	20.4762	20.4682	20.4544	20.3763	20.2123 (90)	
Living area fraction	fLA = Living area / (4) =												0.4518 (91)
MIT	20.4772	20.5708	20.6400	20.6937	20.7034	20.7114	20.7114	20.7129	20.7084	20.6975	20.6226	20.4718 (92)	
Temperature adjustment													0.0000
adjusted MIT	20.4772	20.5708	20.6400	20.6937	20.7034	20.7114	20.7114	20.7129	20.7084	20.6975	20.6226	20.4718 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9603	0.9197	0.8573	0.7168	0.5557	0.3795	0.2661	0.2836	0.4439	0.7060	0.8990	0.9662	(94)
Useful gains	394.6516	411.9806	390.9710	332.1859	254.7294	168.6154	113.4377	118.3639	184.2482	283.3661	356.1651	383.9138	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	477.1771	459.9421	412.9393	335.7757	255.0130	168.6196	113.4378	118.3640	184.2710	286.0036	386.9793	470.4261	(97)
Space heating kWh	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651	(98a)
Space heating requirement - total per year (kWh/year)												201.2829	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												201.2829	
Space heating per m2										(98c) / (4) =		4.0257	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	61.3990	32.2301	16.3444	2.5847	0.2110	0.0000	0.0000	0.0000	0.0000	1.9623	22.1862	64.3651	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
(217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(217)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													201.2829 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400)	121.4388 (230a)
Total electricity for the above, kWh/year	121.4388 (231)
Electricity for lighting (calculated in Appendix L)	124.5474 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1102.8180 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	201.2829	0.1598	32.1715 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			124.7188 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			159.5399 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.1900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	201.2829	1.5916	320.3593 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	655.5490	1.5220	997.7642 (278)
Space and water heating			1318.1235 (279)
Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1692.8710 (286)
Dwelling Primary energy Rate (DPER)			33.8600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

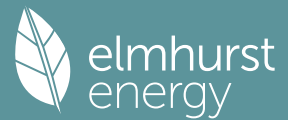
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1688 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4188 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4138	0.4057	0.3976	0.3570	0.3489	0.3083	0.3083	0.3002	0.3246	0.3489	0.3651	0.3813 (22b)
Effective ac	0.5856	0.5823	0.5790	0.5637	0.5609	0.5475	0.5475	0.5451	0.5527	0.5609	0.5667	0.5727 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opening Type			5.9700	1.1450	6.8359			(27)					
External Wall	13.5800	5.9700	7.6100	0.1800	1.3698			(29a)					
External Roof 1	50.0000		50.0000	0.1100	5.5000			(30)					
Total net area of external elements Aum(A, m2)			63.5800					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		13.7057			(33)					
Main dwelling													
Corridor			34.1800	0.0000	0.0000			(32)					
Party Wall			20.6200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							281.9116	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.1800	0.0500		0.1590						
E3 Sill				3.1800	0.0500		0.1590						
E4 Jamb				7.5200	0.0500		0.3760						
E18 Party wall between dwellings				2.3700	0.0600		0.1422						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.1200	0.0000		0.0000						
E7 Party floor between dwellings (in blocks of flats)				5.7300	0.0700		0.4011						
P4 Party wall - Roof (insulation at ceiling level)				23.1200	0.1200		2.7744						
E14 Flat roof				5.7300	0.0800		0.4584						
E25 Staggered party wall between dwellings				2.3700	0.0600		0.1422						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6123	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	18.3180	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.9005	Feb 22.7705	Mar 22.6431	Apr 22.0445	May 21.9326	Jun 21.4112	Jul 21.4112	Aug 21.3147	Sep 21.6120	Oct 21.9326	Nov 22.1591	Dec 22.3960	(38)
Heat transfer coeff	41.2185	41.0885	40.9611	40.3625	40.2505	39.7292	39.7292	39.6327	39.9300	40.2505	40.4771	40.7139	(39)
Average = Sum(39)m / 12 =												40.3620	
HLP	Jan 0.8244	Feb 0.8218	Mar 0.8192	Apr 0.8073	May 0.8050	Jun 0.7946	Jul 0.7946	Aug 0.7927	Sep 0.7986	Oct 0.8050	Nov 0.8095	Dec 0.8143	(40)
HLP (average)												0.8072	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901	(42)
Hot water usage for mixer showers														
52.5569	51.7671	50.6162	48.4141	46.7890	44.9767	43.9465	45.0888	46.3409	48.2867	50.5361	52.3556	52.3556	(42a)	
Hot water usage for baths														
22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	22.6476	(42b)	
Hot water usage for other uses														
31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	31.9383	(42c)	
Average daily hot water use (litres/day)													98.5597	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
107.2197	104.9310	102.1434	97.9036	94.4609	90.7597	89.3366	92.1121	95.0395	98.9252	103.2304	106.9415	106.9415	(44)	
Energy content (annual)	169.8097	149.4203	156.9906	134.0251	127.1626	111.5996	108.0448	114.0541	117.1932	134.2406	147.0706	167.4445	(45)	
Distribution loss (46)m = 0.15 x (45)m														
25.4715	22.4130	23.5486	20.1038	19.0744	16.7399	16.2067	17.1081	17.5790	20.1361	22.0606	25.1167	25.1167	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
216.4047	191.5060	203.5855	179.1170	173.7575	156.6915	154.6398	160.6490	162.2850	180.8355	192.1624	214.0394	214.0394	(62)	
WWHRS	-24.0268	-21.2495	-22.2513	-18.4249	-17.1714	-14.6937	-13.7730	-14.6462	-15.2026	-17.9222	-20.3037	-23.5819	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h														
192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575	190.4575	(64)	
12Total per year (kWh/year)													1962.4258	(64)
Electric shower(s)													1962	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
93.7377	83.3508	89.4753	80.6368	79.5575	73.1803	73.2008	75.1989	75.0402	81.9109	84.9744	92.9512	92.9512	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 84.5050	Feb 84.5050	Mar 84.5050	Apr 84.5050	May 84.5050	Jun 84.5050	Jul 84.5050	Aug 84.5050	Sep 84.5050	Oct 84.5050	Nov 84.5050	Dec 84.5050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	82.5203	91.3618	82.5203	85.2710	82.5203	85.2710	82.5203	82.5203	85.2710	82.5203	85.2710	82.5203	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.2339	148.7618	144.9117	136.7153	126.3689	116.6447	110.1484	108.6205	112.4706	120.6670	131.0134	140.7376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	31.4505	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	125.9915	124.0340	120.2625	111.9956	106.9321	101.6394	98.3882	101.0738	104.2225	110.0953	118.0201	124.9344	(72)
Total internal gains	407.0973	415.5090	399.0460	385.3335	367.1729	351.9066	339.4084	340.5662	350.3157	364.6342	385.6560	399.5439	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	Specific data or Table 6c	FF Table 6d	Access factor Table 6d	Gains W
Southeast	5.9700				36.7938	0.6300		0.7000	0.7700	67.1307 (77)
Solar gains	67.1307	114.3484	156.4565	193.8572	217.1362	215.5660	207.8286	190.4614	169.4093	57.4499 (83)
Total gains	474.2280	529.8575	555.5025	579.1906	584.3091	567.4726	547.2371	531.0276	491.0135	456.9938 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)											
tau	94.9922	95.2928	95.5893	97.0068	97.2767	98.5532	98.5532	98.7932	98.0575	97.2767	96.7322
alpha	7.3328	7.3529	7.3726	7.4671	7.4851	7.5702	7.5702	7.5862	7.5372	7.4851	7.4488
util living area	0.9788	0.9538	0.9079	0.7948	0.6322	0.4475	0.3194	0.3432	0.5280	0.8012	0.9470
MIT	20.5386	20.6785	20.8154	20.9421	20.9899	20.9993	21.0000	20.9999	20.9978	20.9479	20.7497
Th 2	20.2323	20.2345	20.2367	20.2471	20.2490	20.2580	20.2580	20.2597	20.2545	20.2490	20.2451
util rest of house	0.9727	0.9418	0.8861	0.7575	0.5843	0.3959	0.2656	0.2880	0.4720	0.7579	0.9313
MIT 2	19.7161	19.8882	20.0505	20.1961	20.2418	20.2577	20.2580	20.2597	20.2533	20.2059	19.9855
Living area fraction	20.0877	20.2453	20.3961	20.5331	20.5798	20.5928	20.5932	20.5941	20.5897	20.5412	20.3308
MIT	20.0877	20.2453	20.3961	20.5331	20.5798	20.5928	20.5932	20.5941	20.5897	20.5412	20.3308
Temperature adjustment											0.0000
adjusted MIT	20.0877	20.2453	20.3961	20.5331	20.5798	20.5928	20.5932	20.5941	20.5897	20.5412	20.3308

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9713	0.9420	0.8910	0.7721	0.6056	0.4192	0.2899	0.3130	0.4973	0.7754	0.9333	0.9762 (94)
Useful gains	460.6159	499.1229	494.9559	447.2209	353.8568	237.8953	158.6381	166.2073	258.4455	380.7105	434.9769	446.1166 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	650.7444	630.5143	569.1987	469.5425	357.4153	238.0881	158.6477	166.2243	259.1322	400.1367	535.5434	645.9584 (97)
Space heating kWh	141.4556	88.2950	55.2367	16.0715	2.6475	0.0000	0.0000	0.0000	0.0000	14.4531	72.4079	148.6823 (98a)
Space heating requirement - total per year (kWh/year)												539.2496
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	141.4556	88.2950	55.2367	16.0715	2.6475	0.0000	0.0000	0.0000	0.0000	14.4531	72.4079	148.6823 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												539.2496
Space heating per m2										(98c) / (4) =		10.7850 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	141.4556	88.2950	55.2367	16.0715	2.6475	0.0000	0.0000	0.0000	0.0000	14.4531	72.4079	148.6823 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	153.2563	95.6609	59.8447	17.4123	2.8684	0.0000	0.0000	0.0000	0.0000	15.6588	78.4484	161.0859 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.3778	170.2565	181.3342	160.6920	156.5861	141.9978	140.8668	146.0028	147.0824	162.9133	171.8587	190.4575 (64)
Efficiency of water heater	83.3809	82.6610	81.7342	80.5422	79.9347	79.8000	79.8000	79.8000	79.8000	80.4645	82.2717	79.8000 (216)
Fuel for water heating, kWh/month	230.7218	205.9695	221.8584	199.5128	195.8925	177.9421	176.5248	182.9609	184.3137	202.4659	208.8915	228.0637 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1461	13.7552	12.3851	9.0738	7.0089	5.7263	6.3937	8.3108	10.7949	14.1635	15.9977	17.6226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.2425	-25.2134	-37.5810	-43.8822	-48.7584	-46.0692	-45.5459	-42.3124	-36.8084	-29.5951	-19.2897	-14.8063 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.1608	-15.3040	-30.8588	-46.9850	-62.7306	-63.2197	-62.4355	-52.5506	-38.1347	-22.0495	-9.6163	-5.6417 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												584.2357	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2415.1178	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												138.3788	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-823.7918	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2399.9406	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	584.2357	0.2100	122.6895 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2415.1178	0.2100	507.1747 (264)
Space and water heating			629.8642 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.3788	0.1443	19.9723 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	0.1338	-54.4705
PV Unit electricity exported	-416.6872	0.1255	-52.2993
Total			-106.7697 (269)
Total CO2, kg/year			554.9961 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	584.2357	1.1300	660.1864 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2415.1178	1.1300	2729.0831 (278)
Space and water heating			3389.2695 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.3788	1.5338	212.2501 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.1046	1.4945	-608.4000
PV Unit electricity exported	-416.6872	0.4607	-191.9673
Total			-800.3673 (283)
Total Primary energy kWh/year			2931.2530 (286)
Target Primary Energy Rate (TPER)			58.6300 (287)

Full SAP Calculation Printout



Property Reference	Plot 23	Issued on Date	27/08/2025
Assessment Reference	Plot 23	Prop Type Ref	
Property	Flat 23, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD		
SAP Rating	89 B	DER	3.19
Environmental	98 A	% DER < TER	11.10
CO ₂ Emissions (t/year)	0.14	DFEE	17.65
Compliance Check	See BREL	% DFEE < TFEE	4.39
% DPER < TPER	42.25	DPER	33.86
Assessor Details	Daniel Smith	Assessor ID	CJ06-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.8700	(17)
Infiltration rate	0.1935	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1912	0.1875	0.1837	0.1650	0.1612	0.1425	0.1425	0.1387	0.1500	0.1612	0.1687	0.1762 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3312	0.3275	0.3237	0.3050	0.3012	0.2825	0.2825	0.2787	0.2900	0.3012	0.3087	0.3162 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements A _{um} (A, m ²)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 14095.5802 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							281.9116 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	2.3700	0.0290	0.0687
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031
P4 Party wall - Roof (insulation at ceiling level)	23.1200	0.1280	2.9594
E14 Flat roof	5.7300	0.1600	0.9168
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.4715 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	16.5453 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	12.9517	12.8051	12.6584	11.9254	11.7788	11.0458	11.0458	10.8992	11.3390	11.7788	12.0720	12.3652 (38)
Average = Sum(39)m / 12 =	29.4969	29.3503	29.2037	28.4707	28.3241	27.5910	27.5910	27.4444	27.8842	28.3241	28.6173	28.9105 (39)
												28.4340
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5899	0.5870	0.5841	0.5694	0.5665	0.5518	0.5518	0.5489	0.5577	0.5665	0.5723	0.5782 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6901 (42)											
Hot water usage for mixer showers	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889 (42a)
Hot water usage for baths	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476 (42b)
Hot water usage for other uses	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383 (42c)
Average daily hot water use (litres/day)												116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748 (44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856 (45)
Distribution loss (46)m = 0.15 x (45)m	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040 (71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708 (72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
Southeast	5.9700	36.7938	0.2400	0.0000	0.7700	40.5930 (77)
Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784
						125.6711
						434.4725
						115.1694
						102.4395
						76.4199
						48.6211
						34.7392 (83)
						432.1198 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	132.7406	133.4037	134.0734	137.5254	138.2372	141.9099	141.9099	142.6679	140.4176	138.2372	136.8208	135.4332
alpha	9.8494	9.8936	9.9382	10.1684	10.2158	10.4607	10.4607	10.5112	10.3612	10.2158	10.1214	10.0289
util living area	0.9444	0.9057	0.8329	0.7039	0.5538	0.3904	0.2794	0.2958	0.4511	0.6915	0.8806	0.9528 (86)
MIT	20.8517	20.9093	20.9625	20.9932	20.9994	21.0000	21.0000	21.0000	20.9999	20.9951	20.9440	20.8409 (87)
Th 2	20.4391	20.4417	20.4444	20.4576	20.4603	20.4736	20.4736	20.4762	20.4682	20.4603	20.4550	20.4497 (88)
util rest of house	0.9325	0.8887	0.8086	0.6743	0.5219	0.3583	0.2460	0.2621	0.4164	0.6574	0.8585	0.9424 (89)
MIT 2	20.2797	20.3481	20.4084	20.4519	20.4598	20.4735	20.4736	20.4762	20.4682	20.4564	20.4004	20.2770 (90)
Living area fraction	fLA = Living area / (4) =											0.4518 (91)
MIT	20.5381	20.6017	20.6587	20.6964	20.7036	20.7114	20.7114	20.7129	20.7084	20.6998	20.6460	20.5318 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5381	20.6017	20.6587	20.6964	20.7036	20.7114	20.7114	20.7129	20.7084	20.6998	20.6460	20.5318 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9347	0.8938	0.8182	0.6874	0.5363	0.3728	0.2611	0.2773	0.4321	0.6727	0.8665	0.9441 (94)
Useful gains	419.1835	424.6172	398.8418	333.3463	254.8135	168.6161	113.4378	118.3639	184.2538	284.3323	365.8381	407.9605 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	478.9742	460.8483	413.4869	335.8526	255.0186	168.6196	113.4378	118.3640	184.2713	286.0673	387.6498	472.1601 (97)
Space heating kWh	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645 (98a)
Space heating requirement - total per year (kWh/year)												146.4445
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												146.4445
Space heating per m2										(98c) / (4) =		2.9289 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2													(213)
Water heating													
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(221)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(222)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													146.4445 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													344.1753
Water heating fuel used													655.5490 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													121.4388 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	121.4388	(231)
Electricity for lighting (calculated in Appendix L)	124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1047.9796	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	146.4445	16.4900	24.1487 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	655.5490	16.4900	108.1000 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253 (249)
Energy for lighting	124.5474	16.4900	20.5379 (250)
Additional standing charges			0.0000 (251)
Total energy cost			172.8118 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.6549 (257)
SAP value		89.3846
SAP rating (Section 12)		89 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	146.4445	0.1600	23.4243 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	655.5490	0.1412	92.5472 (264)
Space and water heating			115.9716 (265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451 (267)
Energy for lighting	124.5474	0.1443	17.9760 (268)
Total CO2, kg/year			150.7927 (272)
CO2 emissions per m2			3.0200 (273)
EI value			97.8730
EI rating			98 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0000	2.3700	118.5000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8700 (17)
Infiltration rate	0.1935 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.1500 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1612	0.1575	0.1612	0.1462	0.1500	0.1275	0.1237	0.1237	0.1275	0.1425	0.1425	0.1462	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3012	0.2975	0.3012	0.2862	0.2900	0.2675	0.2637	0.2637	0.2675	0.2825	0.2825	0.2862	(25)

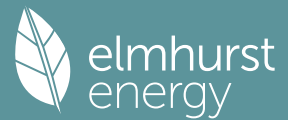
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			5.9700	0.7752	4.6279			(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000	(29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000	(30)
Total net area of external elements Aum(A, m2)			63.5800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		12.0738			(33)
Main dwelling								
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001	(32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002	(32)
Party Floor 1			50.0000			40.0000	2000.0000	(32d)
Internal Wall 1			71.1200			9.0000	640.0800	(32c)
Heat capacity Cm = Sum(A x k)								(28) ... (30) + (32) + (32a) ... (32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								14095.5802 (34)
List of Thermal Bridges								281.9116 (35)
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				3.1800	0.0340		0.1081	
E3 Sill				3.1800	0.0260		0.0827	
E4 Jamb				7.5200	0.0300		0.2256	
E18 Party wall between dwellings				2.3700	0.0290		0.0687	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				23.1200	0.0000		0.0000	
E7 Party floor between dwellings (in blocks of flats)				5.7300	-0.0180		-0.1031	
P4 Party wall - Roof (insulation at ceiling level)				23.1200	0.1280		2.9594	
E14 Flat roof				5.7300	0.1600		0.9168	
E25 Staggered party wall between dwellings				2.3700	0.0900		0.2133	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.4715	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	16.5453	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy content (annual)	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
-----						-----				-----		
Southeast					5.9700	32.4665		0.2400	0.0000	0.7700		35.8189 (77)
-----						-----				-----		
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	138.2372	138.9564	138.2372	141.1598	140.4176	144.9916	145.7830	145.7830	144.9916	141.9099	141.9099	141.1598	(85)
alpha	10.2158	10.2638	10.2158	10.4107	10.3612	10.6661	10.7189	10.7189	10.6661	10.4607	10.4607	10.4107	
util living area	0.9175	0.8687	0.7906	0.6437	0.4890	0.3258	0.2390	0.2562	0.4080	0.6412	0.8384	0.9282	(86)
MIT	20.9067	20.9480	20.9794	20.9975	20.9998	21.0000	21.0000	21.0000	21.0000	20.9979	20.9696	20.8983	(87)
Th 2	20.4603	20.4629	20.4603	20.4709	20.4682	20.4842	20.4869	20.4869	20.4842	20.4736	20.4736	20.4709	(88)
util rest of house	0.9017	0.8481	0.7644	0.6141	0.4573	0.2947	0.2067	0.2234	0.3752	0.6076	0.8128	0.9140	(89)
MIT 2	20.3634	20.4113	20.4413	20.4689	20.4681	20.4842	20.4869	20.4869	20.4842	20.4720	20.4452	20.3640	(90)
Living area fraction	0.9017	0.8481	0.7644	0.6141	0.4573	0.2947	0.2067	0.2234	0.3752	0.6076	0.8128	0.9140	(91)
MIT	20.6088	20.6538	20.6844	20.7077	20.7084	20.7172	20.7187	20.7187	20.7172	20.7096	20.6822	20.6054	(92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(93)
adjusted MIT	20.6088	20.6538	20.6844	20.7077	20.7084	20.7172	20.7187	20.7187	20.7172	20.7096	20.6822	20.6054	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9062	0.8556	0.7755	0.6274	0.4716	0.3087	0.2213	0.2382	0.3900	0.6227	0.8232	0.9178	(94)
Useful gains	402.0714	400.8876	374.0293	301.6463	220.4702	138.1888	94.5055	99.8771	165.1891	261.6618	343.8060	394.9992	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	439.2736	421.3604	381.9327	302.5534	220.5187	138.1892	94.5055	99.8771	165.1935	262.3799	355.4320	435.6310	(97)
Space heating kWh	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(98a)
Space heating requirement - total per year (kWh/year)												87.1405	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												87.1405	
Space heating per m2										(98c) / (4) =		1.7428	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)

Page 7 of 15

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact

Total Savings £0 0.00 kg/m²
Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£281	£281	£0
Space heating	£59	£59	£0
Water heating	£186	£186	£0
Lighting	£35	£35	£0
Total cost of fuels	£281	£281	£0
Total cost of uses	£280	£280	£0
Delivered energy	20 kWh/m²	20 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	30 kWh/m²	30 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000		118.5000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.5000 (5)

2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.8700 (17)
Infiltration rate	0.1935 (18)
Number of sides sheltered	3 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1912	0.1875	0.1837	0.1650	0.1612	0.1425	0.1425	0.1387	0.1500	0.1612	0.1687	0.1762 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3312	0.3275	0.3237	0.3050	0.3012	0.2825	0.2825	0.2787	0.2900	0.3012	0.3087	0.3162 (25)

3. Heat losses and heat loss parameter

Element	Gross m²	Openings m²	NetArea m²	U-value W/m²K	A x U W/K	K-value kJ/m²K	A x K kJ/K
Main dwelling							

Full SAP Calculation Printout



Window				5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700		7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
External Roof 1	50.0000			50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m2)				63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		12.0738		(33)
Main dwelling								
Corridor				34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall				20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1				50.0000			40.0000	2000.0000 (32d)
Internal Wall 1				71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) =	14095.5802 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K									281.9116 (35)
List of Thermal Bridges									
K1 Element					Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)					3.1800	0.0340	0.1081		
E3 Sill					3.1800	0.0260	0.0827		
E4 Jamb					7.5200	0.0300	0.2256		
E18 Party wall between dwellings					2.3700	0.0290	0.0687		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					23.1200	0.0000	0.0000		
E7 Party floor between dwellings (in blocks of flats)					5.7300	-0.0180	-0.1031		
P4 Party wall - Roof (insulation at ceiling level)					23.1200	0.1280	2.9594		
E14 Flat roof					5.7300	0.1600	0.9168		
E25 Staggered party wall between dwellings					2.3700	0.0900	0.2133		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.4715 (36)	
Point Thermal bridges								(36a) =	0.0000
Total fabric heat loss								(33) + (36) + (36a) =	16.5453 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	12.9517	12.8051	12.6584	11.9254	11.7788	11.0458	11.0458	10.8992	11.3390	11.7788	12.0720	12.3652	(38)
Average = Sum(39)m / 12 =	29.4969	29.3503	29.2037	28.4707	28.3241	27.5910	27.5910	27.4444	27.8842	28.3241	28.6173	28.9105	(39)
												28.4340	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.5899	0.5870	0.5841	0.5694	0.5665	0.5518	0.5518	0.5489	0.5577	0.5665	0.5723	0.5782	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6901 (42)
Hot water usage for mixer showers													
	72.2658	71.1798	69.5972	66.5693	64.3348	61.8429	60.4265	61.9971	63.7187	66.3942	69.4872	71.9889	(42a)
Hot water usage for baths													
	22.7244	22.3869	21.9117	21.0354	20.3792	19.6517	19.2587	19.7306	20.2445	21.0230	21.9173	22.6476	(42b)
Hot water usage for other uses													
	31.9383	30.7769	29.6155	28.4541	27.2927	26.1314	26.1314	27.2927	28.4541	29.6155	30.7769	31.9383	(42c)
Average daily hot water use (litres/day)													116.7306 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	126.9285	124.3436	121.1244	116.0589	112.0068	107.6259	105.8165	109.0204	112.4173	117.0328	122.1814	126.5748	(44)
Energy conte	201.0237	177.0637	186.1637	158.8788	150.7827	132.3386	127.9759	134.9900	138.6218	158.8123	174.0698	198.1856	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	30.1536	26.5595	27.9246	23.8318	22.6174	19.8508	19.1964	20.2485	20.7933	23.8219	26.1105	29.7278	(46)
Water storage loss:													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)													
	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains													
	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
-----					5.9700	36.7938	0.2400		0.0000		0.7700		40.5930 (77)

Solar gains	40.5930	69.1449	94.6071	117.2228	131.2993	130.3498	125.6711	115.1694	102.4395	76.4199	48.6211	34.7392	(83)
Total gains	448.4481	475.0794	487.4594	484.9208	475.1355	452.2784	434.4725	426.7964	426.4253	422.6912	422.1810	432.1198	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	132.7406	133.4037	134.0734	137.5254	138.2372	141.9099	141.9099	142.6679	140.4176	138.2372	136.8208	135.4332
alpha	9.8494	9.8936	9.9382	10.1684	10.2158	10.4607	10.4607	10.5112	10.3612	10.2158	10.1214	10.0289
util living area	0.9444	0.9057	0.8329	0.7039	0.5538	0.3904	0.2794	0.2958	0.4511	0.6915	0.8806	0.9528 (86)
MIT	20.8517	20.9093	20.9625	20.9932	20.9994	21.0000	21.0000	21.0000	20.9999	20.9951	20.9440	20.8409 (87)
Th 2	20.4391	20.4417	20.4444	20.4576	20.4603	20.4736	20.4736	20.4762	20.4682	20.4603	20.4550	20.4497 (88)
util rest of house	0.9325	0.8887	0.8086	0.6743	0.5219	0.3583	0.2460	0.2621	0.4164	0.6574	0.8585	0.9424 (89)
MIT 2	20.2797	20.3481	20.4084	20.4519	20.4598	20.4735	20.4736	20.4762	20.4682	20.4564	20.4004	20.2770 (90)
Living area fraction	20.5381	20.6017	20.6587	20.6964	20.7036	20.7114	20.7114	20.7129	20.7084	20.6998	20.6460	20.5318 (91)
MIT	20.5381	20.6017	20.6587	20.6964	20.7036	20.7114	20.7114	20.7129	20.7084	20.6998	20.6460	20.5318 (92)
Temperature adjustment	20.5381	20.6017	20.6587	20.6964	20.7036	20.7114	20.7114	20.7129	20.7084	20.6998	20.6460	0.0000
adjusted MIT	20.5381	20.6017	20.6587	20.6964	20.7036	20.7114	20.7114	20.7129	20.7084	20.6998	20.6460	20.5318 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9347	0.8938	0.8182	0.6874	0.5363	0.3728	0.2611	0.2773	0.4321	0.6727	0.8665	0.9441 (94)
Useful gains	419.1835	424.6172	398.8418	333.3463	254.8135	168.6161	113.4378	118.3639	184.2538	284.3323	365.8381	407.9605 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	478.9742	460.8483	413.4869	335.8526	255.0186	168.6196	113.4378	118.3640	184.2713	286.0673	387.6498	472.1601 (97)
Space heating kWh	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645 (98a)
Space heating requirement - total per year (kWh/year)												146.4445
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												146.4445
Space heating per m2										(98c) / (4) =		2.9289 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	44.4842	24.3473	10.8959	1.8045	0.1526	0.0000	0.0000	0.0000	0.0000	1.2909	15.7045	47.7645 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Efficiency of water heater	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753 (216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140 (231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													146.4445	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													344.1753	
Water heating fuel used													655.5490	(219)
Space cooling fuel													0.0000	(221)

Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													121.4388	(230a)
Total electricity for the above, kWh/year													121.4388	(231)
Electricity for lighting (calculated in Appendix L)													124.5474	(232)

Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1047.9796	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	146.4445	16.4900	24.1487	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	16.4900	108.1000	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	16.4900	20.0253	(249)
Energy for lighting	124.5474	16.4900	20.5379	(250)
Additional standing charges			0.0000	(251)
Total energy cost			172.8118	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.6549	(257)
SAP value		89.3846	
SAP rating (Section 12)		89	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	146.4445	0.1600	23.4243	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			115.9716	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			150.7927	(272)
CO2 emissions per m2			3.0200	(273)
EI value			97.8730	
EI rating			98	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	50.0000 (1b)	2.3700 (2b)	118.5000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.5000 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

Full SAP Calculation Printout



Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.8700 (17)
Infiltration rate 0.1935 (18)
Number of sides sheltered 3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate												
	0.1612	0.1575	0.1612	0.1462	0.1500	0.1275	0.1237	0.1237	0.1275	0.1425	0.1425	0.1462
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3012	0.2975	0.3012	0.2862	0.2900	0.2675	0.2637	0.2637	0.2675	0.2825	0.2825	0.2862

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.9700	0.7752	4.6279		(27)
External Wall	13.5800	5.9700	7.6100	0.1900	1.4459	150.0000	1141.5000 (29a)
External Roof 1	50.0000		50.0000	0.1200	6.0000	9.0000	450.0000 (30)
Total net area of external elements Aum(A, m2)			63.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.0738		(33)
Main dwelling							
Corridor			34.1800	0.0000	0.0000	180.0000	6152.4001 (32)
Party Wall			20.6200	0.0000	0.0000	180.0000	3711.6002 (32)
Party Floor 1			50.0000			40.0000	2000.0000 (32d)
Internal Wall 1			71.1200			9.0000	640.0800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 14095.5802 (34)
List of Thermal Bridges 281.9116 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.1800	0.0340	0.1081
E3 Sill	3.1800	0.0260	0.0827
E4 Jamb	7.5200	0.0300	0.2256
E18 Party wall between dwellings	2.3700	0.0290	0.0687
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	23.1200	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	5.7300	-0.0180	-0.1031
P4 Party wall - Roof (insulation at ceiling level)	23.1200	0.1280	2.9594
E14 Flat roof	5.7300	0.1600	0.9168
E25 Staggered party wall between dwellings	2.3700	0.0900	0.2133

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.4715 (36)
Point Thermal bridges 0.0000
Total fabric heat loss (33) + (36) + (36a) = 16.5453 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 11.7788 Feb 11.6322 Mar 11.7788 Apr 11.1924 May 11.3390 Jun 10.4593 Jul 10.3127 Aug 10.3127 Sep 10.4593 Oct 11.0458 Nov 11.0458 Dec 11.1924 (38)
Heat transfer coeff 28.3241 28.1775 28.3241 27.7376 27.8842 27.0046 26.8580 26.8580 27.0046 27.5910 27.5910 27.7376 (39)
Average = Sum(39)m / 12 = 27.5910

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.5665	0.5635	0.5665	0.5548	0.5577	0.5401	0.5372	0.5372	0.5401	0.5518	0.5518	0.5548
HLP (average)												0.5518
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6901 (42)
Hot water usage for mixer showers 72.2658 71.1798 69.5972 66.5693 64.3348 61.8429 60.4265 61.9971 63.7187 66.3942 69.4872 71.9889 (42a)
Hot water usage for baths 22.7244 22.3869 21.9117 21.0354 20.3792 19.6517 19.2587 19.7306 20.2445 21.0230 21.9173 22.6476 (42b)
Hot water usage for other uses 31.9383 30.7769 29.6155 28.4541 27.2927 26.1314 26.1314 27.2927 28.4541 29.6155 30.7769 31.9383 (42c)
Average daily hot water use (litres/day) 116.7306 (43)
Daily hot water use Jan 126.9285 Feb 124.3436 Mar 121.1244 Apr 116.0589 May 112.0068 Jun 107.6259 Jul 105.8165 Aug 109.0204 Sep 112.4173 Oct 117.0328 Nov 122.1814 Dec 126.5748 (44)
Energy conte 201.0237 177.0637 186.1637 158.8788 150.7827 132.3386 127.9759 134.9900 138.6218 158.8123 174.0698 198.1856 (45)
Energy content (annual) Total = Sum(45)m = 1938.9067
Distribution loss (46)m = 0.15 x (45)m 30.1536 26.5595 27.9246 23.8318 22.6174 19.8508 19.1964 20.2485 20.7933 23.8219 26.1105 29.7278 (46)
Water storage loss: 201.0000 (47)
Store volume 1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)
Enter (49) or (54) in (55) 0.8694 (55)
Total storage loss 26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (56)
If cylinder contains dedicated solar storage 26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Total heat required for water heating calculated for each month

Full SAP Calculation Printout



WWHRS	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	66.8404	58.8737	61.8994	52.8272	50.1352	44.0026	42.5520	44.8842	46.0917	52.8051	57.8782	65.8967 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66m)	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	101.4061	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.6310	15.6597	12.7353	9.6414	7.2071	6.0845	6.5745	8.5458	11.4702	14.5641	16.9984	18.1210	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.7522	222.0325	216.2861	204.0527	188.6103	174.0966	164.4006	162.1202	167.8666	180.1000	195.5424	210.0561	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	46.8307	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	-67.6040	(71)
Water heating gains (Table 5)	89.8392	87.6096	83.1982	73.3711	67.3861	61.1147	57.1935	60.3282	64.0163	70.9746	80.3864	88.5708	(72)
Total internal gains	407.8551	405.9345	392.8523	367.6980	343.8362	321.9286	308.8014	311.6270	323.9858	346.2714	373.5600	397.3807	(73)

6. Solar gains

[Jan]														
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.9700				32.4665		0.2400		0.0000		0.7700		35.8189 (77)	
Solar gains	35.8189	62.5870	89.4795	113.1202	123.6245	125.6617	118.2266	107.6706	99.5624	73.9251	44.0898	33.0020 (83)		
Total gains	443.6740	468.5215	482.3318	480.8182	467.4607	447.5903	427.0280	419.2976	423.5482	420.1964	417.6497	430.3826 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	138.2372	138.9564	138.2372	141.1598	140.4176	144.9916	145.7830	145.7830	144.9916	141.9099	141.9099	141.1598	
alpha	10.2158	10.2638	10.2158	10.4107	10.3612	10.6661	10.7189	10.7189	10.6661	10.4607	10.4607	10.4107	
util living area	0.9175	0.8687	0.7906	0.6437	0.4890	0.3258	0.2390	0.2562	0.4080	0.6412	0.8384	0.9282	(86)
MIT	20.9067	20.9480	20.9794	20.9975	20.9998	21.0000	21.0000	21.0000	21.0000	20.9979	20.9696	20.8983	(87)
Th 2	20.4603	20.4629	20.4603	20.4709	20.4682	20.4842	20.4869	20.4869	20.4842	20.4736	20.4736	20.4709	(88)
util rest of house	0.9017	0.8481	0.7644	0.6141	0.4573	0.2947	0.2067	0.2234	0.3752	0.6076	0.8128	0.9140	(89)
MIT 2	20.3634	20.4113	20.4413	20.4689	20.4681	20.4842	20.4869	20.4869	20.4842	20.4720	20.4452	20.3640	(90)
Living area fraction									fLA = Living area / (4) =			0.4518	(91)
MIT	20.6088	20.6538	20.6844	20.7077	20.7084	20.7172	20.7187	20.7187	20.7172	20.7096	20.6822	20.6054	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.6088	20.6538	20.6844	20.7077	20.7084	20.7172	20.7187	20.7187	20.7172	20.7096	20.6822	20.6054	(93)

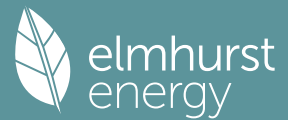
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	402.0714	400.8876	374.0293	301.6463	220.4702	138.1888	94.5055	99.8771	165.1891	261.6618	343.8060	394.9992	(95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(96)
Heat loss rate W	439.2736	421.3604	381.9327	302.5534	220.5187	138.1892	94.5055	99.8771	165.1935	262.3799	355.4320	435.6310	(97)
Space heating kWh	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(98a)
Space heating requirement - total per year (kWh/year)												87.1405	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												87.1405	
Space heating per m2										(98c) / (4) =		1.7428	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	27.6784	13.7577	5.8801	0.6532	0.0361	0.0000	0.0000	0.0000	0.0000	0.5342	8.3707	30.2301	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	227.9751	201.4069	213.1151	184.9608	177.7341	158.4206	154.9273	161.9414	164.7038	185.7637	200.1518	225.1370	(64)
Efficiency of water heater (217)m	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	344.1753	(216)
Fuel for water heating, kWh/month	66.2381	58.5187	61.9205	53.7403	51.6406	46.0291	45.0141	47.0520	47.8546	53.9736	58.1540	65.4135	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.3140	9.3159	10.3140	9.9813	10.3140	9.9813	10.3140	10.3140	9.9813	10.3140	9.9813	10.3140	(231)
Lighting	15.4323	12.3803	11.1471	8.1669	6.3083	5.1540	5.7547	7.4801	9.7159	12.7478	14.3987	15.8612	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												87.1405	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1753	
Water heating fuel used												655.5490	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												121.4388	(230a)
Total electricity for the above, kWh/year												121.4388	(231)
Electricity for lighting (calculated in Appendix L)												124.5474	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												988.6756	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	87.1405	28.4300	24.7741	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	28.4300	186.3726	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	121.4388	28.4300	34.5250	(249)
Energy for lighting	124.5474	28.4300	35.4088	(250)
Additional standing charges			0.0000	(251)
Total energy cost			281.0805	(255)

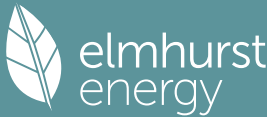
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	87.1405	0.1604	13.9748	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	655.5490	0.1412	92.5472	(264)
Space and water heating			106.5220	(265)
Pumps, fans and electric keep-hot	121.4388	0.1387	16.8451	(267)
Energy for lighting	124.5474	0.1443	17.9760	(268)
Total CO2, kg/year			141.3431	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	87.1405	1.5936	138.8640	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	655.5490	1.5220	997.7642	(278)
Space and water heating			1136.6282	(279)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	121.4388	1.5128	183.7126 (281)
Energy for lighting	124.5474	1.5338	191.0349 (282)
Total Primary energy kWh/year			1511.3757 (286)

Full SAP Calculation Printout



Property Reference	Plot 24			Issued on Date	27/08/2025	
Assessment Reference	Plot 24		Prop Type Ref			
Property	Flat 24, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	87 B	DER	3.59	TER	10.76	
Environmental	97 A	% DER < TER				66.64
CO ₂ Emissions (t/year)	0.19	DFEE	21.79	TFEE	22.86	
Compliance Check	See BREL	% DFEE < TFEE				4.70
% DPER < TPER	33.24	DPER	37.76	TPER	56.57	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7000	(17)
Infiltration rate	0.1850	(18)
Number of sides sheltered	2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1573 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2005	0.1966	0.1926	0.1730	0.1690	0.1494	0.1494	0.1455	0.1573	0.1690	0.1769	0.1848 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3405	0.3366	0.3326	0.3130	0.3090	0.2894	0.2894	0.2855	0.2973	0.3090	0.3169	0.3248 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements A _{um} (A, m ²)			98.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.4438		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15547.8796 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							250.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	16.5106	16.3200	16.1294	15.1762	14.9856	14.0325	14.0325	13.8418	14.4137	14.9856	15.3668	15.7481 (38)
Heat transfer coeff	41.2467	41.0561	40.8654	39.9123	39.7217	38.7685	38.7685	38.5779	39.1498	39.7217	40.1029	40.4842 (39)
Average = Sum(39)m / 12 =												39.8646
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.6653	0.6622	0.6591	0.6437	0.6407	0.6253	0.6253	0.6222	0.6314	0.6407	0.6468	0.6530 (40)
HLP (average)												0.6430
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
12Total per year (kWh/year)												2471.2368 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	430.7076	440.7252	420.5228	403.0119	380.5447	365.1370	349.6164	351.2521	363.3156	377.6397	403.9136	421.4465 (73)

[Jan]					Area m2	Solar flux Table 6a		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
					8.6000	36.7938		0.2400	0.0000	0.7700		58.4757 (77)
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	489.1834	540.3310	556.8078	571.8755	569.6861	552.9106	530.6502	517.1578	510.8834	487.7253	473.9540	471.4895 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	104.7079	105.1941	105.6848	108.2086	108.7279	111.4011	111.4011	111.9515	110.3162	108.7279	107.6943	106.6801	21.0000 (85)
alpha	7.9805	8.0129	8.0457	8.2139	8.2485	8.4267	8.4267	8.4634	8.3544	8.2485	8.1796	8.1120	
util living area	0.9802	0.9567	0.9150	0.8030	0.6419	0.4485	0.3214	0.3431	0.5275	0.8050	0.9487	0.9837	(86)
MIT	20.6041	20.7273	20.8427	20.9549	20.9929	20.9997	21.0000	21.0000	20.9988	20.9611	20.7954	20.5899	(87)
Th 2	20.3716	20.3743	20.3771	20.3908	20.3935	20.4073	20.4073	20.4100	20.4018	20.3935	20.3880	20.3826	(88)
util rest of house													
	0.9752	0.9468	0.8974	0.7721	0.6023	0.4071	0.2782	0.2991	0.4823	0.7691	0.9357	0.9795	(89)
MIT 2	19.9206	20.0739	20.2133	20.3492	20.3881	20.4071	20.4073	20.4100	20.4011	20.3596	20.1702	19.9123	(90)
Living area fraction									fLA = Living area / (4) =				0.3531 (91)
MIT	20.1619	20.3046	20.4355	20.5631	20.6017	20.6163	20.6165	20.6183	20.6121	20.5720	20.3909	20.1515	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1619	20.3046	20.4355	20.5631	20.6017	20.6163	20.6165	20.6183	20.6121	20.5720	20.3909	20.1515	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9732	0.9456	0.8992	0.7811	0.6160	0.4217	0.2934	0.3147	0.4983	0.7800	0.9357	0.9777	(94)
Useful gains	476.0976	510.9209	500.6765	446.7097	350.9333	233.1509	155.7119	162.7276	254.5632	380.4443	443.4907	460.9725	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	654.2507	632.4511	569.4812	465.4997	353.5894	233.2445	155.7155	162.7339	254.9477	396.1032	533.0051	645.7838	(97)
Space heating kWh	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(98a)
Space heating requirement - total per year (kWh/year)												494.5100	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												494.5100	
Space heating per m2										(98c) / (4) =		7.9760	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												494.5100	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 150.5841 (230a)
 Total electricity for the above, kWh/year 150.5841 (231)
 Electricity for lighting (calculated in Appendix L) 145.1281 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 1516.8932 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	494.5100	0.1586	78.4284 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			181.0418 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			222.8762 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	494.5100	1.5871	784.8257 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1890.9352 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			2341.3411 (286)
Dwelling Primary energy Rate (DPER)			37.7600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1361 (8)
 Pressure test
 Pressure Test Method
 Measured/design AP50
 Infiltration rate
 Number of sides sheltered
 Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3282 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4184	0.4102	0.4020	0.3610	0.3528	0.3118	0.3118	0.3036	0.3282	0.3528	0.3692	0.3856 (22b)
Effective ac	0.5875	0.5841	0.5808	0.5652	0.5622	0.5486	0.5486	0.5461	0.5539	0.5622	0.5682	0.5744 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
TER Opening Type			8.6000	1.1450	9.8473		(27)
External Wall	36.6900	8.6000	28.0900	0.1800	5.0562		(29a)
External Roof 1	62.0000		62.0000	0.1100	6.8200		(30)
Total net area of external elements A _{um} (A, m ²)			98.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		21.7235		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000		(32)
Party Wall			18.3200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = C_m / TFA) in kJ/m²K

250.7723 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	4.7700	0.0500	0.2385
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385
E3 Sill	10.8200	0.0500	0.5410
E4 Jamb	4.7400	0.0600	0.2844
E18 Party wall between dwellings	17.4200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.4800	0.0700	1.0836
E7 Party floor between dwellings (in blocks of flats)	15.4800	0.0800	1.2384
E14 Flat roof	17.4200	0.1200	2.0904
P4 Party wall - Roof (insulation at ceiling level)	2.3700	0.0900	0.2133
E16 Corner (normal)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

5.9281 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 27.6516 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	28.4904	28.3255	28.1639	27.4050	27.2630	26.6019	26.6019	26.4795	26.8566	27.2630	27.5502	27.8505 (38)
Average = Sum(39)m / 12 =	56.1420	55.9771	55.8156	55.0566	54.9146	54.2536	54.2536	54.1312	54.5082	54.9146	55.2019	55.5022 (39)
												55.0559
HLP	0.9055	0.9029	0.9003	0.8880	0.8857	0.8751	0.8751	0.8731	0.8792	0.8857	0.8904	0.8952 (40)
HLP (average)												0.8880
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers	58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594	(42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)													109.4892 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.1099	116.5670	113.4700	108.7601	104.9355	100.8238	99.2431	102.3267	105.5789	109.8956	114.6781	118.8009	(44)
Energy content (annual)	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135	(45)
Distribution loss (46)m = 0.15 x (45)m	28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084	(62)
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961	(63a)
PV diverter	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2119.2152	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331 (72)
Total internal gains	465.4239	475.4341	456.2523	440.3782	419.0310	401.6141	386.9341	388.0709	399.4389	415.6535	440.1792	456.3976 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area	Solar flux	g		FF		Access	Gains	
				m2	Table 6a	Specific data		Specific data		factor	W	
					W/m2	or Table 6b		or Table 6c		Table 6d		
Southeast				8.6000	36.7938	0.6300		0.7000		0.7700	96.7042 (77)	
Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586 (83)
Total gains	562.1281	640.1571	681.6335	719.6364	731.8235	712.1447	686.3187	662.4375	643.4791	597.7076	556.0085	539.1562 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	76.9274	77.1539	77.3773	78.4439	78.6468	79.6050	79.6050	79.7850	79.2331	78.6468	78.2375	77.8142
alpha	6.1285	6.1436	6.1585	6.2296	6.2431	6.3070	6.3070	6.3190	6.2822	6.2431	6.2158	6.1876
util living area	0.9821	0.9612	0.9225	0.8263	0.6738	0.4849	0.3475	0.3754	0.5760	0.8416	0.9588	0.9855 (86)
MIT	20.3042	20.4837	20.6739	20.8704	20.9681	20.9965	20.9996	20.9994	20.9901	20.8766	20.5760	20.2746 (87)
Th 2	20.1628	20.1651	20.1673	20.1777	20.1797	20.1888	20.1888	20.1904	20.1852	20.1797	20.1757	20.1716 (88)
util rest of house	0.9772	0.9513	0.9038	0.7908	0.6220	0.4246	0.2836	0.3096	0.5116	0.8013	0.9465	0.9814 (89)
MIT 2	19.3724	19.5961	19.8270	20.0573	20.1553	20.1869	20.1886	20.1902	20.1794	20.0702	19.7215	19.3424 (90)
Living area fraction	19.7014	19.9095	20.1260	20.3444	20.4423	20.4727	20.4750	20.4759	20.4656	20.3549	20.0232	19.6715 (92)
MIT	19.7014	19.9095	20.1260	20.3444	20.4423	20.4727	20.4750	20.4759	20.4656	20.3549	20.0232	19.6715 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7014	19.9095	20.1260	20.3444	20.4423	20.4727	20.4750	20.4759	20.4656	20.3549	20.0232	19.6715 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9738	0.9477	0.9028	0.7984	0.6390	0.4459	0.3062	0.3329	0.5340	0.8106	0.9438	0.9783 (94)
Useful gains	547.3943	606.6829	615.3523	574.5923	467.6107	317.5106	210.1473	220.4934	343.6393	484.4770	524.7850	527.4800 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	864.6633	840.1874	760.5421	630.0905	480.0782	318.6168	210.2311	220.6349	346.9779	535.6864	713.3852	858.7023 (97)
Space heating kWh	236.0482	156.9151	108.0212	39.9587	9.2758	0.0000	0.0000	0.0000	0.0000	38.0998	135.7921	246.4294 (98a)
Space heating requirement - total per year (kWh/year)												970.5403
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	236.0482	156.9151	108.0212	39.9587	9.2758	0.0000	0.0000	0.0000	0.0000	38.0998	135.7921	246.4294 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												970.5403
Space heating per m2										(98c) / (4) =		15.6539 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	236.0482	156.9151	108.0212	39.9587	9.2758	0.0000	0.0000	0.0000	0.0000	38.0998	135.7921	246.4294 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	255.7402	170.0055	117.0327	43.2922	10.0497	0.0000	0.0000	0.0000	0.0000	41.2782	147.1204	266.9874 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Efficiency of water heater	84.3383	83.6992	82.7782	81.3432	80.2236	79.8000	79.8000	79.8000	79.8000	81.2670	83.3664	79.8000 (216)
Fuel for water heating, kWh/month	247.2726	220.3970	237.1108	213.3080	210.3913	191.4084	189.6254	196.7757	198.4878	216.3403	223.0124	244.3958 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.0502	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	1051.5063	1.1300	1188.2021 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2588.5255	1.1300	2925.0338 (278)
Space and water heating			4113.2359 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			3507.6235 (286)
Target Primary Energy Rate (TPER)			56.5700 (287)

Full SAP Calculation Printout



Property Reference	Plot 24			Issued on Date	27/08/2025
Assessment Reference	Plot 24	Prop Type Ref			
Property	Flat 24, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	3.59	TER	10.76
Environmental	97 A	% DER < TER			66.64
CO ₂ Emissions (t/year)	0.19	DFEE	21.79	TFEE	22.86
Compliance Check	See BREL	% DFEE < TFEE			4.70
% DPER < TPER	33.24	DPER	37.76	TPER	56.57
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1361 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.7000 (17)
Infiltration rate		0.3211 (18)
Number of sides sheltered	2	(19)

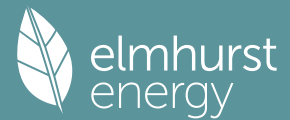
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2729 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.3480	0.3412	0.3344	0.3002	0.2934	0.2593	0.2593	0.2525	0.2729	0.2934	0.3071	0.3207 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5606	0.5582	0.5559	0.5451	0.5430	0.5336	0.5336	0.5319	0.5372	0.5430	0.5471	0.5514 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements Aum(A, m ²)			98.6900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	19.4438	(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15547.8796 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7700	0.0340	0.1622	
E3 Sill				4.7700	0.0260	0.1240	
E4 Jamb				10.8200	0.0300	0.3246	

Full SAP Calculation Printout



E18 Party wall between dwellings	4.7400	0.0290	0.1375
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.4200	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	15.4800	-0.0180	-0.2786
E14 Flat roof	15.4800	0.1600	2.4768
P4 Party wall - Roof (insulation at ceiling level)	17.4200	0.1280	2.2298
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2923 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.7361 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	27.1813	27.0673	26.9556	26.4306	26.3324	25.8752	25.8752	25.7905	26.0513	26.3324	26.5311	26.7388 (38)
Average = Sum(39)m / 12 =	51.9174	51.8034	51.6916	51.1667	51.0685	50.6113	50.6113	50.5266	50.7874	51.0685	51.2672	51.4749 (39)
												51.1662
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8374	0.8355	0.8337	0.8253	0.8237	0.8163	0.8163	0.8149	0.8192	0.8237	0.8269	0.8302 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												55.6619 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414 (44)
Energy content (annual)	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499 (45)
Distribution loss	(46)m = 0.15 x (45)m											924.4260
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074 (64)
12Total per year (kWh/year)												785.7621 (64)
Electric shower(s)	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												531.8370 (64a)
Heat gains from water heating, kWh/month	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.3812	110.0291	99.3812	102.6939	99.3812	102.6939	99.3812	99.3812	102.6939	99.3812	102.6939	99.3812 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	42.8301 (72)
Total internal gains	374.0866	385.4940	368.5137	358.7915	340.9103	330.3519	318.1474	317.5698	326.9630	335.8843	354.7262	365.8842 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Southeast	8.6000	36.7938	0.2400	0.0000	0.7700	58.4757 (77)						
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	432.5624	485.0997	504.7987	527.6552	530.0516	518.1255	499.1812	483.4755	474.5308	445.9699	424.7666	415.9272 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	83.1870	83.3701	83.5504	84.4076	84.5699	85.3338	85.3338	85.4768	85.0379	84.5699	84.2421	83.9022
alpha	6.5458	6.5580	6.5700	6.6272	6.6380	6.6889	6.6889	6.6985	6.6692	6.6380	6.6161	6.5935
util living area	0.9947	0.9878	0.9744	0.9273	0.8168	0.6148	0.4450	0.4789	0.7101	0.9318	0.9866	0.9958 (86)
MIT	20.2013	20.3509	20.5285	20.7621	20.9230	20.9901	20.9990	20.9984	20.9753	20.7881	20.4621	20.1749 (87)
Th 2	20.2211	20.2226	20.2242	20.2315	20.2329	20.2392	20.2392	20.2404	20.2368	20.2329	20.2301	20.2272 (88)
util rest of house	0.9931	0.9842	0.9666	0.9061	0.7708	0.5462	0.3687	0.4008	0.6426	0.9076	0.9819	0.9945 (89)
MIT 2	19.4951	19.6440	19.8189	20.0451	20.1830	20.2348	20.2389	20.2399	20.2244	20.0730	19.7609	19.4740 (90)
Living area fraction	19.7444	19.8936	20.0694	20.2982	20.4443	20.5015	20.5073	20.5077	FLA = Living area / (4) =	20.3255	20.0085	0.3531 (91)
MIT	19.7444	19.8936	20.0694	20.2982	20.4443	20.5015	20.5073	20.5077	20.4895	20.3255	20.0085	19.7214 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7444	19.8936	20.0694	20.2982	20.4443	20.5015	20.5073	20.5077	20.4895	20.3255	20.0085	19.7214 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9918	0.9824	0.9648	0.9081	0.7842	0.5702	0.3957	0.4284	0.6657	0.9109	0.9803	0.9935 (94)
Useful gains	429.0228	476.5437	487.0265	479.1691	415.6693	295.4585	197.5087	207.1370	315.9036	406.2348	416.3861	413.2141 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	801.8340	776.7183	701.4265	583.2084	446.5557	298.6815	197.7528	207.5482	324.5065	496.6661	661.7809	798.9646 (97)
Space heating kWh	277.3715	201.7173	159.5136	74.9083	22.9795	0.0000	0.0000	0.0000	0.0000	67.2809	176.6843	286.9984 (98a)
Space heating requirement - total per year (kWh/year)												1267.4537
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	277.3715	201.7173	159.5136	74.9083	22.9795	0.0000	0.0000	0.0000	0.0000	67.2809	176.6843	286.9984 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1267.4537
Space heating per m2										(98c) / (4) =		20.4428 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	475.7461	374.5235	384.0023	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9301	0.9723	0.9638	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	442.5118	364.1323	370.1080	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	561.7220	541.7854	525.4332	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	85.8314	132.1739	115.5620	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	21.4578	33.0435	28.8905	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												83.3918 (107)
Energy for space heating												20.4428 (99)
Energy for space cooling												1.3450 (108)
Total												21.7878 (109)
Fabric Energy Efficiency (DFEE)												21.8 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour
Pressure test	20.0000 / (5) = 0.1361 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	5.0000 (17)
	0.3861 (18)

Full SAP Calculation Printout



Number of sides sheltered

2 (19)

Shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3282 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4184	0.4102	0.4020	0.3610	0.3528	0.3118	0.3118	0.3036	0.3282	0.3528	0.3692	0.3856	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5875	0.5841	0.5808	0.5652	0.5622	0.5486	0.5486	0.5461	0.5539	0.5622	0.5682	0.5744	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			8.6000	1.1450	9.8473			(27)
External Wall	36.6900	8.6000	28.0900	0.1800	5.0562			(29a)
External Roof 1	62.0000		62.0000	0.1100	6.8200			(30)
Total net area of external elements Aum(A, m2)			98.6900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	21.7235			(33)
Main dwelling								
Corridor			22.9700	0.0000	0.0000			(32)
Party Wall			18.3200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

250.7723 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385	
E3 Sill	4.7700	0.0500	0.2385	
E4 Jamb	10.8200	0.0500	0.5410	
E18 Party wall between dwellings	4.7400	0.0600	0.2844	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.4200	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	15.4800	0.0700	1.0836	
E14 Flat roof	15.4800	0.0800	1.2384	
P4 Party wall - Roof (insulation at ceiling level)	17.4200	0.1200	2.0904	
E16 Corner (normal)	2.3700	0.0900	0.2133	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

5.9281 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 27.6516 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	28.4904	28.3255	28.1639	27.4050	27.2630	26.6019	26.6019	26.4795	26.8566	27.2630	27.5502	27.8505	(38)
Average = Sum(39)m / 12 =	56.1420	55.9771	55.8156	55.0566	54.9146	54.2536	54.2536	54.1312	54.5082	54.9146	55.2019	55.5022	(39)
												55.0559	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9055	0.9029	0.9003	0.8880	0.8857	0.8751	0.8751	0.8731	0.8792	0.8857	0.8904	0.8952	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses													
	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)													55.6619 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	60.7267	59.0612	57.2428	54.9791	52.9598	50.8612	50.4249	52.2397	54.1010	56.2561	58.5398	60.6414	(44)
Energy conte	96.1763	84.1024	87.9800	75.2636	71.2941	62.5398	60.9845	64.6836	66.7119	76.3390	83.4007	94.9499	(45)
Energy content (annual)										Total = Sum(45)m =		924.4260	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	81.7499	71.4871	74.7830	63.9741	60.6000	53.1588	51.8369	54.9811	56.7051	64.8882	70.8906	80.7074	(64)
												785.7621	(64)
12Total per year (kWh/year)												786	(64)
Electric shower(s)													
	46.7551	41.6592	45.4903	43.4108	44.2254	42.1867	43.5930	44.2254	43.4108	45.4903	44.6349	46.7551	(64a)
												531.8370	(64a)
Heat gains from water heating, kWh/month													
	32.1263	28.2866	30.0683	26.8462	26.2063	23.8364	23.8575	24.8016	25.0290	27.5946	28.8814	31.8656	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	99.7080	96.4916	99.7080	96.4916	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	43.1804	42.0931	40.4144	37.2864	35.2236	33.1061	32.0665	33.3355	34.7625	37.0895	40.1130	(72)
Total internal gains	371.1971	382.2948	365.6242	355.8056	338.0207	327.3660	315.2579	314.6802	323.9771	332.9947	351.7403	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W	
-----					-----					-----					
Southeast					8.6000	36.7938	0.6300		0.7000		0.7700				96.7042 (77)
-----					-----					-----					
Solar gains		96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586	(83)	
Total gains		467.9013	547.0178	591.0054	635.0639	650.8132	637.8966	614.6425	589.0468	568.0173	515.0488	467.5697	445.7533	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	76.9274	77.1539	77.3773	78.4439	78.6468	79.6050	79.6050	79.7850	79.2331	78.6468	78.2375	77.8142	
alpha	6.1285	6.1436	6.1585	6.2296	6.2431	6.3070	6.3070	6.3190	6.2822	6.2431	6.2158	6.1876	
util living area	0.9929	0.9812	0.9565	0.8814	0.7398	0.5389	0.3878	0.4217	0.6445	0.9023	0.9815	0.9945	(86)
MIT	20.1462	20.3417	20.5591	20.8073	20.9470	20.9937	20.9993	20.9989	20.9818	20.8072	20.4418	20.1154	(87)
Th 2	20.1628	20.1651	20.1673	20.1777	20.1797	20.1888	20.1888	20.1904	20.1852	20.1797	20.1757	20.1716	(88)
util rest of house	0.9907	0.9758	0.9443	0.8518	0.6879	0.4730	0.3166	0.3480	0.5755	0.8709	0.9752	0.9929	(89)
MIT 2	19.3921	19.5859	19.7973	20.0329	20.1471	20.1861	20.1886	20.1901	20.1765	20.0392	19.6945	19.3688	(90)
Living area fraction	19.6583	19.8527	20.0663	20.3063	20.4295	20.4712	20.4748	20.4757	20.4609	20.3104	19.9584	19.6324	(91)
MIT	19.6583	19.8527	20.0663	20.3063	20.4295	20.4712	20.4748	20.4757	20.4609	20.3104	19.9584	19.6324	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6583	19.8527	20.0663	20.3063	20.4295	20.4712	20.4748	20.4757	20.4609	20.3104	19.9584	19.6324	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9891	0.9733	0.9425	0.8568	0.7043	0.4962	0.3418	0.3741	0.5994	0.8764	0.9732	0.9915	(94)
Useful gains	462.7842	532.4273	557.0461	544.1274	458.3592	316.5253	210.0637	220.3418	340.4686	451.4069	455.0393	441.9616	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	862.2481	837.0118	757.2079	627.9907	479.3773	318.5357	210.2230	220.6205	346.7186	533.2411	709.8052	856.5337	(97)
Space heating kWh	297.2011	204.6808	148.9204	60.3816	15.6375	0.0000	0.0000	0.0000	0.0000	60.8846	183.4314	308.4416	(98a)
Space heating requirement - total per year (kWh/year)												1279.5791	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	297.2011	204.6808	148.9204	60.3816	15.6375	0.0000	0.0000	0.0000	0.0000	60.8846	183.4314	308.4416	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1279.5791	
Space heating per m2										(98c) / (4) =		20.6384	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	509.9836	401.4764	411.3968	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9604	0.9849	0.9792	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	489.7815	395.4160	402.8210	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	704.9514	679.8443	651.8505	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	154.9223	211.6147	185.2780	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	38.7306	52.9037	46.3195	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												137.9537	(107)
Energy for space heating												20.6384	(99)
Energy for space cooling												2.2251	(108)
Total												22.8634	(109)
Fabric Energy Efficiency (TFEE)												22.9	(109)

Full SAP Calculation Printout



Property Reference	Plot 24			Issued on Date	27/08/2025	
Assessment Reference	Plot 24		Prop Type Ref			
Property	Flat 24, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD					
SAP Rating	87 B	DER	3.59	TER	10.76	
Environmental	97 A	% DER < TER				66.64
CO ₂ Emissions (t/year)	0.19	DFEE	21.79	TFEE	22.86	
Compliance Check	See BREL	% DFEE < TFEE				4.70
% DPER < TPER	33.24	DPER	37.76	TPER	56.57	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client						

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7000	(17)
Infiltration rate	0.1850	(18)
Number of sides sheltered	2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1573 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2005	0.1966	0.1926	0.1730	0.1690	0.1494	0.1494	0.1455	0.1573	0.1690	0.1769	0.1848 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3405	0.3366	0.3326	0.3130	0.3090	0.2894	0.2894	0.2855	0.2973	0.3090	0.3169	0.3248 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements A _{um} (A, m ²)			98.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.4438		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15547.8796 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							250.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	489.1834	540.3310	556.8078	571.8755	569.6861	552.9106	530.6502	517.1578	510.8834	487.7253	473.9540	471.4895 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	104.7079	105.1941	105.6848	108.2086	108.7279	111.4011	111.4011	111.9515	110.3162	108.7279	107.6943	106.6801	21.0000 (85)
alpha	7.9805	8.0129	8.0457	8.2139	8.2485	8.4267	8.4267	8.4634	8.3544	8.2485	8.1796	8.1120	
util living area	0.9802	0.9567	0.9150	0.8030	0.6419	0.4485	0.3214	0.3431	0.5275	0.8050	0.9487	0.9837	(86)
MIT	20.6041	20.7273	20.8427	20.9549	20.9929	20.9997	21.0000	21.0000	20.9988	20.9611	20.7954	20.5899	(87)
Th 2	20.3716	20.3743	20.3771	20.3908	20.3935	20.4073	20.4073	20.4100	20.4018	20.3935	20.3880	20.3826	(88)
util rest of house													
	0.9752	0.9468	0.8974	0.7721	0.6023	0.4071	0.2782	0.2991	0.4823	0.7691	0.9357	0.9795	(89)
MIT 2	19.9206	20.0739	20.2133	20.3492	20.3881	20.4071	20.4073	20.4100	20.4011	20.3596	20.1702	19.9123	(90)
Living area fraction									fLA = Living area / (4) =				0.3531 (91)
MIT	20.1619	20.3046	20.4355	20.5631	20.6017	20.6163	20.6165	20.6183	20.6121	20.5720	20.3909	20.1515	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1619	20.3046	20.4355	20.5631	20.6017	20.6163	20.6165	20.6183	20.6121	20.5720	20.3909	20.1515	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9732	0.9456	0.8992	0.7811	0.6160	0.4217	0.2934	0.3147	0.4983	0.7800	0.9357	0.9777	(94)
Useful gains	476.0976	510.9209	500.6765	446.7097	350.9333	233.1509	155.7119	162.7276	254.5632	380.4443	443.4907	460.9725	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	654.2507	632.4511	569.4812	465.4997	353.5894	233.2445	155.7155	162.7339	254.9477	396.1032	533.0051	645.7838	(97)
Space heating kWh	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(98a)
Space heating requirement - total per year (kWh/year)												494.5100	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												494.5100	
Space heating per m2										(98c) / (4) =		7.9760	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Fraction of main heating from main system 2													1.0000 (202)
Fraction of total heating from main system 1													0.0000 (203)
Fraction of total heating from main system 2													1.0000 (204)
Efficiency of main space heating system 1 (in %)													0.0000 (205)
Efficiency of main space heating system 2 (in %)													100.0000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	132.5459	81.6683	51.1907	13.5288	1.9762	0.0000	0.0000	0.0000	0.0000	11.6502	64.4503	137.4996	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													494.5100 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													340.0764
Water heating fuel used													726.6710 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 0.8400) 150.5841 (230a)
Total electricity for the above, kWh/year 150.5841 (231)
Electricity for lighting (calculated in Appendix L) 145.1281 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
PV generation 0.0000 (233)
Wind generation 0.0000 (234)
Hydro-electric generation (Appendix N) 0.0000 (235a)
Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
Appendix Q - special features
Energy saved or generated -0.0000 (236)
Energy used 0.0000 (237)
Total delivered energy for all uses 1516.8932 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	494.5100	0.1586	78.4284 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			181.0418 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			222.8762 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	494.5100	1.5871	784.8257 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	726.6710	1.5222	1106.1095 (278)
Space and water heating			1890.9352 (279)
Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			2341.3411 (286)
Dwelling Primary energy Rate (DPER)			37.7600 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1361 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
Yes
5.0000 (17)
0.3861 (18)
2 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3282 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4184	0.4102	0.4020	0.3610	0.3528	0.3118	0.3118	0.3036	0.3282	0.3528	0.3692	0.3856 (22b)
Effective ac	0.5875	0.5841	0.5808	0.5652	0.5622	0.5486	0.5486	0.5461	0.5539	0.5622	0.5682	0.5744 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
TER Opening Type			8.6000	1.1450	9.8473		(27)
External Wall	36.6900	8.6000	28.0900	0.1800	5.0562		(29a)
External Roof 1	62.0000		62.0000	0.1100	6.8200		(30)
Total net area of external elements Aum(A, m ²)			98.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		21.7235		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000		(32)
Party Wall			18.3200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

250.7723 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	4.7700	0.0500	0.2385
E2 Other lintels (including other steel lintels)	4.7700	0.0500	0.2385
E3 Sill	10.8200	0.0500	0.5410
E4 Jamb	4.7400	0.0600	0.2844
E18 Party wall between dwellings	17.4200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.4800	0.0700	1.0836
E7 Party floor between dwellings (in blocks of flats)	15.4800	0.0800	1.2384
E14 Flat roof	17.4200	0.1200	2.0904
P4 Party wall - Roof (insulation at ceiling level)	2.3700	0.0900	0.2133
E16 Corner (normal)			5.9281 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges

(33a) = 0.0000
(33) + (36) + (36a) = 27.6516 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	28.4904	28.3255	28.1639	27.4050	27.2630	26.6019	26.6019	26.4795	26.8566	27.2630	27.5502	27.8505 (38)
Average = Sum(39)m / 12 =	56.1420	55.9771	55.8156	55.0566	54.9146	54.2536	54.2536	54.1312	54.5082	54.9146	55.2019	55.5022 (39)
												55.0559
HLP	0.9055	0.9029	0.9003	0.8880	0.8857	0.8751	0.8751	0.8731	0.8792	0.8857	0.8904	0.8952 (40)
HLP (average)												0.8880
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers	58.3831	57.5057	56.2272	53.7810	51.9757	49.9625	48.8182	50.0871	51.4780	53.6395	56.1383	58.1594 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												109.4892 (43)
Daily hot water use	119.1099	116.5670	113.4700	108.7601	104.9355	100.8238	99.2431	102.3267	105.5789	109.8956	114.6781	118.8009 (44)
Energy conte	188.6409	165.9898	174.3992	148.8871	141.2634	123.9746	120.0260	126.7019	130.1894	149.1274	163.3800	186.0135 (45)
Energy content (annual)										Total = Sum(45)m =		1818.5931
Distribution loss (46)m = 0.15 x (45)m	28.2961	24.8985	26.1599	22.3331	21.1895	18.5962	18.0039	19.0053	19.5284	22.3691	24.5070	27.9020 (46)
Water storage loss:												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	235.2358	208.0755	220.9941	193.9790	187.8583	169.0664	166.6209	173.2968	175.2812	195.7223	208.4719	232.6084 (62)
WWHRS	-26.6903	-23.6051	-24.7179	-20.4674	-19.0749	-16.3225	-15.2998	-16.2698	-16.8879	-19.9090	-22.5545	-26.1961 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2119.2152 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	99.9990	88.8602	95.2636	85.5784	84.2460	77.2950	77.1846	79.4043	79.3614	86.8608	90.3973	99.1254 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790	101.8790 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.4916	106.8300	96.4916	99.7080	96.4916	99.7080	96.4916	96.4916	99.7080	96.4916	99.7080	96.4916 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.9613	179.8080	175.1544	165.2475	152.7418	140.9882	133.1361	131.2894	135.9430	145.8499	158.3556	170.1092 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879	33.1879 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	134.4073	132.2324	128.0425	118.8589	113.2339	107.3542	103.7427	106.7262	110.2242	116.7483	125.5519	133.2331 (72)
Total internal gains	465.4239	475.4341	456.2523	440.3782	419.0310	401.6141	386.9341	388.0709	399.4389	415.6535	440.1792	456.3976 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]														
			Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
-----			-----		-----		-----		-----		-----		-----	
Southeast			8.6000		36.7938		0.6300		0.7000		0.7700		96.7042 (77)	
-----			-----		-----		-----		-----		-----		-----	
Solar gains	96.7042	164.7230	225.3812	279.2583	312.7925	310.5306	299.3846	274.3665	244.0402	182.0540	115.8293	82.7586	(83)	
Total gains	562.1281	640.1571	681.6335	719.6364	731.8235	712.1447	686.3187	662.4375	643.4791	597.7076	556.0085	539.1562	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	76.9274	77.1539	77.3773	78.4439	78.6468	79.6050	79.6050	79.7850	79.2331	78.6468	78.2375	77.8142
alpha	6.1285	6.1436	6.1585	6.2296	6.2431	6.3070	6.3070	6.3190	6.2822	6.2431	6.2158	6.1876
util living area	0.9821	0.9612	0.9225	0.8263	0.6738	0.4849	0.3475	0.3754	0.5760	0.8416	0.9588	0.9855 (86)
MIT	20.3042	20.4837	20.6739	20.8704	20.9681	20.9965	20.9996	20.9994	20.9901	20.8766	20.5760	20.2746 (87)
Th 2	20.1628	20.1651	20.1673	20.1777	20.1797	20.1888	20.1888	20.1904	20.1852	20.1797	20.1757	20.1716 (88)
util rest of house	0.9772	0.9513	0.9038	0.7908	0.6220	0.4246	0.2836	0.3096	0.5116	0.8013	0.9465	0.9814 (89)
MIT 2	19.3724	19.5961	19.8270	20.0573	20.1553	20.1869	20.1886	20.1902	20.1794	20.0702	19.7215	19.3424 (90)
Living area fraction	19.7014	19.9095	20.1260	20.3444	20.4423	20.4727	20.4750	20.4759	20.4656	20.3549	20.0232	19.6715 (92)
MIT	19.7014	19.9095	20.1260	20.3444	20.4423	20.4727	20.4750	20.4759	20.4656	20.3549	20.0232	19.6715 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7014	19.9095	20.1260	20.3444	20.4423	20.4727	20.4750	20.4759	20.4656	20.3549	20.0232	19.6715 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9738	0.9477	0.9028	0.7984	0.6390	0.4459	0.3062	0.3329	0.5340	0.8106	0.9438	0.9783 (94)
Useful gains	547.3943	606.6829	615.3523	574.5923	467.6107	317.5106	210.1473	220.4934	343.6393	484.4770	524.7850	527.4800 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	864.6633	840.1874	760.5421	630.0905	480.0782	318.6168	210.2311	220.6349	346.9779	535.6864	713.3852	858.7023 (97)
Space heating kWh	236.0482	156.9151	108.0212	39.9587	9.2758	0.0000	0.0000	0.0000	0.0000	38.0998	135.7921	246.4294 (98a)
Space heating requirement - total per year (kWh/year)												970.5403
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	236.0482	156.9151	108.0212	39.9587	9.2758	0.0000	0.0000	0.0000	0.0000	38.0998	135.7921	246.4294 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												970.5403
Space heating per m2										(98c) / (4) =		15.6539 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	236.0482	156.9151	108.0212	39.9587	9.2758	0.0000	0.0000	0.0000	0.0000	38.0998	135.7921	246.4294 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	255.7402	170.0055	117.0327	43.2922	10.0497	0.0000	0.0000	0.0000	0.0000	41.2782	147.1204	266.9874 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	208.5455	184.4704	196.2761	173.5115	168.7834	152.7439	151.3211	157.0270	158.3933	175.8133	185.9174	206.4123 (64)
Efficiency of water heater	84.3383	83.6992	82.7782	81.3432	80.2236	79.8000	79.8000	79.8000	79.8000	81.2670	83.3664	79.8000 (216)
Fuel for water heating, kWh/month	247.2726	220.3970	237.1108	213.3080	210.3913	191.4084	189.6254	196.7757	198.4878	216.3403	223.0124	244.3958 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.0490	16.0841	14.4819	10.6101	8.1955	6.6958	7.4762	9.7179	12.6226	16.5615	18.7062	20.6063 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.2099	-30.9264	-45.9611	-53.4941	-59.2708	-55.9180	-55.2561	-51.3975	-44.8297	-36.1966	-23.6876	-18.2212 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.0502	-19.3152	-38.9043	-59.1811	-78.9756	-79.6002	-78.6409	-66.2326	-48.0997	-27.8427	-12.1557	-7.1343 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	1051.5063	1.1300	1188.2021 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2588.5255	1.1300	2925.0338 (278)
Space and water heating			4113.2359 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	161.8073	1.5338	248.1854 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.3691	1.4947	-741.9365
PV Unit electricity exported	-525.1326	0.4608	-241.9622
Total			-983.8987 (283)
Total Primary energy kWh/year			3507.6235 (286)
Target Primary Energy Rate (TPER)			56.5700 (287)

Full SAP Calculation Printout



Property Reference	Plot 24			Issued on Date	27/08/2025
Assessment Reference	Plot 24	Prop Type Ref			
Property	Flat 24, Makers Court, 2 Francis Road, MANCHESTER, M20 4DD				
SAP Rating	87 B	DER	3.59	TER	10.76
Environmental	97 A	% DER < TER			66.64
CO ₂ Emissions (t/year)	0.19	DFEE	21.79	TFEE	22.86
Compliance Check	See BREL	% DFEE < TFEE			4.70
% DPER < TPER	33.24	DPER	37.76	TPER	56.57
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.0000 (1b)	2.3700 (2b)	146.9400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		146.9400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	146.9400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7000 (17)
Infiltration rate	0.1850 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1573 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2005	0.1966	0.1926	0.1730	0.1690	0.1494	0.1494	0.1455	0.1573	0.1690	0.1769	0.1848 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3405	0.3366	0.3326	0.3130	0.3090	0.2894	0.2894	0.2855	0.2973	0.3090	0.3169	0.3248 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements A _{um} (A, m ²)			98.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.4438		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15547.8796 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							250.7723 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	4.7700	0.0340	0.1622
E3 Sill	4.7700	0.0260	0.1240
E4 Jamb	10.8200	0.0300	0.3246
E18 Party wall between dwellings	4.7400	0.0290	0.1375
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.4200	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	15.4800	-0.0180	-0.2786
E14 Flat roof	15.4800	0.1600	2.4768
P4 Party wall - Roof (insulation at ceiling level)	17.4200	0.1280	2.2298
E16 Corner (normal)	2.3700	0.0490	0.1161
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2923 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.7361 (37)

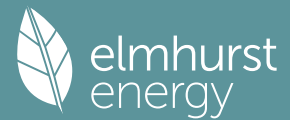
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.5106	16.3200	16.1294	15.1762	14.9856	14.0325	14.0325	13.8418	14.4137	14.9856	15.3668	15.7481 (38)
Average = Sum(39)m / 12 =	41.2467	41.0561	40.8654	39.9123	39.7217	38.7685	38.7685	38.5779	39.1498	39.7217	40.1029	40.4842 (39)
												39.8646
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6653	0.6622	0.6591	0.6437	0.6407	0.6253	0.6253	0.6222	0.6314	0.6407	0.6468	0.6530 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0376 (42)
Hot water usage for mixer showers	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692 (42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446 (42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969 (42c)
Average daily hot water use (litres/day)												129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107 (44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623 (45)
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Pumps, fans	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Total internal gains	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
FGHRS	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains												
[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Southeast	8.6000	36.7938	0.2400	0.0000	0.7700	58.4757 (77)						
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	70.0404	50.0430 (83)
Total gains	534.4501	573.5623	594.9874	598.2578	590.3849	563.1996	540.9554	528.8506	524.9630	513.6023	505.5145	513.4598 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	104.7079	105.1941	105.6848	108.2086	108.7279	111.4011	111.4011	111.9515	110.3162	108.7279	107.6943	106.6801
alpha	7.9805	8.0129	8.0457	8.2139	8.2485	8.4267	8.4267	8.4634	8.3544	8.2485	8.1796	8.1120
util living area	0.9670	0.9412	0.8876	0.7761	0.6208	0.4403	0.3153	0.3355	0.5136	0.7742	0.9293	0.9728 (86)
MIT	20.6747	20.7707	20.8780	20.9646	20.9944	20.9997	21.0000	21.0000	20.9990	20.9706	20.8336	20.6576 (87)
Th 2	20.3716	20.3743	20.3771	20.3908	20.3935	20.4073	20.4073	20.4100	20.4018	20.3935	20.3880	20.3826 (88)
util rest of house	0.9594	0.9289	0.8669	0.7445	0.5820	0.3996	0.2729	0.2925	0.4695	0.7373	0.9130	0.9664 (89)
MIT 2	20.0072	20.1253	20.2525	20.3586	20.3893	20.4071	20.4073	20.4100	20.4012	20.3683	20.2143	19.9959 (90)
Living area fraction	fLA = Living area / (4) =											0.3531 (91)
MIT	20.2429	20.3532	20.4733	20.5726	20.6030	20.6164	20.6165	20.6183	20.6123	20.5810	20.4329	20.2295 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2429	20.3532	20.4733	20.5726	20.6030	20.6164	20.6165	20.6183	20.6123	20.5810	20.4329	20.2295 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9576	0.9284	0.8703	0.7542	0.5955	0.4140	0.2878	0.3077	0.4851	0.7490	0.9143	0.9646 (94)
Useful gains	511.8015	532.4946	517.8234	451.1993	351.5529	233.1644	155.7124	162.7287	254.6394	384.6986	462.2120	495.2660 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	657.5909	634.4457	571.0258	465.8791	353.6404	233.2456	155.7155	162.7340	254.9540	396.4606	534.6902	648.9411 (97)
Space heating kWh	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (98a)
Space heating requirement - total per year (kWh/year)												403.9531
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												403.9531
Space heating per m2	(98c) / (4) =											6.5154 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893 (231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												403.9531 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												340.0764
Water heating fuel used												726.6710 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												150.5841 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	150.5841	(231)
Electricity for lighting (calculated in Appendix L)	145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1426.3363	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	403.9531	16.4900	66.6119 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	726.6710	16.4900	119.8280 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313 (249)
Energy for lighting	145.1281	16.4900	23.9316 (250)
Additional standing charges			0.0000 (251)
Total energy cost			235.2029 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7913 (257)
SAP value		87.1724
SAP rating (Section 12)		87 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	403.9531	0.1587	64.1210 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	726.6710	0.1412	102.6134 (264)
Space and water heating			166.7344 (265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879 (267)
Energy for lighting	145.1281	0.1443	20.9465 (268)
Total CO2, kg/year			208.5687 (272)
CO2 emissions per m2			3.3600 (273)
EI value			97.3880
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.0000	2.3700	146.9400
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000	x	146.9400 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7000 (17)
Infiltration rate	0.1850 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.1573 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1690	0.1651	0.1690	0.1533	0.1573	0.1337	0.1297	0.1297	0.1337	0.1494	0.1494	0.1533	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													72.0000 (23c)
Effective ac	0.3090	0.3051	0.3090	0.2933	0.2973	0.2737	0.2697	0.2697	0.2737	0.2894	0.2894	0.2933	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
Window			8.6000	0.7752	6.6667			(27)					
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998	(29a)					
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000	(30)					
Total net area of external elements Aum(A, m2)			98.6900					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.4438			(33)					
Main dwelling													
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999	(32)					
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999	(32)					
Party Floor 1			62.0000			40.0000	2480.0000	(32d)					
Internal Wall 1			96.0200			9.0000	864.1800	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15547.8796	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.7723	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				4.7700	0.0340		0.1622						
E3 Sill				4.7700	0.0260		0.1240						
E4 Jamb				10.8200	0.0300		0.3246						
E18 Party wall between dwellings				4.7400	0.0290		0.1375						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				17.4200	0.0000		0.0000						
E7 Party floor between dwellings (in blocks of flats)				15.4800	-0.0180		-0.2786						
E14 Flat roof				15.4800	0.1600		2.4768						
P4 Party wall - Roof (insulation at ceiling level)				17.4200	0.1280		2.2298						
E16 Corner (normal)				2.3700	0.0490		0.1161						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								5.2923 (36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	24.7361 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	14.9856	14.7950	14.9856	14.2231	14.4137	13.2699	13.0793	13.0793	13.2699	14.0325	14.0325	14.2231	(38)
Average = Sum(39)m / 12 =	39.7217	39.5310	39.7217	38.9592	39.1498	38.0060	37.8154	37.8154	38.0060	38.7685	38.7685	38.9592	(39)
													38.7685
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6407	0.6376	0.6407	0.6284	0.6314	0.6130	0.6099	0.6099	0.6130	0.6253	0.6253	0.6284	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	
													0.6253

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers													
Hot water usage for baths	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	(42a)
Hot water usage for other uses	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Average daily hot water use (litres/day)	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
													129.6745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
													Total per year (kWh/year) = Sum(64)m = 2471.2368 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032 (71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924 (72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168 (73)

6. Solar gains

[Jan]	Area		Solar flux		Specific data		FF		Access		Gains	
	m2		Table 6a		or Table 6b		or Table 6c		factor		W	
			W/m2						Table 6d			
Southeast	8.6000		32.4665		0.2400		0.0000		0.7700		51.5984 (77)	
Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405 (83)
Total gains	527.5728	564.1154	587.6009	592.3479	579.3292	556.4463	530.2314	518.0483	520.8185	510.0085	498.9869	510.9573 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	108.7279	109.2523	108.7279	110.8560	110.3162	113.6361	114.2089	114.2089	113.6361	111.4011	111.4011	110.8560
alpha	8.2485	8.2835	8.2485	8.3904	8.3544	8.5757	8.6139	8.6139	8.5757	8.4267	8.4267	8.3904
util living area	0.9539	0.9207	0.8584	0.7208	0.5523	0.3688	0.2710	0.2920	0.4667	0.7280	0.9048	0.9612 (86)
MIT	20.7562	20.8375	20.9168	20.9821	20.9980	21.0000	21.0000	21.0000	20.9996	20.9835	20.8852	20.7406 (87)
Th 2	20.3935	20.3963	20.3935	20.4045	20.4018	20.4183	20.4211	20.4211	20.4183	20.4073	20.4073	20.4045 (88)
util rest of house	0.9436	0.9049	0.8344	0.6868	0.5128	0.3291	0.2297	0.2497	0.4244	0.6891	0.8844	0.9522 (89)
MIT 2	20.1261	20.2243	20.3112	20.3891	20.4004	20.4183	20.4211	20.4211	20.4181	20.3939	20.2912	20.1173 (90)
Living area fraction	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (91)
MIT	20.3485	20.4408	20.5250	20.5985	20.6114	20.6237	20.6255	20.6255	20.6234	20.6020	20.5009	20.3374 (92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (93)
adjusted MIT	20.3485	20.4408	20.5250	20.5985	20.6114	20.6237	20.6255	20.6255	20.6234	20.6020	20.5009	20.3374 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9427	0.9062	0.8398	0.6981	0.5267	0.3431	0.2443	0.2646	0.4393	0.7021	0.8879	0.9511 (94)
Useful gains	497.3673	511.1887	493.4940	413.5059	305.1193	190.9162	129.5350	137.0975	228.8152	358.0996	443.0397	485.9789 (95)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000 (96)
Heat loss rate W	605.6968	582.7185	529.2917	420.7008	305.8152	190.9292	129.5356	137.0986	228.9266	364.5036	492.3958	601.4263 (97)
Space heating kWh	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929 (98a)
Space heating requirement - total per year (kWh/year)												287.1905
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												287.1905
Space heating per m2										(98c) / (4) =		4.6321 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)

elmhurst
energy

B 87
A 97

Full SAP Calculation Printout



N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 87
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, West Pennines (England)):

	Current	Potential	Saving
Electricity	£372	£372	£0
Space heating	£124	£124	£0
Water heating	£207	£207	£0
Lighting	£41	£41	£0
Total cost of fuels	£372	£372	£0
Total cost of uses	£372	£372	£0
Delivered energy	21 kWh/m²	21 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	32 kWh/m²	32 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.9400 (5)

2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.7000	(17)
Infiltration rate	0.1850	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1573 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2005	0.1966	0.1926	0.1730	0.1690	0.1494	0.1494	0.1455	0.1573	0.1690	0.1769	0.1848 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3405	0.3366	0.3326	0.3130	0.3090	0.2894	0.2894	0.2855	0.2973	0.3090	0.3169	0.3248 (25)

3. Heat losses and heat loss parameter

Element	Gross m²	Openings m²	NetArea m²	U-value W/m²K	A x U W/K	K-value kJ/m²K	A x K kJ/K
Main dwelling							

Full SAP Calculation Printout



Window				8.6000	0.7752	6.6667			(27)				
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998	(29a)					
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000	(30)					
Total net area of external elements Aum(A, m2)			98.6900					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.4438			(33)					
Main dwelling													
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999	(32)					
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999	(32)					
Party Floor 1			62.0000			40.0000	2480.0000	(32d)					
Internal Wall 1			96.0200			9.0000	864.1800	(32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		15547.8796	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.7723	(35)					
List of Thermal Bridges													
K1 Element					Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)					4.7700	0.0340	0.1622						
E3 Sill					4.7700	0.0260	0.1240						
E4 Jamb					10.8200	0.0300	0.3246						
E18 Party wall between dwellings					4.7400	0.0290	0.1375						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					17.4200	0.0000	0.0000						
E7 Party floor between dwellings (in blocks of flats)					15.4800	-0.0180	-0.2786						
E14 Flat roof					15.4800	0.1600	2.4768						
P4 Party wall - Roof (insulation at ceiling level)					17.4200	0.1280	2.2298						
E16 Corner (normal)					2.3700	0.0490	0.1161						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.2923	(36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	24.7361 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	16.5106	16.3200	16.1294	15.1762	14.9856	14.0325	14.0325	13.8418	14.4137	14.9856	15.3668	15.7481	(38)
Average = Sum(39)m / 12 =	41.2467	41.0561	40.8654	39.9123	39.7217	38.7685	38.7685	38.5779	39.1498	39.7217	40.1029	40.4842	(39)
												39.8646	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6653	0.6622	0.6591	0.6437	0.6407	0.6253	0.6253	0.6222	0.6314	0.6407	0.6468	0.6530	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0376 (42)
Hot water usage for mixer showers	80.2768	79.0704	77.3124	73.9489	71.4666	68.6985	67.1251	68.8697	70.7822	73.7544	77.1902	79.9692	(42a)
Hot water usage for baths	25.2299	24.8552	24.3275	23.3546	22.6261	21.8183	21.3820	21.9060	22.4765	23.3408	24.3338	25.1446	(42b)
Hot water usage for other uses	35.4969	34.2061	32.9153	31.6245	30.3337	29.0429	29.0429	30.3337	31.6245	32.9153	34.2061	35.4969	(42c)
Average daily hot water use (litres/day)												129.6745	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	141.0035	138.1316	134.5552	128.9280	124.4264	119.5597	117.5500	121.1094	124.8832	130.0105	135.7300	140.6107	(44)
Energy content (annual)	223.3151	196.6976	206.8063	176.4959	167.5019	147.0126	142.1665	149.9587	153.9934	176.4230	193.3723	220.1623	(45)
Distribution loss (46)m = 0.15 x (45)m	33.4973	29.5046	31.0210	26.4744	25.1253	22.0519	21.3250	22.4938	23.0990	26.4634	29.0058	33.0243	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924	(72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W
Southeast				8.6000	36.7938		0.2400		0.0000	0.7700	58.4757 (77)
Solar gains	58.4757	99.6058	136.2849	168.8636	189.1414	187.7736	181.0338	165.9057	147.5678	110.0856	50.0430 (83)
Total gains	534.4501	573.5623	594.9874	598.2578	590.3849	563.1996	540.9554	528.8506	524.9630	513.6023	513.4598 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	104.7079	105.1941	105.6848	108.2086	108.7279	111.4011	111.4011	111.9515	110.3162	108.7279	107.6943	106.6801
alpha	7.9805	8.0129	8.0457	8.2139	8.2485	8.4267	8.4267	8.4634	8.3544	8.2485	8.1796	8.1120
util living area												
	0.9670	0.9412	0.8876	0.7761	0.6208	0.4403	0.3153	0.3355	0.5136	0.7742	0.9293	0.9728 (86)
MIT	20.6747	20.7707	20.8780	20.9646	20.9944	20.9997	21.0000	21.0000	20.9990	20.9706	20.8336	20.6576 (87)
Th 2	20.3716	20.3743	20.3771	20.3908	20.3935	20.4073	20.4073	20.4100	20.4018	20.3935	20.3880	20.3826 (88)
util rest of house												
	0.9594	0.9289	0.8669	0.7445	0.5820	0.3996	0.2729	0.2925	0.4695	0.7373	0.9130	0.9664 (89)
MIT 2	20.0072	20.1253	20.2525	20.3586	20.3893	20.4071	20.4073	20.4100	20.4012	20.3683	20.2143	19.9959 (90)
Living area fraction									fLA = Living area / (4) =			
	20.2429	20.3532	20.4733	20.5726	20.6030	20.6164	20.6165	20.6183	20.6123	20.5810	20.4329	20.3531 (91)
MIT												
Temperature adjustment												0.0000
adjusted MIT	20.2429	20.3532	20.4733	20.5726	20.6030	20.6164	20.6165	20.6183	20.6123	20.5810	20.4329	20.2295 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9576	0.9284	0.8703	0.7542	0.5955	0.4140	0.2878	0.3077	0.4851	0.7490	0.9143	0.9646 (94)
Useful gains	511.8015	532.4946	517.8234	451.1993	351.5529	233.1644	155.7124	162.7287	254.6394	384.6986	462.2120	495.2660 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	657.5909	634.4457	571.0258	465.8791	353.6404	233.2456	155.7155	162.7340	254.9540	396.4606	534.6902	648.9411 (97)
Space heating kWh	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (98a)
Space heating requirement - total per year (kWh/year)												403.9531
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												403.9531
Space heating per m2										(98c) / (4) =		6.5154 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	108.4673	68.5111	39.5826	10.5695	1.5531	0.0000	0.0000	0.0000	0.0000	8.7509	52.1843	114.3342 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Efficiency of water heater	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764 (216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.7893	12.7893	12.3768	12.7893 (231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													403.9531	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													340.0764	
Water heating fuel used													726.6710	(219)
Space cooling fuel													0.0000	(221)

Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													150.5841	(230a)
Total electricity for the above, kWh/year													150.5841	(231)
Electricity for lighting (calculated in Appendix L)													145.1281	(232)

Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1426.3363	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	403.9531	16.4900	66.6119	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	16.4900	119.8280	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	150.5841	16.4900	24.8313	(249)
Energy for lighting	145.1281	16.4900	23.9316	(250)
Additional standing charges			0.0000	(251)
Total energy cost			235.2029	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7913	(257)
SAP value		87.1724	
SAP rating (Section 12)		87	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	403.9531	0.1587	64.1210	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			166.7344	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	145.1281	0.1443	20.9465	(268)
Total CO2, kg/year			208.5687	(272)
CO2 emissions per m2			3.3600	(273)
EI value			97.3880	
EI rating			97	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	62.0000 (1b)	x 2.3700 (2b)	= 146.9400 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.9400 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

Full SAP Calculation Printout



Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.7000 (17)
Infiltration rate 0.1850 (18)
Number of sides sheltered 2 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1573 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.3000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0750	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate												
	0.1690	0.1651	0.1690	0.1533	0.1573	0.1337	0.1297	0.1297	0.1337	0.1494	0.1494	0.1533
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3090	0.3051	0.3090	0.2933	0.2973	0.2737	0.2697	0.2697	0.2737	0.2894	0.2894	0.2933

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			8.6000	0.7752	6.6667		(27)
External Wall	36.6900	8.6000	28.0900	0.1900	5.3371	150.0000	4213.4998 (29a)
External Roof 1	62.0000		62.0000	0.1200	7.4400	9.0000	558.0000 (30)
Total net area of external elements Aum(A, m2)			98.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.4438		(33)
Main dwelling							
Corridor			22.9700	0.0000	0.0000	180.0000	4134.5999 (32)
Party Wall			18.3200	0.0000	0.0000	180.0000	3297.5999 (32)
Party Floor 1			62.0000			40.0000	2480.0000 (32d)
Internal Wall 1			96.0200			9.0000	864.1800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 15547.8796 (34)
List of Thermal Bridges 250.7723 (35)

	Length	Psi-value	Total
K1 Element	4.7700	0.0340	0.1622
E2 Other lintels (including other steel lintels)	4.7700	0.0260	0.1240
E3 Sill	10.8200	0.0300	0.3246
E4 Jamb	4.7400	0.0290	0.1375
E18 Party wall between dwellings	17.4200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.4800	-0.0180	-0.2786
E7 Party floor between dwellings (in blocks of flats)	15.4800	0.1600	2.4768
E14 Flat roof	17.4200	0.1280	2.2298
P4 Party wall - Roof (insulation at ceiling level)	2.3700	0.0490	0.1161
E16 Corner (normal)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2923 (36)
Point Thermal bridges			0.0000 (36a)
Total fabric heat loss			(33) + (36) + (36a) = 24.7361 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan 14.9856 Feb 14.7950 Mar 14.9856 Apr 14.2231 May 14.4137 Jun 13.2699 Jul 13.0793 Aug 13.0793 Sep 13.2699 Oct 14.0325 Nov 14.0325 Dec 14.2231 (38)
Heat transfer coeff 39.7217 39.5310 39.7217 38.9592 39.1498 38.0060 37.8154 37.8154 38.0060 38.7685 38.7685 38.9592 (39)
Average = Sum(39)m / 12 = 38.7685

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6407	0.6376	0.6407	0.6284	0.6314	0.6130	0.6099	0.6099	0.6130	0.6253	0.6253	0.6284
HLP (average)												0.6253
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0376 (42)
Hot water usage for mixer showers 80.2768 79.0704 77.3124 73.9489 71.4666 68.6985 67.1251 68.8697 70.7822 73.7544 77.1902 79.9692 (42a)
Hot water usage for baths 25.2299 24.8552 24.3275 23.3546 22.6261 21.8183 21.3820 21.9060 22.4765 23.3408 24.3338 25.1446 (42b)
Hot water usage for other uses 35.4969 34.2061 32.9153 31.6245 30.3337 29.0429 29.0429 30.3337 31.6245 32.9153 34.2061 35.4969 (42c)
Average daily hot water use (litres/day) 129.6745 (43)
Daily hot water use
Jan 141.0035 Feb 138.1316 Mar 134.5552 Apr 128.9280 May 124.4264 Jun 119.5597 Jul 117.5500 Aug 121.1094 Sep 124.8832 Oct 130.0105 Nov 135.7300 Dec 140.6107 (44)
Energy conte 223.3151 196.6976 206.8063 176.4959 167.5019 147.0126 142.1665 149.9587 153.9934 176.4230 193.3723 220.1623 (45)
Energy content (annual) Total = Sum(45)m = 2153.9058
Distribution loss (46)m = 0.15 x (45)m 33.4973 29.5046 31.0210 26.4744 25.1253 22.0519 21.3250 22.4938 23.0990 26.4634 29.0058 33.0243 (46)
Water storage loss:
Store volume 201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.8694 (55)
Total storage loss
26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (56)
If cylinder contains dedicated solar storage
26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month

Full SAP Calculation Printout



WWHRS	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	74.2523	65.4019	68.7631	58.6849	55.6944	48.8817	47.2704	49.8613	51.2028	58.6606	64.2963	73.2040 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	122.2548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.5444	18.2473	14.8397	11.2346	8.3980	7.0900	7.6610	9.9580	13.3656	16.9707	19.8073	21.1154	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	265.6139	268.3702	261.4245	246.6381	227.9728	210.4302	198.7106	195.9543	202.9000	217.6864	236.3516	253.8943	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	49.2631	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	-81.5032	(71)
Water heating gains (Table 5)	99.8014	97.3243	92.4235	81.5068	74.8580	67.8912	63.5354	67.0178	71.1150	78.8450	89.3004	98.3924	(72)
Total internal gains	475.9744	473.9565	458.7025	429.3942	401.2436	375.4261	359.9216	362.9449	377.3953	403.5168	435.4740	463.4168	(73)

6. Solar gains

[Jan]													
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W

Southeast				8.6000	32.4665		0.2400		0.0000		0.7700		51.5984 (77)

Solar gains	51.5984	90.1589	128.8984	162.9537	178.0856	181.0203	170.3097	155.1034	143.4232	106.4917	63.5129	47.5405	(83)
Total gains	527.5728	564.1154	587.6009	592.3479	579.3292	556.4463	530.2314	518.0483	520.8185	510.0085	498.9869	510.9573	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	108.7279	109.2523	108.7279	110.8560	110.3162	113.6361	114.2089	114.2089	113.6361	111.4011	111.4011	110.8560	
alpha	8.2485	8.2835	8.2485	8.3904	8.3544	8.5757	8.6139	8.6139	8.5757	8.4267	8.4267	8.3904	
util living area	0.9539	0.9207	0.8584	0.7208	0.5523	0.3688	0.2710	0.2920	0.4667	0.7280	0.9048	0.9612	(86)
MIT	20.7562	20.8375	20.9168	20.9821	20.9980	21.0000	21.0000	21.0000	20.9996	20.9835	20.8852	20.7406	(87)
Th 2	20.3935	20.3963	20.3935	20.4045	20.4018	20.4183	20.4211	20.4211	20.4183	20.4073	20.4073	20.4045	(88)
util rest of house	0.9436	0.9049	0.8344	0.6868	0.5128	0.3291	0.2297	0.2497	0.4244	0.6891	0.8844	0.9522	(89)
MIT 2	20.1261	20.2243	20.3112	20.3891	20.4004	20.4183	20.4211	20.4211	20.4181	20.3939	20.2912	20.1173	(90)
Living area fraction	20.3485	20.4408	20.5250	20.5985	20.6114	20.6237	20.6255	20.6255	20.6234	20.6020	20.5009	20.3374	(91)
MIT	20.3485	20.4408	20.5250	20.5985	20.6114	20.6237	20.6255	20.6255	20.6234	20.6020	20.5009	20.3374	(92)
Temperature adjustment	20.3485	20.4408	20.5250	20.5985	20.6114	20.6237	20.6255	20.6255	20.6234	20.6020	20.5009	20.3374	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	497.3673	511.1887	493.4940	413.5059	305.1193	190.9162	129.5350	137.0975	228.8152	358.0996	443.0397	485.9789	(94)
Ext temp.	5.1000	5.7000	7.2000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	4.9000	(95)
Heat loss rate W	605.6968	582.7185	529.2917	420.7008	305.8152	190.9292	129.5356	137.0986	228.9266	364.5036	492.3958	601.4263	(96)
Space heating kWh	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929	(98a)
Space heating requirement - total per year (kWh/year)												287.1905	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												287.1905	
Space heating per m2												4.6321	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	80.5971	48.0680	26.6335	5.1803	0.5178	0.0000	0.0000	0.0000	0.0000	4.7646	35.5363	85.8929	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	250.2665	221.0408	233.7577	202.5779	194.4533	173.0946	169.1179	176.9101	180.0754	203.3744	219.4543	247.1137	(64)
Efficiency of water heater (217)m	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	340.0764	(216)
Fuel for water heating, kWh/month	73.5913	64.9974	68.7368	59.5684	57.1793	50.8987	49.7294	52.0207	52.9515	59.8026	64.5309	72.6642	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.7893	11.5517	12.7893	12.3768	12.7893	12.3768	12.7893	12.7893	12.3768	12.7893	12.3768	12.7893	(231)
Lighting	17.9824	14.4261	12.9891	9.5164	7.3507	6.0056	6.7056	8.7162	11.3215	14.8544	16.7780	18.4822	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												287.1905	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												340.0764	
Water heating fuel used												726.6710	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												150.5841	(230a)
Total electricity for the above, kWh/year												150.5841	(231)
Electricity for lighting (calculated in Appendix L)												145.1281	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1309.5737	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	287.1905	28.4300	81.6483	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	28.4300	206.5926	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	150.5841	28.4300	42.8111	(249)
Energy for lighting	145.1281	28.4300	41.2599	(250)
Additional standing charges			0.0000	(251)
Total energy cost			372.3118	(255)

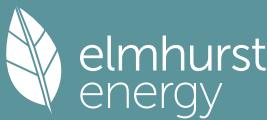
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	287.1905	0.1592	45.7268	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	726.6710	0.1412	102.6134	(264)
Space and water heating			148.3402	(265)
Pumps, fans and electric keep-hot	150.5841	0.1387	20.8879	(267)
Energy for lighting	145.1281	0.1443	20.9465	(268)
Total CO2, kg/year			190.1745	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	287.1905	1.5894	456.4497	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	726.6710	1.5222	1106.1095	(278)
Space and water heating			1562.5592	(279)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	150.5841	1.5128	227.8036 (281)
Energy for lighting	145.1281	1.5338	222.6023 (282)
Total Primary energy kWh/year			2012.9652 (286)