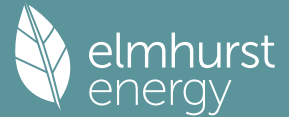


Full SAP Calculation Printout



Plot Reference	Plot 07			Issued on Date	22/12/2025
Assessment Reference	Plot 07	Plot Type Ref			
Plot Address	Flat 2, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	88 B	DER	3.12	TER	11.22
Environmental	98 A	% DER < TER			72.19
CO ₂ Emissions (t/year)	0.19	DFEE	22.37	TFEE	26.29
Compliance Check	See BREL	% DFEE < TFEE			14.92
% DPER < TPER	44.92	DPER	32.69	TPER	59.35
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client	J Greenwood (Builders) Limited, Steve Brown				

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	73.4100 (1b)	2.5000 (2b)	183.5250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	183.5250 (5)

2. Ventilation rate

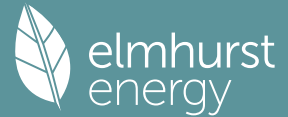
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.9800 (17)
Infiltration rate	0.1490 (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) = 0.1266 (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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			73.4100	0.1100	8.0751	110.0000	8075.1000 (28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230	110.0000	2458.4999 (29a)
Total net area of external elements Aum(A, m ²)			106.9600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.9466		(33)
Main dwelling							
Party Wall			55.4800	0.0000	0.0000	45.0000	2496.6000 (32)
Corridor			23.5600	0.0000	0.0000	45.0000	1060.2000 (32)
Party Ceiling			73.4100			30.0000	2202.3000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17262.7199 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							235.1549 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	13.6300	0.0370	0.5043
P1 Party wall - Ground floor	29.4900	0.0510	1.5040
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	13.6300	0.0670	0.9132
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	5.3600	0.0320	0.1715
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.7438 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.6904 (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	18.2585	18.0668	17.8750	16.9162	16.7245	15.7657	15.7657	15.5739	16.1492	16.7245	17.1080	17.4915	(38)
Heat transfer coeff	48.9489	48.7572	48.5654	47.6066	47.4149	46.4561	46.4561	46.2643	46.8396	47.4149	47.7984	48.1819	(39)
Average = Sum(39)m / 12 =												47.5587	
HLP	0.6668	0.6642	0.6616	0.6485	0.6459	0.6328	0.6328	0.6302	0.6381	0.6459	0.6511	0.6563	(40)
HLP (average)												0.6478	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3260 (42)
Hot water usage for mixer showers	63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766	(42a)
Hot water usage for baths	27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171	(42b)
Hot water usage for other uses	38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504	(42c)
Average daily hot water use (litres/day)												118.5607	(43)
Daily hot water use	128.9786	126.2248	122.8710	117.7709	113.6294	109.1769	107.4655	110.8048	114.3266	119.0010	124.1797	128.6441	(44)
Energy conte	204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255	(45)
Energy content (annual)										Total = Sum(45)m =		1969.2679	
Distribution loss (46)m = 0.15 x (45)m	30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138	(46)
Water storage loss (or HIU 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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(64)
										Total per year (kWh/year) = Sum(64)m =		2286.5989	(64)
12Total per year (kWh/year)												2287	(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	67.9200	59.7644	62.7920	53.6065	50.8615	44.6367	43.2151	45.6188	46.8746	53.6932	58.8248	66.9740	(65)

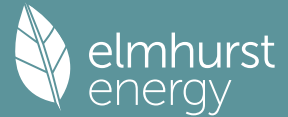
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.9816	120.6582	108.9816	112.6143	108.9816	112.6143	108.9816	108.9816	112.6143	108.9816	112.6143	108.9816	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.1215	207.2500	201.8862	190.4673	176.0530	162.5056	153.4551	151.3266	156.6904	168.1093	182.5236	196.0710	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	(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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	(71)
Water heating gains (Table 5)	91.2903	88.9350	84.3979	74.4534	68.3623	61.9954	58.0848	61.3156	65.1036	72.1683	81.7012	90.0188	(72)
Total internal gains	463.2831	474.7330	453.1555	435.4248	411.2867	395.0051	378.4113	379.5136	392.2980	407.1489	434.7288	452.9612	(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
North	3.6800	10.6334	0.4000	0.0000	0.7700	12.0523 (74)
South	7.5200	46.7521	0.4000	0.0000	0.7700	108.2853 (78)

Full SAP Calculation Printout



Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	583.6207	675.1090	718.1974	753.6110	762.0322	741.7101	713.2256	689.6183	675.3380	625.8476	577.9519	556.5770 (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	97.9633	98.3486	98.7370	100.7255	101.1329	103.2201	103.2201	103.6480	102.3750	101.1329	100.3214	99.5229
alpha	7.5309	7.5566	7.5825	7.7150	7.7422	7.8813	7.8813	7.9099	7.8250	7.7422	7.6881	7.6349
util living area	0.9760	0.9382	0.8746	0.7393	0.5751	0.4007	0.2866	0.3086	0.4778	0.7578	0.9365	0.9814 (86)
MIT	20.5817	20.7439	20.8715	20.9680	20.9954	20.9998	21.0000	21.0000	20.9991	20.9680	20.7915	20.5546 (87)
Th 2	20.3703	20.3726	20.3749	20.3865	20.3889	20.4005	20.4005	20.4029	20.3959	20.3889	20.3842	20.3796 (88)
util rest of house	0.9704	0.9260	0.8534	0.7078	0.5385	0.3632	0.2475	0.2685	0.4363	0.7212	0.9220	0.9769 (89)
MIT 2	19.8932	20.0924	20.2428	20.3573	20.3853	20.4004	20.4005	20.4029	20.3953	20.3610	20.1623	19.8676 (90)
Living area fraction										FLA = Living area / (4) =		0.3926 (91)
MIT	20.1635	20.3482	20.4896	20.5970	20.6248	20.6357	20.6359	20.6373	20.6324	20.5993	20.4093	20.1373 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1635	20.3482	20.4896	20.5970	20.6248	20.6357	20.6359	20.6373	20.6324	20.5993	20.4093	20.1373 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9683	0.9254	0.8575	0.7188	0.5527	0.3779	0.2629	0.2843	0.4526	0.7341	0.9226	0.9749 (94)
Useful gains	565.1221	624.7705	615.8690	541.6861	421.1780	280.3140	187.4872	196.0285	305.6313	459.4260	533.2406	542.5862 (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	776.4992	753.2100	679.4120	556.8563	423.1700	280.3956	187.4909	196.0352	305.9729	474.1170	636.1639	767.8897 (97)
Space heating kWh	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (98a)
Space heating requirement - total per year (kWh/year)												555.9172
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	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												555.9172
Space heating per m2										(98c) / (4) =		7.5728 (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	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (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)	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769 (64)
Efficiency of water heater (217)m	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958 (216)
Fuel for water heating, kWh/month	67.2948	59.3970	62.8062	54.5130	52.3634	46.6617	45.6704	47.7744	48.6205	54.8420	59.0807	66.4667 (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	14.2622	12.8819	14.2622	13.8021	14.2622	13.8021	14.2622	14.2622	13.8021	14.2622	13.8021	14.2622 (231)
Lighting	20.1610	16.1739	14.5628	10.6694	8.2413	6.7332	7.5180	9.7722	12.6931	16.6540	18.8107	20.7214 (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												555.9172 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.5958
Water heating fuel used												665.4910 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	167.9254 (230a)
Total electricity for the above, kWh/year	167.9254 (231)
Electricity for lighting (calculated in Appendix L)	162.7112 (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	1552.0447 (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	555.9172	0.1591	88.4340 (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)	665.4910	0.1412	93.9543 (264)
Space and water heating			182.3883 (265)
Pumps, fans and electric keep-hot	167.9254	0.1387	23.2933 (267)
Energy for lighting	162.7112	0.1443	23.4843 (268)
Total CO2, kg/year			229.1659 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.1200 (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	555.9172	1.5888	883.2417 (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)	665.4910	1.5220	1012.9091 (278)
Space and water heating			1896.1508 (279)
Pumps, fans and electric keep-hot	167.9254	1.5128	254.0375 (281)
Energy for lighting	162.7112	1.5338	249.5718 (282)
Total Primary energy kWh/year			2399.7602 (286)
Dwelling Primary energy Rate (DPER)			32.6900 (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	73.4100 (1b)	x 2.5000 (2b)	= 183.5250 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.5250 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1635 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4135 (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) = 0.3514 (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	0.4481	0.4393	0.4305	0.3866	0.3778	0.3339	0.3339	0.3251	0.3514	0.3778	0.3954	0.4129 (22b)
Effective ac	0.6004	0.5965	0.5927	0.5747	0.5714	0.5557	0.5557	0.5528	0.5618	0.5714	0.5782	0.5853 (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			11.2000	1.1450	12.8244			(27)
Ground Floor			73.4100	0.1300	9.5433			(28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230			(29a)
Total net area of external elements Aum(A, m2)			106.9600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		26.3907			(33)
Main dwelling								
Party Wall			55.4800	0.0000	0.0000			(32)
Corridor			23.5600	0.0000	0.0000			(32)

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

235.1549 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	13.6300	0.0700	0.9541	
P1 Party wall - Ground floor	29.4900	0.0800	2.3592	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885	
E3 Sill	2.5000	0.0500	0.1250	
E4 Jamb	10.4800	0.0500	0.5240	
E5 Ground floor (normal)	13.6300	0.1600	2.1808	
E16 Corner (normal)	2.6800	0.0900	0.2412	
E18 Party wall between dwellings	5.3600	0.0600	0.3216	
E25 Staggered party wall between dwellings	5.3600	0.0600	0.3216	

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

7.3160 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 33.7067 (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	36.3618	36.1257	35.8943	34.8073	34.6039	33.6572	33.6572	33.4818	34.0218	34.6039	35.0153	35.4454	(38)
Average = Sum(39)m / 12 =	70.0685	69.8324	69.6010	68.5140	68.3106	67.3639	67.3639	67.1886	67.7286	68.3106	68.7221	69.1522	(39)
												68.5130	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9545	0.9513	0.9481	0.9333	0.9305	0.9176	0.9176	0.9153	0.9226	0.9305	0.9361	0.9420	(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												2.3260 (42)
Hot water usage for mixer showers												
63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766	(42a)
Hot water usage for baths												
27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171	(42b)
Hot water usage for other uses												
38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504	(42c)
Average daily hot water use (litres/day)												118.5607 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
Energy conte	128.9786	126.2248	122.8710	117.7709	113.6294	109.1769	107.4655	110.8048	114.3266	119.0010	124.1797	128.6441	(44)
Energy content (annual)	204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1969.2679	
	30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138	(46)

Water storage loss (or HIU 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 250.8655 221.8281 235.4431 206.3143 199.5619 179.3376 176.5651 183.7944 186.0680 208.0782 222.0086 248.0204 (62)

WWHRS -28.9010 -25.5603 -26.7653 -22.1627 -20.6548 -17.6745 -16.5670 -17.6174 -18.2867 -21.5580 -24.4226 -28.3658 (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 221.9645 196.2679 208.6778 184.1516 178.9071 161.6631 159.9981 166.1770 167.7813 186.5202 197.5860 219.6546 (64)

Total per year (kWh/year) = Sum(64a)m = 2249.3493 (64)

12Total per year (kWh/year) 2249 (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)

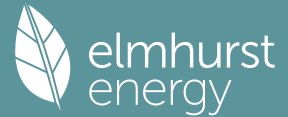
Total Energy used by instantaneous electric shower(s) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 105.1959 93.4329 100.0679 89.6799 88.1375 80.7102 80.4910 82.8948 82.9480 90.9691 94.8983 104.2499 (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	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.9816	120.6582	108.9816	112.6143	108.9816	112.6143	108.9816	108.9816	112.6143	108.9816	112.6143	108.9816	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.1215	207.2500	201.8862	190.4673	176.0530	162.5056	153.4551	151.3266	156.6904	168.1093	182.5236	196.0710	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	(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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	(71)
Water heating gains (Table 5)													

Full SAP Calculation Printout



Total internal gains	141.3923	139.0371	134.4999	124.5555	118.4643	112.0975	108.1869	111.4177	115.2056	122.2703	131.8032	140.1209 (72)
	516.3852	527.8351	506.2575	488.5269	464.3887	445.1072	428.5133	429.6156	442.4001	460.2509	487.8309	506.0632 (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	
North	3.6800		10.6334		0.6300		0.7000		0.7700		11.9589 (74)	
South	7.5200		46.7521		0.6300		0.7000		0.7700		107.4461 (78)	
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	635.7902	726.6581	769.2454	804.2471	812.4160	789.1252	760.7328	737.3170	723.2464	677.2548	629.9439	608.8760 (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	68.4359	68.6672	68.8956	69.9886	70.1970	71.1835	71.1835	71.3693	70.8003	70.1970	69.7767	69.3427
alpha	5.5624	5.5778	5.5930	5.6659	5.6798	5.7456	5.7456	5.7580	5.7200	5.6798	5.6518	5.6228
util living area	0.9844	0.9671	0.9375	0.8626	0.7297	0.5385	0.3886	0.4175	0.6263	0.8698	0.9655	0.9872 (86)
MIT	20.1337	20.3287	20.5409	20.7837	20.9321	20.9901	20.9987	20.9981	20.9770	20.8060	20.4456	20.1054 (87)
Th 2	20.1214	20.1241	20.1268	20.1393	20.1416	20.1525	20.1525	20.1546	20.1483	20.1416	20.1369	20.1319 (88)
util rest of house	0.9801	0.9587	0.9218	0.8309	0.6771	0.4706	0.3143	0.3417	0.5567	0.8335	0.9551	0.9837 (89)
MIT 2	19.1300	19.3752	19.6373	19.9305	20.0871	20.1469	20.1521	20.1538	20.1339	19.9625	19.5337	19.1026 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5240	19.7495	19.9920	20.2655	20.4188	20.4780	20.4845	20.4853	20.4649	20.2936	19.8917	19.4963 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5240	19.7495	19.9920	20.2655	20.4188	20.4780	20.4845	20.4853	20.4649	20.2936	19.8917	19.4963 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9765	0.9544	0.9190	0.8359	0.6947	0.4970	0.3435	0.3715	0.5832	0.8406	0.9516	0.9805 (94)
Useful gains	620.8488	693.5476	706.9316	672.2889	564.4131	392.1736	261.2994	273.9007	421.7706	569.2722	599.4742	596.9933 (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	1066.7257	1036.9774	939.0597	778.6942	595.5877	395.9624	261.6727	274.4840	431.0838	662.1789	879.0737	1057.7716 (97)
Space heating kWh	331.7325	230.7848	172.7033	76.6118	23.1939	0.0000	0.0000	0.0000	0.0000	69.1226	201.3116	342.8190 (98a)
Space heating requirement - total per year (kWh/year)												1448.2796
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	331.7325	230.7848	172.7033	76.6118	23.1939	0.0000	0.0000	0.0000	0.0000	69.1226	201.3116	342.8190 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1448.2796
Space heating per m2												(98c) / (4) = 19.7286 (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	331.7325	230.7848	172.7033	76.6118	23.1939	0.0000	0.0000	0.0000	0.0000	69.1226	201.3116	342.8190 (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)	359.4068	250.0377	187.1108	83.0031	25.1288	0.0000	0.0000	0.0000	0.0000	74.8891	218.1058	371.4182 (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	221.9645	196.2679	208.6778	184.1516	178.9071	161.6631	159.9981	166.1770	167.7813	186.5202	197.5860	219.6546 (64)
Efficiency of water heater (217)m	84.9589	84.4240	83.6386	82.2491	80.7391	79.8000	79.8000	79.8000	79.8000	82.0485	84.1017	79.8000 (216)
Fuel for water heating, kWh/month	261.2612	232.4786	249.4993	223.8950	221.5866	202.5853	200.4989	208.2419	210.2522	227.3292	234.9370	258.2533 (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	22.6442	18.1660	16.3565	11.9835	9.2564	7.5625	8.4440	10.9758	14.2565	18.7053	21.1276	23.2736 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.6500	-29.1001	-43.9107	-51.9077	-58.1978	-55.1357	-54.4663	-50.3182	-43.3845	-34.3877	-22.0950	-16.8297 (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	-7.2217	-15.5157	-31.4518	-48.1507	-64.5684	-65.2077	-64.4375	-54.1402	-39.1391	-22.4808	-9.7348	-5.6866	(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												1569.1003	(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												2730.8185	(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)												182.7518	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-907.1183	(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												3661.5523	(238)

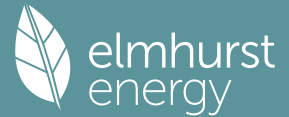
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1569.1003	0.2100	329.5111 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2730.8185	0.2100	573.4719 (264)
Space and water heating			902.9830 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	182.7518	0.1443	26.3767 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-479.3835	0.1336	-64.0291
PV Unit electricity exported	-427.7349	0.1253	-53.6123
Total			-117.6414 (269)
Total CO2, kg/year			823.6476 (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	1569.1003	1.1300	1773.0833 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2730.8185	1.1300	3085.8249 (278)
Space and water heating			4858.9083 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	182.7518	1.5338	280.3109 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-479.3835	1.4936	-715.9965
PV Unit electricity exported	-427.7349	0.4601	-196.7824
Total			-912.7790 (283)
Total Primary energy kWh/year			4356.5410 (286)
Target Primary Energy Rate (TPER)			59.3500 (287)

Full SAP Calculation Printout



Plot Reference	Plot 07			Issued on Date	22/12/2025
Assessment Reference	Plot 07	Plot Type Ref			
Plot Address	Flat 2, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	88 B	DER	3.12	TER	11.22
Environmental	98 A	% DER < TER			72.19
CO ₂ Emissions (t/year)	0.19	DFEE	22.37	TFEE	26.29
Compliance Check	See BREL	% DFEE < TFEE			14.92
% DPER < TPER	44.92	DPER	32.69	TPER	59.35
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client	J Greenwood (Builders) Limited, Steve Brown				

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	73.4100 (1b)	x 2.5000 (2b)	= 183.5250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.5250 (5)

2. Ventilation rate

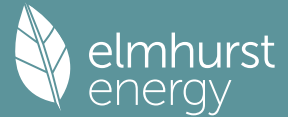
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1635 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.9800 (17)
Infiltration rate	0.3125 (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) = 0.2656 (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	0.3386	0.3320	0.3254	0.2922	0.2855	0.2523	0.2523	0.2457	0.2656	0.2855	0.2988	0.3121 (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	0.5573	0.5551	0.5529	0.5427	0.5408	0.5318	0.5318	0.5302	0.5353	0.5408	0.5446	0.5487 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			73.4100	0.1100	8.0751	110.0000	8075.1000 (28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230	110.0000	2458.4999 (29a)
Total net area of external elements Aum(A, m ²)			106.9600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.9466		(33)
Main dwelling							
Party Wall			55.4800	0.0000	0.0000	45.0000	2496.6000 (32)
Corridor			23.5600	0.0000	0.0000	45.0000	1060.2000 (32)
Party Ceiling			73.4100			30.0000	2202.3000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17262.7199 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							235.1549 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				13.6300	0.0370	0.5043	
P1 Party wall - Ground floor				29.4900	0.0510	1.5040	

Full SAP Calculation Printout



P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442	
E3 Sill	2.5000	0.0220	0.0550	
E4 Jamb	10.4800	0.0170	0.1782	
E5 Ground floor (normal)	13.6300	0.0670	0.9132	
E16 Corner (normal)	2.6800	0.0420	0.1126	
E18 Party wall between dwellings	5.3600	0.0320	0.1715	
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				3.7438 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		30.6904 (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	33.7541	33.6193	33.4871	32.8663	32.7502	32.2095	32.2095	32.1093	32.4177	32.7502	32.9851	33.2308 (38)
Average = Sum(39)m / 12 =	64.4445	64.3097	64.1775	63.5567	63.4405	62.8998	62.8998	62.7997	63.1081	63.4405	63.6755	63.9212 (39)
												63.5561
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8779	0.8760	0.8742	0.8658	0.8642	0.8568	0.8568	0.8555	0.8597	0.8642	0.8674	0.8707 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

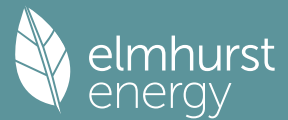
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.3260 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171 (42b)
Hot water usage for other uses	38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504 (42c)
Average daily hot water use (litres/day)												60.2750 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	65.7598	63.9560	61.9867	59.5354	57.3487	55.0761	54.6038	56.5692	58.5849	60.9187	63.3917	65.6675 (44)
Energy content	104.1475	91.0725	95.2712	81.5010	77.2023	67.7225	66.0386	70.0444	72.2410	82.6661	90.3130	102.8194 (45)
Energy content (annual)										Total = Sum(45)m =		1001.0396
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 (or HIU 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	88.5253	77.4117	80.9805	69.2758	65.6220	57.5641	56.1328	59.5378	61.4049	70.2662	76.7661	87.3965 (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	88.5253	77.4117	80.9805	69.2758	65.6220	57.5641	56.1328	59.5378	61.4049	70.2662	76.7661	87.3965 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				850.8836 (64)
Electric shower(s)	50.6277	45.1097	49.2581	47.0064	47.8885	45.6809	47.2036	47.8885	47.0064	49.2581	48.3319	50.6277 (64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				575.8875 (64a)
Heat gains from water heating, kWh/month	34.7883	30.6303	32.5597	29.0706	28.3776	25.8113	25.8341	26.8566	27.1028	29.8811	31.2745	34.5061 (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	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.9816	120.6582	108.9816	112.6143	108.9816	112.6143	108.9816	108.9816	112.6143	108.9816	112.6143	108.9816 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.1215	207.2500	201.8862	190.4673	176.0530	162.5056	153.4551	151.3266	156.6904	168.1093	182.5236	196.0710 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299 (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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395 (71)
Water heating gains (Table 5)	46.7584	45.5809	43.7630	40.3758	38.1419	35.8490	34.7233	36.0975	37.6428	40.1627	43.4368	46.3791 (72)
Total internal gains	418.7513	431.3788	412.5206	401.3472	381.0663	368.8587	355.0497	354.2955	364.8373	375.1434	396.4644	409.3215 (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
North			3.6800	10.6334	0.4000	0.0000		0.7700				12.0523 (74)
South			7.5200	46.7521	0.4000	0.0000		0.7700				108.2853 (78)
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	539.0889	631.7548	677.5625	719.5334	731.8119	715.5637	689.8640	664.4002	647.8772	593.8421	539.6875	512.9373 (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	74.4082	74.5642	74.7178	75.4476	75.5857	76.2355	76.2355	76.3570	75.9839	75.5857	75.3068	75.0174
alpha	5.9605	5.9709	5.9812	6.0298	6.0390	6.0824	6.0824	6.0905	6.0656	6.0390	6.0205	6.0012
util living area	0.9918	0.9789	0.9543	0.8846	0.7517	0.5550	0.4002	0.4333	0.6510	0.8989	0.9795	0.9938 (86)
MIT	20.1247	20.3259	20.5406	20.7853	20.9353	20.9912	20.9990	20.9983	20.9779	20.7958	20.4227	20.0869 (87)
Th 2	20.1864	20.1879	20.1895	20.1967	20.1980	20.2044	20.2044	20.2055	20.2019	20.1980	20.1953	20.1924 (88)
util rest of house	0.9895	0.9733	0.9422	0.8568	0.7020	0.4892	0.3284	0.3592	0.5838	0.8685	0.9730	0.9920 (89)
MIT 2	19.3938	19.5925	19.8010	20.0323	20.1569	20.2004	20.2041	20.2050	20.1908	20.0470	19.6953	19.3614 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.6808	19.8804	20.0914	20.3279	20.4625	20.5109	20.5161	20.5165	20.4998	20.3410	19.9808	19.6462 (92)
Temperature adjustment												
adjusted MIT	19.6808	19.8804	20.0914	20.3279	20.4625	20.5109	20.5161	20.5165	20.4998	20.3410	19.9808	19.6462 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9877	0.9707	0.9405	0.8617	0.7191	0.5149	0.3566	0.3883	0.6095	0.8744	0.9709	0.9905 (94)
Useful gains	532.4748	613.2717	637.2688	620.0535	526.2145	368.4304	246.0224	258.0095	394.9076	519.2783	524.0044	508.0457 (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	991.2073	963.3841	872.2614	726.3206	555.8990	371.7927	246.3241	258.5133	403.8804	617.9742	820.1943	987.3421 (97)
Space heating kWh	341.2970	235.2756	174.8344	76.5123	22.0853	0.0000	0.0000	0.0000	0.0000	73.4298	213.2567	356.5965 (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	341.2970	235.2756	174.8344	76.5123	22.0853	0.0000	0.0000	0.0000	0.0000	73.4298	213.2567	356.5965 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
Space heating per m2	(98c) / (4) =											

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	591.2585	465.4588	477.2778	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9507	0.9801	0.9736	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	562.1205	456.2093	464.6671	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	790.9713	763.2071	735.6125	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	164.7726	228.4064	201.5834	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	41.1931	57.1016	50.3958	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												
Energy for space heating												
Energy for space cooling												
Total												
Fabric Energy Efficiency (DFEE)												

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

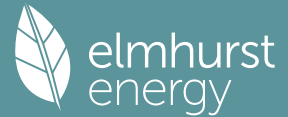
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	73.4100 (1b)	x 2.5000 (2b)	= 183.5250 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		20.3417 (99)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	183.5250 (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	3 * 10 = 30.0000 (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	30.0000 / (5) = 0.1635 (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)
0.4135 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor
(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.3514 (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 infilt rate	0.4481	0.4393	0.4305	0.3866	0.3778	0.3339	0.3339	0.3251	0.3514	0.3778	0.3954	0.4129	(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	0.6004	0.5965	0.5927	0.5747	0.5714	0.5557	0.5557	0.5528	0.5618	0.5714	0.5782	0.5853	(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			11.2000	1.1450	12.8244			(27)
Ground Floor			73.4100	0.1300	9.5433			(28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230			(29a)
Total net area of external elements Aum(A, m2)			106.9600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 26.3907			(33)
Main dwelling								
Party Wall			55.4800	0.0000	0.0000			(32)
Corridor			23.5600	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							235.1549	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	13.6300	0.0700	0.9541	
P1 Party wall - Ground floor	29.4900	0.0800	2.3592	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885	
E3 Sill	2.5000	0.0500	0.1250	
E4 Jamb	10.4800	0.0500	0.5240	
E5 Ground floor (normal)	13.6300	0.1600	2.1808	
E16 Corner (normal)	2.6800	0.0900	0.2412	
E18 Party wall between dwellings	5.3600	0.0600	0.3216	
E25 Staggered party wall between dwellings	5.3600	0.0600	0.3216	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.3160 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	33.7067 (37)

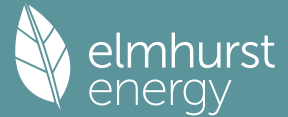
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	36.3618	36.1257	35.8943	34.8073	34.6039	33.6572	33.6572	33.4818	34.0218	34.6039	35.0153	35.4454	(38)
Heat transfer coeff	70.0685	69.8324	69.6010	68.5140	68.3106	67.3639	67.3639	67.1886	67.7286	68.3106	68.7221	69.1522	(39)
Average = Sum(39)m / 12 =												68.5130	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9545	0.9513	0.9481	0.9333	0.9305	0.9176	0.9176	0.9153	0.9226	0.9305	0.9361	0.9420	(40)
HLP (average)												0.9333	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3260 (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	
Hot water usage for baths	27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171	(42b)
Hot water usage for other uses	38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504	(42c)
Average daily hot water use (litres/day)												60.2750	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	65.7598	63.9560	61.9867	59.5354	57.3487	55.0761	54.6038	56.5692	58.5849	60.9187	63.3917	65.6675	(44)
Energy conte	104.1475	91.0725	95.2712	81.5010	77.2023	67.7225	66.0386	70.0444	72.2410	82.6661	90.3130	102.8194	(45)
Energy content (annual)										Total = Sum(45)m =		1001.0396	
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 (or HIU 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	88.5253	77.4117	80.9805	69.2758	65.6220	57.5641	56.1328	59.5378	61.4049	70.2662	76.7661	87.3965	(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	88.5253	77.4117	80.9805	69.2758	65.6220	57.5641	56.1328	59.5378	61.4049	70.2662	76.7661	87.3965	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		850.8836	(64)
Electric shower(s)	50.6277	45.1097	49.2581	47.0064	47.8885	45.6809	47.2036	47.8885	47.0064	49.2581	48.3319	50.6277	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												575.8875	(64a)
Heat gains from water heating, kWh/month	34.7883	30.6303	32.5597	29.0706	28.3776	25.8113	25.8341	26.8566	27.1028	29.8811	31.2745	34.5061	(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	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.9816	120.6582	108.9816	112.6143	108.9816	112.6143	108.9816	108.9816	112.6143	108.9816	112.6143	108.9816 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.1215	207.2500	201.8862	190.4673	176.0530	162.5056	153.4551	151.3266	156.6904	168.1093	182.5236	196.0710 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299 (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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395 (71)
Water heating gains (Table 5)	46.7584	45.5809	43.7630	40.3758	38.1419	35.8490	34.7233	36.0975	37.6428	40.1627	43.4368	46.3791 (72)
Total internal gains	418.7513	431.3788	412.5206	401.3472	381.0663	368.8587	355.0497	354.2955	364.8373	375.1434	396.4644	409.3215 (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
North						3.6800	10.6334	0.6300	0.7000	0.7700			11.9589 (74)
South						7.5200	46.7521	0.6300	0.7000	0.7700			107.4461 (78)
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128	(83)
Total gains	538.1562	630.2019	675.5085	717.0674	729.0936	712.8767	687.2692	661.9968	645.6836	592.1472	538.5775	512.1343	(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	68.4359	68.6672	68.8956	69.9886	70.1970	71.1835	71.1835	71.3693	70.8003	70.1970	69.7767	69.3427
alpha	5.5624	5.5778	5.5930	5.6659	5.6798	5.7456	5.7456	5.7580	5.7200	5.6798	5.6518	5.6228
util living area	0.9928	0.9822	0.9623	0.9042	0.7861	0.5910	0.4293	0.4638	0.6883	0.9159	0.9825	0.9944 (86)
MIT	19.9879	20.1952	20.4276	20.7113	20.9006	20.9843	20.9978	20.9967	20.9633	20.7312	20.3194	19.9589 (87)
Th 2	20.1214	20.1241	20.1268	20.1393	20.1416	20.1525	20.1525	20.1546	20.1483	20.1416	20.1369	20.1319 (88)
util rest of house	0.9907	0.9772	0.9517	0.8785	0.7358	0.5185	0.3477	0.3802	0.6164	0.8879	0.9767	0.9927 (89)
MIT 2	19.2055	19.4118	19.6399	19.9154	20.0773	20.1454	20.1519	20.1536	20.1297	19.9401	19.5460	19.1853 (90)
Living area fraction	19.5127	19.7193	19.9491	20.2278	20.4005	20.4748	20.4840	20.4846	20.4569	20.2507	19.8496	19.4890 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5127	19.7193	19.9491	20.2278	20.4005	20.4748	20.4840	20.4846	20.4569	20.2507	19.8496	19.4890 (93)

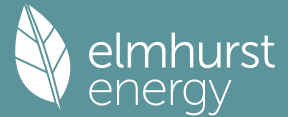
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9888	0.9744	0.9492	0.8815	0.7518	0.5466	0.3798	0.4130	0.6434	0.8919	0.9744	0.9912 (94)
Useful gains	532.1373	614.0897	641.1875	632.0650	548.1243	389.6459	261.0122	273.4251	415.4289	528.1400	524.7741	507.6135 (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	1065.9304	1034.8703	936.0727	776.1162	594.3387	395.7464	261.6438	274.4371	430.5466	659.2426	876.1807	1057.2658 (97)
Space heating kWh	397.1421	282.7645	219.3946	103.7169	34.3836	0.0000	0.0000	0.0000	0.0000	97.5403	253.0127	408.9413 (98a)
Space heating requirement - total per year (kWh/year)												1796.8960
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	397.1421	282.7645	219.3946	103.7169	34.3836	0.0000	0.0000	0.0000	0.0000	97.5403	253.0127	408.9413 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1796.8960
Space heating per m ²										(98c) / (4) =		24.4775 (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	633.2206	498.4928	510.6331	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9274	0.9676	0.9585	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	587.2769	482.3643	489.4462	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	787.8307	760.1742	732.8034	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	144.3987	206.6906	181.0577	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	36.0997	51.6726	45.2644	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												133.0368 (107)
Energy for space heating												24.4775 (99)
Energy for space cooling												1.8122 (108)
Total												26.2898 (109)
Fabric Energy Efficiency (TFEE)												26.3 (109)

Full SAP Calculation Printout



Plot Reference	Plot 07			Issued on Date	22/12/2025
Assessment Reference	Plot 07	Plot Type Ref			
Plot Address	Flat 2, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	88 B	DER	3.12	TER	11.22
Environmental	98 A	% DER < TER			72.19
CO ₂ Emissions (t/year)	0.19	DFEE	22.37	TFEE	26.29
Compliance Check	See BREL	% DFEE < TFEE			14.92
% DPER < TPER	44.92	DPER	32.69	TPER	59.35
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client	J Greenwood (Builders) Limited, Steve Brown				

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	73.4100 (1b)	x 2.5000 (2b)	= 183.5250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.5250 (5)

2. Ventilation rate

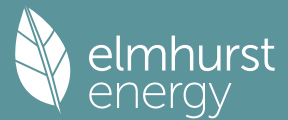
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.9800 (17)
Infiltration rate	0.1490 (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) = 0.1266 (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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			73.4100	0.1100	8.0751	110.0000	8075.1000 (28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230	110.0000	2458.4999 (29a)
Total net area of external elements Aum(A, m ²)			106.9600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.9466		(33)
Main dwelling							
Party Wall			55.4800	0.0000	0.0000	45.0000	2496.6000 (32)
Corridor			23.5600	0.0000	0.0000	45.0000	1060.2000 (32)
Party Ceiling			73.4100			30.0000	2202.3000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17262.7199 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							235.1549 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	13.6300	0.0370	0.5043
P1 Party wall - Ground floor	29.4900	0.0510	1.5040
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	13.6300	0.0670	0.9132
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	5.3600	0.0320	0.1715
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.7438 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.6904 (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	18.2585	18.0668	17.8750	16.9162	16.7245	15.7657	15.7657	15.5739	16.1492	16.7245	17.1080	17.4915	(38)
Heat transfer coeff	48.9489	48.7572	48.5654	47.6066	47.4149	46.4561	46.4561	46.2643	46.8396	47.4149	47.7984	48.1819	(39)
Average = Sum(39)m / 12 =												47.5587	
HLP	0.6668	0.6642	0.6616	0.6485	0.6459	0.6328	0.6328	0.6302	0.6381	0.6459	0.6511	0.6563	(40)
HLP (average)												0.6478	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3260 (42)
Hot water usage for mixer showers	63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766	(42a)
Hot water usage for baths	27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171	(42b)
Hot water usage for other uses	38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504	(42c)
Average daily hot water use (litres/day)												118.5607	(43)
Daily hot water use	128.9786	126.2248	122.8710	117.7709	113.6294	109.1769	107.4655	110.8048	114.3266	119.0010	124.1797	128.6441	(44)
Energy conte	204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255	(45)
Energy content (annual)										Total = Sum(45)m =		1969.2679	
Distribution loss (46)m = 0.15 x (45)m	30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138	(46)
Water storage loss (or HIU 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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2286.5989	(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	67.9200	59.7644	62.7920	53.6065	50.8615	44.6367	43.2151	45.6188	46.8746	53.6932	58.8248	66.9740	(65)

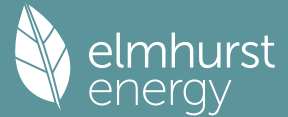
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.9816	120.6582	108.9816	112.6143	108.9816	112.6143	108.9816	108.9816	112.6143	108.9816	112.6143	108.9816	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.1215	207.2500	201.8862	190.4673	176.0530	162.5056	153.4551	151.3266	156.6904	168.1093	182.5236	196.0710	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	(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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	(71)
Water heating gains (Table 5)	91.2903	88.9350	84.3979	74.4534	68.3623	61.9954	58.0848	61.3156	65.1036	72.1683	81.7012	90.0188	(72)
Total internal gains	463.2831	474.7330	453.1555	435.4248	411.2867	395.0051	378.4113	379.5136	392.2980	407.1489	434.7288	452.9612	(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
North	3.6800	10.6334	0.4000	0.0000	0.7700	12.0523 (74)
South	7.5200	46.7521	0.4000	0.0000	0.7700	108.2853 (78)

Full SAP Calculation Printout



Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	583.6207	675.1090	718.1974	753.6110	762.0322	741.7101	713.2256	689.6183	675.3380	625.8476	577.9519	556.5770 (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	97.9633	98.3486	98.7370	100.7255	101.1329	103.2201	103.2201	103.6480	102.3750	101.1329	100.3214	99.5229
alpha	7.5309	7.5566	7.5825	7.7150	7.7422	7.8813	7.8813	7.9099	7.8250	7.7422	7.6881	7.6349
util living area	0.9760	0.9382	0.8746	0.7393	0.5751	0.4007	0.2866	0.3086	0.4778	0.7578	0.9365	0.9814 (86)
MIT	20.5817	20.7439	20.8715	20.9680	20.9954	20.9998	21.0000	21.0000	20.9991	20.9680	20.7915	20.5546 (87)
Th 2	20.3703	20.3726	20.3749	20.3865	20.3889	20.4005	20.4005	20.4029	20.3959	20.3889	20.3842	20.3796 (88)
util rest of house	0.9704	0.9260	0.8534	0.7078	0.5385	0.3632	0.2475	0.2685	0.4363	0.7212	0.9220	0.9769 (89)
MIT 2	19.8932	20.0924	20.2428	20.3573	20.3853	20.4004	20.4005	20.4029	20.3953	20.3610	20.1623	19.8676 (90)
Living area fraction										FLA = Living area / (4) =		0.3926 (91)
MIT	20.1635	20.3482	20.4896	20.5970	20.6248	20.6357	20.6359	20.6373	20.6324	20.5993	20.4093	20.1373 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1635	20.3482	20.4896	20.5970	20.6248	20.6357	20.6359	20.6373	20.6324	20.5993	20.4093	20.1373 (93)

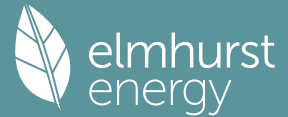
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9683	0.9254	0.8575	0.7188	0.5527	0.3779	0.2629	0.2843	0.4526	0.7341	0.9226	0.9749 (94)
Useful gains	565.1221	624.7705	615.8690	541.6861	421.1780	280.3140	187.4872	196.0285	305.6313	459.4260	533.2406	542.5862 (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	776.4992	753.2100	679.4120	556.8563	423.1700	280.3956	187.4909	196.0352	305.9729	474.1170	636.1639	767.8897 (97)
Space heating kWh	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (98a)
Space heating requirement - total per year (kWh/year)												555.9172
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	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												555.9172
Space heating per m2										(98c) / (4) =		7.5728 (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	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (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)	157.2646	86.3114	47.2760	10.9225	1.4821	0.0000	0.0000	0.0000	0.0000	10.9300	74.1048	167.6258 (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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769 (64)
Efficiency of water heater (217)m	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958 (216)
Fuel for water heating, kWh/month	67.2948	59.3970	62.8062	54.5130	52.3634	46.6617	45.6704	47.7744	48.6205	54.8420	59.0807	66.4667 (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	14.2622	12.8819	14.2622	13.8021	14.2622	13.8021	14.2622	14.2622	13.8021	14.2622	13.8021	14.2622 (231)
Lighting	20.1610	16.1739	14.5628	10.6694	8.2413	6.7332	7.5180	9.7722	12.6931	16.6540	18.8107	20.7214 (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												555.9172 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												343.5958
Water heating fuel used												665.4910 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	167.9254	(230a)
Total electricity for the above, kWh/year	167.9254	(231)
Electricity for lighting (calculated in Appendix L)	162.7112	(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	1552.0447	(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	555.9172	0.1591	88.4340	(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)	665.4910	0.1412	93.9543	(264)
Space and water heating			182.3883	(265)
Pumps, fans and electric keep-hot	167.9254	0.1387	23.2933	(267)
Energy for lighting	162.7112	0.1443	23.4843	(268)
Total CO2, kg/year			229.1659	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.1200	(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	555.9172	1.5888	883.2417	(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)	665.4910	1.5220	1012.9091	(278)
Space and water heating			1896.1508	(279)
Pumps, fans and electric keep-hot	167.9254	1.5128	254.0375	(281)
Energy for lighting	162.7112	1.5338	249.5718	(282)
Total Primary energy kWh/year			2399.7602	(286)
Dwelling Primary energy Rate (DPER)			32.6900	(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	73.4100	2.5000	183.5250	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100			
Dwelling volume			183.5250	(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	3 * 10 =	30.0000 (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) =	30.0000 / (5) =	0.1635 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4135	(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) =	0.3514 (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	0.4481	0.4393	0.4305	0.3866	0.3778	0.3339	0.3339	0.3251	0.3514	0.3778	0.3954	0.4129
Effective ac	0.6004	0.5965	0.5927	0.5747	0.5714	0.5557	0.5557	0.5528	0.5618	0.5714	0.5782	0.5853

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			11.2000	1.1450	12.8244			(27)
Ground Floor			73.4100	0.1300	9.5433			(28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230			(29a)
Total net area of external elements Aum(A, m2)			106.9600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		26.3907			(33)
Main dwelling								
Party Wall			55.4800	0.0000	0.0000			(32)
Corridor			23.5600	0.0000	0.0000			(32)

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

235.1549 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	13.6300	0.0700	0.9541
P1 Party wall - Ground floor	29.4900	0.0800	2.3592
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885
E3 Sill	2.5000	0.0500	0.1250
E4 Jamb	10.4800	0.0500	0.5240
E5 Ground floor (normal)	13.6300	0.1600	2.1808
E16 Corner (normal)	2.6800	0.0900	0.2412
E18 Party wall between dwellings	5.3600	0.0600	0.3216
E25 Staggered party wall between dwellings	5.3600	0.0600	0.3216

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

7.3160 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 33.7067 (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	36.3618	36.1257	35.8943	34.8073	34.6039	33.6572	33.6572	33.4818	34.0218	34.6039	35.0153	35.4454	(38)
Average = Sum(39)m / 12 =	70.0685	69.8324	69.6010	68.5140	68.3106	67.3639	67.3639	67.1886	67.7286	68.3106	68.7221	69.1522	(39)
												68.5130	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9545	0.9513	0.9481	0.9333	0.9305	0.9176	0.9176	0.9153	0.9226	0.9305	0.9361	0.9420	(40)
HLP (average)												0.9333	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

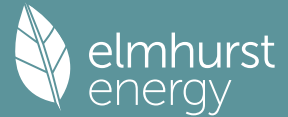
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3260 (42)
Hot water usage for mixer showers												
63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766 (42a)	
Hot water usage for baths												
27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171 (42b)	
Hot water usage for other uses												
38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504 (42c)	
Average daily hot water use (litres/day)												118.5607 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
128.9786	126.2248	122.8710	117.7709	113.6294	109.1769	107.4655	110.8048	114.3266	119.0010	124.1797	128.6441 (44)	
Energy content (annual)												
204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255 (45)	
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1969.2679
30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138 (46)	
Water storage loss (or HIU 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	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												
250.8655	221.8281	235.4431	206.3143	199.5619	179.3376	176.5651	183.7944	186.0680	208.0782	222.0086	248.0204 (62)	
WWHRS	-28.9010	-25.5603	-26.7653	-22.1627	-20.6548	-17.6745	-16.5670	-17.6174	-18.2867	-21.5580	-24.4226	-28.3658 (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 (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												
221.9645	196.2679	208.6778	184.1516	178.9071	161.6631	159.9981	166.1770	167.7813	186.5202	197.5860	219.6546 (64)	
Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2249.3493 (64)
												2249 (64)

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	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993	116.2993 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.9816	120.6582	108.9816	112.6143	108.9816	112.6143	108.9816	108.9816	112.6143	108.9816	112.6143	108.9816 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.1215	207.2500	201.8862	190.4673	176.0530	162.5056	153.4551	151.3266	156.6904	168.1093	182.5236	196.0710 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299	34.6299 (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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395 (71)
Water heating gains (Table 5)												

Full SAP Calculation Printout



Total internal gains	141.3923	139.0371	134.4999	124.5555	118.4643	112.0975	108.1869	111.4177	115.2056	122.2703	131.8032	140.1209 (72)
	516.3852	527.8351	506.2575	488.5269	464.3887	445.1072	428.5133	429.6156	442.4001	460.2509	487.8309	506.0632 (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
North	3.6800			10.6334		0.6300		0.7000		0.7700		11.9589 (74)
South	7.5200			46.7521		0.6300		0.7000		0.7700		107.4461 (78)
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	635.7902	726.6581	769.2454	804.2471	812.4160	789.1252	760.7328	737.3170	723.2464	677.2548	629.9439	608.8760 (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	68.4359	68.6672	68.8956	69.9886	70.1970	71.1835	71.1835	71.3693	70.8003	70.1970	69.7767	69.3427
alpha	5.5624	5.5778	5.5930	5.6659	5.6798	5.7456	5.7456	5.7580	5.7200	5.6798	5.6518	5.6228
util living area	0.9844	0.9671	0.9375	0.8626	0.7297	0.5385	0.3886	0.4175	0.6263	0.8698	0.9655	0.9872 (86)
MIT	20.1337	20.3287	20.5409	20.7837	20.9321	20.9901	20.9987	20.9981	20.9770	20.8060	20.4456	20.1054 (87)
Th 2	20.1214	20.1241	20.1268	20.1393	20.1416	20.1525	20.1525	20.1546	20.1483	20.1416	20.1369	20.1319 (88)
util rest of house	0.9801	0.9587	0.9218	0.8309	0.6771	0.4706	0.3143	0.3417	0.5567	0.8335	0.9551	0.9837 (89)
MIT 2	19.1300	19.3752	19.6373	19.9305	20.0871	20.1469	20.1521	20.1538	20.1339	19.9625	19.5337	19.1026 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5240	19.7495	19.9920	20.2655	20.4188	20.4780	20.4845	20.4853	20.4649	20.2936	19.8917	19.4963 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5240	19.7495	19.9920	20.2655	20.4188	20.4780	20.4845	20.4853	20.4649	20.2936	19.8917	19.4963 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9765	0.9544	0.9190	0.8359	0.6947	0.4970	0.3435	0.3715	0.5832	0.8406	0.9516	0.9805 (94)
Useful gains	620.8488	693.5476	706.9316	672.2889	564.4131	392.1736	261.2994	273.9007	421.7706	569.2722	599.4742	596.9933 (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	1066.7257	1036.9774	939.0597	778.6942	595.5877	395.9624	261.6727	274.4840	431.0838	662.1789	879.0737	1057.7716 (97)
Space heating kWh	331.7325	230.7848	172.7033	76.6118	23.1939	0.0000	0.0000	0.0000	0.0000	69.1226	201.3116	342.8190 (98a)
Space heating requirement - total per year (kWh/year)												1448.2796
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	331.7325	230.7848	172.7033	76.6118	23.1939	0.0000	0.0000	0.0000	0.0000	69.1226	201.3116	342.8190 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1448.2796
Space heating per m2												(98c) / (4) = 19.7286 (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	331.7325	230.7848	172.7033	76.6118	23.1939	0.0000	0.0000	0.0000	0.0000	69.1226	201.3116	342.8190 (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)	359.4068	250.0377	187.1108	83.0031	25.1288	0.0000	0.0000	0.0000	0.0000	74.8891	218.1058	371.4182 (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	221.9645	196.2679	208.6778	184.1516	178.9071	161.6631	159.9981	166.1770	167.7813	186.5202	197.5860	219.6546 (64)
Efficiency of water heater	84.9589	84.4240	83.6386	82.2491	80.7391	79.8000	79.8000	79.8000	79.8000	82.0485	84.1017	79.8000 (216)
Fuel for water heating, kWh/month	261.2612	232.4786	249.4993	223.8950	221.5866	202.5853	200.4989	208.2419	210.2522	227.3292	234.9370	258.2533 (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	22.6442	18.1660	16.3565	11.9835	9.2564	7.5625	8.4440	10.9758	14.2565	18.7053	21.1276	23.2736 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.6500	-29.1001	-43.9107	-51.9077	-58.1978	-55.1357	-54.4663	-50.3182	-43.3845	-34.3877	-22.0950	-16.8297 (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	-7.2217	-15.5157	-31.4518	-48.1507	-64.5684	-65.2077	-64.4375	-54.1402	-39.1391	-22.4808	-9.7348	-5.6866	(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												1569.1003	(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												2730.8185	(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)												182.7518	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-907.1183	(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												3661.5523	(238)

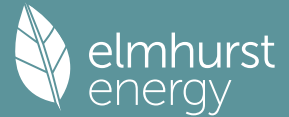
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1569.1003	0.2100	329.5111	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2730.8185	0.2100	573.4719	(264)
Space and water heating			902.9830	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	182.7518	0.1443	26.3767	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-479.3835	0.1336	-64.0291	
PV Unit electricity exported	-427.7349	0.1253	-53.6123	
Total			-117.6414	(269)
Total CO2, kg/year			823.6476	(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	1569.1003	1.1300	1773.0833	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2730.8185	1.1300	3085.8249	(278)
Space and water heating			4858.9083	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	182.7518	1.5338	280.3109	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-479.3835	1.4936	-715.9965	
PV Unit electricity exported	-427.7349	0.4601	-196.7824	
Total			-912.7790	(283)
Total Primary energy kWh/year			4356.5410	(286)
Target Primary Energy Rate (TPER)			59.3500	(287)

Full SAP Calculation Printout



Plot Reference	Plot 07			Issued on Date	22/12/2025
Assessment Reference	Plot 07	Plot Type Ref			
Plot Address	Flat 2, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	88 B	DER	3.12	TER	11.22
Environmental	98 A	% DER < TER			72.19
CO ₂ Emissions (t/year)	0.19	DFEE	22.37	TFEE	26.29
Compliance Check	See BREL	% DFEE < TFEE			14.92
% DPER < TPER	44.92	DPER	32.69	TPER	59.35
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client	J Greenwood (Builders) Limited, Steve Brown				

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	73.4100 (1b)	x 2.5000 (2b)	= 183.5250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.5250 (5)

2. Ventilation rate

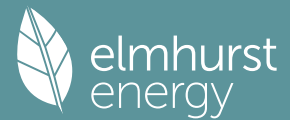
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.9800 (17)
Infiltration rate	0.1490 (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) = 0.1266 (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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			73.4100	0.1100	8.0751	110.0000	8075.1000 (28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230	110.0000	2458.4999 (29a)
Total net area of external elements Aum(A, m ²)			106.9600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.9466		(33)
Main dwelling							
Party Wall			55.4800	0.0000	0.0000	45.0000	2496.6000 (32)
Corridor			23.5600	0.0000	0.0000	45.0000	1060.2000 (32)
Party Ceiling			73.4100			30.0000	2202.3000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17262.7199 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							235.1549 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	13.6300	0.0370	0.5043
P1 Party wall - Ground floor	29.4900	0.0510	1.5040
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	13.6300	0.0670	0.9132
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	5.3600	0.0320	0.1715
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.7438 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.6904 (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	18.2585	18.0668	17.8750	16.9162	16.7245	15.7657	15.7657	15.5739	16.1492	16.7245	17.1080	17.4915	(38)
Heat transfer coeff	48.9489	48.7572	48.5654	47.6066	47.4149	46.4561	46.4561	46.2643	46.8396	47.4149	47.7984	48.1819	(39)
Average = Sum(39)m / 12 =												47.5587	
HLP	0.6668	0.6642	0.6616	0.6485	0.6459	0.6328	0.6328	0.6302	0.6381	0.6459	0.6511	0.6563	(40)
HLP (average)												0.6478	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3260 (42)
Hot water usage for mixer showers	63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766	(42a)
Hot water usage for baths	27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171	(42b)
Hot water usage for other uses	38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504	(42c)
Average daily hot water use (litres/day)												118.5607	(43)
Daily hot water use	128.9786	126.2248	122.8710	117.7709	113.6294	109.1769	107.4655	110.8048	114.3266	119.0010	124.1797	128.6441	(44)
Energy conte	204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255	(45)
Energy content (annual)										Total = Sum(45)m =		1969.2679	
Distribution loss (46)m = 0.15 x (45)m	30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138	(46)
Water storage loss (or HIU 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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(64)
								Total per year (kWh/year) = Sum(64)m =				2286.5989	(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	67.9200	59.7644	62.7920	53.6065	50.8615	44.6367	43.2151	45.6188	46.8746	53.6932	58.8248	66.9740	(65)

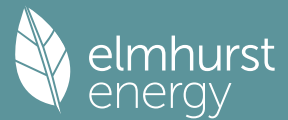
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0335	20.4581	16.6377	12.5958	9.4155	7.9490	8.5891	11.1645	14.9849	19.0268	22.2071	23.6736	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	306.1514	309.3283	301.3227	284.2795	262.7657	242.5456	229.0374	225.8605	233.8662	250.9093	272.4232	292.6432	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	(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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	(71)
Water heating gains (Table 5)	91.2903	88.9350	84.3979	74.4534	68.3623	61.9954	58.0848	61.3156	65.1036	72.1683	81.7012	90.0188	(72)
Total internal gains	518.2768	516.5231	500.1598	469.1304	438.3450	410.2916	393.5130	396.1423	411.7563	439.9060	474.1331	504.1373	(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
North				3.6800	10.6334		0.4000		0.0000		0.7700		12.0523 (74)
South				7.5200	46.7521		0.4000		0.0000		0.7700		108.2853 (78)
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158	(83)

Full SAP Calculation Printout



Total gains 638.6144 716.8991 765.2018 787.3166 789.0906 756.9966 728.3273 706.2470 694.7963 658.6048 617.3561 607.7531 (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	97.9633	98.3486	98.7370	100.7255	101.1329	103.2201	103.2201	103.6480	102.3750	101.1329	100.3214	99.5229	21.0000 (85)
alpha	7.5309	7.5566	7.5825	7.7150	7.7422	7.8813	7.8813	7.9099	7.8250	7.7422	7.6881	7.6349	
util living area	0.9612	0.9191	0.8436	0.7128	0.5561	0.3926	0.2806	0.3013	0.4645	0.7270	0.9146	0.9695	(86)
MIT	20.6563	20.7870	20.9009	20.9748	20.9963	20.9998	21.0000	21.0000	20.9993	20.9757	20.8311	20.6274	(87)
Th 2	20.3703	20.3726	20.3749	20.3865	20.3889	20.4005	20.4005	20.4029	20.3959	20.3889	20.3842	20.3796	(88)
util rest of house	0.9529	0.9044	0.8202	0.6813	0.5205	0.3559	0.2424	0.2622	0.4241	0.6902	0.8969	0.9627	(89)
MIT 2	19.9845	20.1427	20.2747	20.3638	20.3861	20.4004	20.4005	20.4029	20.3954	20.3680	20.2077	19.9574	(90)
Living area fraction									fLA = Living area / (4) =				0.3926 (91)
MIT	20.2482	20.3957	20.5206	20.6037	20.6257	20.6357	20.6359	20.6373	20.6325	20.6066	20.4524	20.2204	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2482	20.3957	20.5206	20.6037	20.6257	20.6357	20.6359	20.6373	20.6325	20.6066	20.4524	20.2204	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9511	0.9049	0.8259	0.6926	0.5343	0.3703	0.2574	0.2776	0.4400	0.7035	0.8991	0.9607	(94)
Useful gains	607.3757	648.7504	631.9849	545.2806	421.6242	280.3263	187.4878	196.0297	305.6989	463.3575	555.0365	583.8977	(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	780.6487	755.5240	680.9143	557.1719	423.2084	280.3967	187.4909	196.0353	305.9787	474.4618	638.2240	771.8945	(97)
Space heating kWh	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696	(98a)
Space heating requirement - total per year (kWh/year)												454.8371	
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	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												454.8371	
Space heating per m2										(98c) / (4) =		6.1958	(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	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696	(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)	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696	(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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(64)
Efficiency of water heater (217)m	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	(216)
Fuel for water heating, kWh/month	67.2948	59.3970	62.8062	54.5130	52.3634	46.6617	45.6704	47.7744	48.6205	54.8420	59.0807	66.4667	(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	14.2622	12.8819	14.2622	13.8021	14.2622	13.8021	14.2622	14.2622	13.8021	14.2622	13.8021	14.2622	(231)
Lighting	20.1610	16.1739	14.5628	10.6694	8.2413	6.7332	7.5180	9.7722	12.6931	16.6540	18.8107	20.7214	(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													454.8371 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.5958
Water heating fuel used													665.4910 (219)
Space cooling fuel													0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	167.9254 (230a)
Total electricity for the above, kWh/year	167.9254 (231)
Electricity for lighting (calculated in Appendix L)	162.7112 (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	1450.9646 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	454.8371	16.4900	75.0026	(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)	665.4910	16.4900	109.7395	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	167.9254	16.4900	27.6909	(249)
Energy for lighting	162.7112	16.4900	26.8311	(250)
Additional standing charges			0.0000	(251)
Total energy cost			239.2641	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7274	(257)
SAP value		88.2083	
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	454.8371	0.1592	72.4096	(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)	665.4910	0.1412	93.9543	(264)
Space and water heating			166.3639	(265)
Pumps, fans and electric keep-hot	167.9254	0.1387	23.2933	(267)
Energy for lighting	162.7112	0.1443	23.4843	(268)
Total CO2, kg/year			213.1414	(272)
CO2 emissions per m2			2.9000	(273)
EI value			97.5880	
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

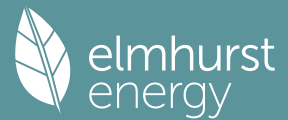
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	73.4100	2.5000	183.5250	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	183.5250	(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		2.9800	(17)
Infiltration rate		0.1490	(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

$$(21) = (18) \times (20) = 0.1266 \quad (21)$$

Wind speed	Jan 4.3000	Feb 4.2000	Mar 4.2000	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	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1361	0.1330	0.1330	0.1235	0.1266	0.1077	0.1045	0.1045	0.1077	0.1203	0.1203	0.1235	(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	0.2761	0.2730	0.2730	0.2635	0.2666	0.2477	0.2445	0.2445	0.2477	0.2603	0.2603	0.2635	(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 N/E			3.6800	1.3258	4.8788			(27)
Window S/W			7.5200	1.3258	9.9697			(27)
Ground Floor			73.4100	0.1100	8.0751	110.0000	8075.1000	(28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230	110.0000	2458.4999	(29a)
Total net area of external elements Aum(A, m2)			106.9600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	26.9466			(33)
Main dwelling								
Party Wall			55.4800	0.0000	0.0000	45.0000	2496.6000	(32)
Corridor			23.5600	0.0000	0.0000	45.0000	1060.2000	(32)
Party Ceiling			73.4100			30.0000	2202.3000	(32b)
Internal Wall			107.7800			9.0000	970.0200	(32c)

Heat capacity Cm = Sum(A x k)

$$(28) \dots (30) + (32) + (32a) \dots (32e) = 17262.7199 \quad (34)$$

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

$$235.1549 \quad (35)$$

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	13.6300	0.0370	0.5043
P1 Party wall - Ground floor	29.4900	0.0510	1.5040
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.4900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	13.6300	0.0670	0.9132
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	5.3600	0.0320	0.1715
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608

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

$$3.7438 \quad (36)$$

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 30.6904 \quad (37)$$

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

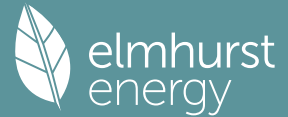
(38)m	Jan 16.7245	Feb 16.5327	Mar 16.5327	Apr 15.9574	May 16.1492	Jun 14.9986	Jul 14.8069	Aug 14.8069	Sep 14.9986	Oct 15.7657	Nov 15.7657	Dec 15.9574	(38)
Heat transfer coeff	47.4149	47.2231	47.2231	46.6478	46.8396	45.6890	45.4973	45.4973	45.6890	46.4561	46.4561	46.6478	(39)
Average = Sum(39)m / 12 =													46.4401

HLP	Jan 0.6459	Feb 0.6433	Mar 0.6433	Apr 0.6354	May 0.6381	Jun 0.6224	Jul 0.6198	Aug 0.6198	Sep 0.6224	Oct 0.6328	Nov 0.6328	Dec 0.6354	(40)
HLP (average)													0.6326
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3260 (42)
Hot water usage for mixer showers													
63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766	62.9766	(42a)
Hot water usage for baths													
27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171	27.2171	(42b)
Hot water usage for other uses													
38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504	38.4504	(42c)
Average daily hot water use (litres/day)													118.5607 (43)
Daily hot water use	Jan 128.9786	Feb 126.2248	Mar 122.8710	Apr 117.7709	May 113.6294	Jun 109.1769	Jul 107.4655	Aug 110.8048	Sep 114.3266	Oct 119.0010	Nov 124.1797	Dec 128.6441	(44)
Energy conte	204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255	(45)
Energy content (annual)										Total = Sum(45)m =			1969.2679
Distribution loss (46)m = 0.15 x (45)m	30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138	(46)
Water storage loss (or HIU 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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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 per year (kWh/year) = Sum(64)m =													2286.5989 (64)

Full SAP Calculation Printout



Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	67.9200	59.7644	62.7920	53.6065	50.8615	44.6367	43.2151	45.6188	46.8746	53.6932	58.8248	66.9740 (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	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0335	20.4581	16.6377	12.5958	9.4155	7.9490	8.5891	11.1645	14.9849	19.0268	22.2071	23.6736 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	306.1514	309.3283	301.3227	284.2795	262.7657	242.5456	229.0374	225.8605	233.8662	250.9093	272.4232	292.6432 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819 (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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395 (71)
Water heating gains (Table 5)	91.2903	88.9350	84.3979	74.4534	68.3623	61.9954	58.0848	61.3156	65.1036	72.1683	81.7012	90.0188 (72)
Total internal gains	518.2768	516.5231	500.1598	469.1304	438.3450	410.2916	393.5130	396.1423	411.7563	439.9060	474.1331	504.1373 (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
North					3.6800	9.3942	0.4000	0.0000	0.7700			10.6478 (74)
South					7.5200	41.2355	0.4000	0.0000	0.7700			95.5081 (78)
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386	93.4882 (83)
Total gains	624.4327	697.8402	750.7607	776.1110	768.5475	744.5018	708.4630	684.0304	686.7691	648.0951	603.9717	597.6255 (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	101.1329	101.5435	101.5435	102.7958	102.3750	104.9530	105.3953	105.3953	104.9530	103.2201	103.2201	102.7958
alpha	7.7422	7.7696	7.7696	7.8531	7.8250	7.9969	8.0264	8.0264	7.9969	7.8813	7.8813	7.8531
util living area	0.9490	0.8981	0.8061	0.6576	0.4927	0.3252	0.2376	0.2594	0.4189	0.6827	0.8907	0.9596 (86)
MIT	20.7345	20.8455	20.9372	20.9875	20.9987	21.0000	21.0000	21.0000	20.9997	20.9861	20.8800	20.7062 (87)
Th 2	20.3889	20.3912	20.3912	20.3982	20.3959	20.4099	20.4122	20.4122	20.4099	20.4005	20.4005	20.3982 (88)
util rest of house	0.9382	0.8803	0.7797	0.6246	0.4563	0.2890	0.1999	0.2203	0.3798	0.6443	0.8692	0.9507 (89)
MIT 2	20.0966	20.2285	20.3299	20.3874	20.3950	20.4099	20.4122	20.4122	20.4097	20.3892	20.2789	20.0708 (90)
Living area fraction									fLA = Living area / (4) =			0.3926 (91)
MIT	20.3470	20.4707	20.5683	20.6230	20.6320	20.6415	20.6430	20.6430	20.6414	20.6236	20.5149	20.3203 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3470	20.4707	20.5683	20.6230	20.6320	20.6415	20.6430	20.6430	20.6414	20.6236	20.5149	20.3203 (93)

8. Space heating requirement

Utilisation	0.9374	0.8827	0.7876	0.6371	0.4705	0.3032	0.2147	0.2357	0.3951	0.6588	0.8736	0.9494 (94)
Useful gains	585.3224	616.0040	591.2864	494.4393	361.6310	225.7630	152.0963	161.1951	271.3571	426.9662	527.6157	567.3913 (95)
Ext temp.	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000 (96)
Heat loss rate W	718.1935	692.7957	621.8495	500.2042	362.1629	225.7743	152.0968	161.1962	271.4552	433.1362	586.0386	714.6568 (97)
Space heating kWh	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655 (98a)
Space heating requirement - total per year (kWh/year)	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655 (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	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655 (98c)
Space heating per m ²										(98c) / (4) =		4.5493 (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	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655 (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)	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655 (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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(64)
Efficiency of water heater												343.5958	(216)
(217)m	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	(217)
Fuel for water heating, kWh/month	67.2948	59.3970	62.8062	54.5130	52.3634	46.6617	45.6704	47.7744	48.6205	54.8420	59.0807	66.4667	(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	14.2622	12.8819	14.2622	13.8021	14.2622	13.8021	14.2622	14.2622	13.8021	14.2622	13.8021	14.2622	(231)
Lighting	20.1610	16.1739	14.5628	10.6694	8.2413	6.7332	7.5180	9.7722	12.6931	16.6540	18.8107	20.7214	(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												333.9660	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.5958	
Water heating fuel used												665.4910	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)													
mechanical ventilation fans (SFP = 0.7500)												167.9254	(230a)
Total electricity for the above, kWh/year												167.9254	(231)
Electricity for lighting (calculated in Appendix L)												162.7112	(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												1330.0936	(238)

10a. Fuel costs - using BEDF prices (587)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	333.9660	28.4300	94.9465	(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)	665.4910	28.4300	189.1991	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	167.9254	28.4300	47.7412	(249)
Energy for lighting	162.7112	28.4300	46.2588	(250)
Additional standing charges			0.0000	(251)
Total energy cost			378.1456	(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	333.9660	0.1597	53.3303	(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)	665.4910	0.1412	93.9543	(264)
Space and water heating			147.2846	(265)
Pumps, fans and electric keep-hot	167.9254	0.1387	23.2933	(267)
Energy for lighting	162.7112	0.1443	23.4843	(268)
Total CO2, kg/year			194.0621	(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	333.9660	1.5910	531.3501	(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)	665.4910	1.5220	1012.9091	(278)
Space and water heating			1544.2592	(279)
Pumps, fans and electric keep-hot	167.9254	1.5128	254.0375	(281)
Energy for lighting	162.7112	1.5338	249.5718	(282)
Total Primary energy kWh/year			2047.8686	(286)

SAP 10 EPC IMPROVEMENTS

Full SAP Calculation Printout



Plot 07

Current energy efficiency rating: B 88
Current environmental impact rating: 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
(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 98

Fuel prices for cost data on this page from database revision number 587 TEST (28 Nov 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £378	Potential £378	Saving £0
Electricity			
Space heating	£143	£143	£0
Water heating	£189	£189	£0
Lighting	£46	£46	£0
Total cost of fuels	£378	£378	£0
Total cost of uses	£378	£378	£0
Delivered energy	18 kWh/m²	18 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	28 kWh/m²	28 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	73.4100 (1b)	x 2.5000 (2b)	= 183.5250 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.5250 (5)

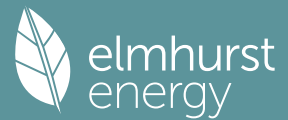
2. Ventilation rate

	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	2.9800	(17)
Infiltration rate	0.1490	(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) =	0.1266 (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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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 N/E			3.6800	1.3258	4.8788			(27)
Window S/W			7.5200	1.3258	9.9697			(27)
Ground Floor			73.4100	0.1100	8.0751	110.0000	8075.1000	(28a)
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230	110.0000	2458.4999	(29a)
Total net area of external elements Aum(A, m2)			106.9600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.9466			(33)
Main dwelling								
Party Wall			55.4800	0.0000	0.0000	45.0000	2496.6000	(32)
Corridor			23.5600	0.0000	0.0000	45.0000	1060.2000	(32)
Party Ceiling			73.4100			30.0000	2202.3000	(32b)
Internal Wall			107.7800			9.0000	970.0200	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17262.7199	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							235.1549	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E7 Party floor between dwellings (in blocks of flats)				13.6300	0.0370	0.5043		
P1 Party wall - Ground floor				29.4900	0.0510	1.5040		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				29.4900	0.0000	0.0000		
E2 Other lintels (including other steel lintels)				5.7700	0.0250	0.1442		
E3 Sill				2.5000	0.0220	0.0550		
E4 Jamb				10.4800	0.0170	0.1782		
E5 Ground floor (normal)				13.6300	0.0670	0.9132		
E16 Corner (normal)				2.6800	0.0420	0.1126		
E18 Party wall between dwellings				5.3600	0.0320	0.1715		
E25 Staggered party wall between dwellings				5.3600	0.0300	0.1608		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.7438	(36)
Point Thermal bridges							0.0000	(36a) =
Total fabric heat loss						(33) + (36) + (36a) =	30.6904	(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	18.2585	18.0668	17.8750	16.9162	16.7245	15.7657	15.7657	15.5739	16.1492	16.7245	17.1080	17.4915	(38)
Average = Sum(39)m / 12 =	48.9489	48.7572	48.5654	47.6066	47.4149	46.4561	46.4561	46.2643	46.8396	47.4149	47.7984	48.1819	(39)
												47.5587	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6668	0.6642	0.6616	0.6485	0.6459	0.6328	0.6328	0.6302	0.6381	0.6459	0.6511	0.6563	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.6478	
												31	

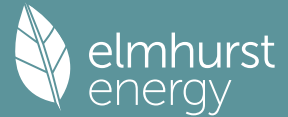
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3260	(42)
Hot water usage for mixer showers	63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766	(42a)	
Hot water usage for baths	27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171	(42b)	
Hot water usage for other uses	38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504	(42c)	
Average daily hot water use (litres/day)													118.5607	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	128.9786	126.2248	122.8710	117.7709	113.6294	109.1769	107.4655	110.8048	114.3266	119.0010	124.1797	128.6441	(44)	
Energy conte	204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255	(45)	
Energy content (annual)										Total = Sum(45)m =		1969.2679		
Distribution loss (46)m = 0.15 x (45)m	30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138	(46)	
Water storage loss (or HIU 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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(64)	
								Total per year (kWh/year) = Sum(64)m =				2286.5989	(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	67.9200	59.7644	62.7920	53.6065	50.8615	44.6367	43.2151	45.6188	46.8746	53.6932	58.8248	66.9740	(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	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	23.0335	20.4581	16.6377	12.5958	9.4155	7.9490	8.5891	11.1645	14.9849	19.0268	22.2071	23.6736	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	306.1514	309.3283	301.3227	284.2795	262.7657	242.5456	229.0374	225.8605	233.8662	250.9093	272.4232	292.6432	(68)	
Pumps, fans	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	(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)	

Full SAP Calculation Printout



	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395 (71)
Water heating gains (Table 5)	91.2903	88.9350	84.3979	74.4534	68.3623	61.9954	58.0848	61.3156	65.1036	72.1683	81.7012	90.0188 (72)
Total internal gains	518.2768	516.5231	500.1598	469.1304	438.3450	410.2916	393.5130	396.1423	411.7563	439.9060	474.1331	504.1373 (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	
North				3.6800	10.6334	0.4000	0.0000		0.7700		12.0523 (74)	
South				7.5200	46.7521	0.4000	0.0000		0.7700		108.2853 (78)	
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	638.6144	716.8991	765.2018	787.3166	789.0906	756.9966	728.3273	706.2470	694.7963	658.6048	617.3561	607.7531 (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	97.9633	98.3486	98.7370	100.7255	101.1329	103.2201	103.2201	103.6480	102.3750	101.1329	100.3214	99.5229
alpha	7.5309	7.5566	7.5825	7.7150	7.7422	7.8813	7.8813	7.9099	7.8250	7.7422	7.6881	7.6349
util living area	0.9612	0.9191	0.8436	0.7128	0.5561	0.3926	0.2806	0.3013	0.4645	0.7270	0.9146	0.9695 (86)
MIT	20.6563	20.7870	20.9009	20.9748	20.9963	20.9998	21.0000	21.0000	20.9993	20.9757	20.8311	20.6274 (87)
Th 2	20.3703	20.3726	20.3749	20.3865	20.3889	20.4005	20.4005	20.4029	20.3959	20.3889	20.3842	20.3796 (88)
util rest of house	0.9529	0.9044	0.8202	0.6813	0.5205	0.3559	0.2424	0.2622	0.4241	0.6902	0.8969	0.9627 (89)
MIT 2	19.9845	20.1427	20.2747	20.3638	20.3861	20.4004	20.4005	20.4029	20.3954	20.3680	20.2077	19.9574 (90)
Living area fraction	20.2482	20.3957	20.5206	20.6037	20.6257	20.6357	20.6359	20.6373	20.6325	20.6066	20.4524	20.2204 (92)
Temperature adjustment	20.2482	20.3957	20.5206	20.6037	20.6257	20.6357	20.6359	20.6373	20.6325	20.6066	20.4524	20.2204 (93)
adjusted MIT	20.2482	20.3957	20.5206	20.6037	20.6257	20.6357	20.6359	20.6373	20.6325	20.6066	20.4524	20.2204 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9511	0.9049	0.8259	0.6926	0.5343	0.3703	0.2574	0.2776	0.4400	0.7035	0.8991	0.9607 (94)
Useful gains	607.3757	648.7504	631.9849	545.2806	421.6242	280.3263	187.4878	196.0297	305.6989	463.3575	555.0365	583.8977 (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	780.6487	755.5240	680.9143	557.1719	423.2084	280.3967	187.4909	196.0353	305.9787	474.4618	638.2240	771.8945 (97)
Space heating kWh	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696 (98a)
Space heating requirement - total per year (kWh/year)												454.8371
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	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												454.8371
Space heating per m2										(98c) / (4) =		6.1958 (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	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696 (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)	128.9151	71.7519	36.4034	8.5617	1.1787	0.0000	0.0000	0.0000	0.0000	8.2616	59.8950	139.8696 (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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769 (64)
Efficiency of water heater (217)m	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958 (216)
Fuel for water heating, kWh/month	67.2948	59.3970	62.8062	54.5130	52.3634	46.6617	45.6704	47.7744	48.6205	54.8420	59.0807	66.4667 (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	14.2622	12.8819	14.2622	13.8021	14.2622	13.8021	14.2622	14.2622	13.8021	14.2622	13.8021	14.2622 (231)
Lighting	20.1610	16.1739	14.5628	10.6694	8.2413	6.7332	7.5180	9.7722	12.6931	16.6540	18.8107	20.7214 (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												454.8371	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												343.5958	
Water heating fuel used												665.4910	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)													
mechanical ventilation fans (SFP = 0.7500)												167.9254	(230a)
Total electricity for the above, kWh/year												167.9254	(231)
Electricity for lighting (calculated in Appendix L)												162.7112	(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												1450.9646	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price £/kWh	Fuel cost £/year
Space heating - main system 1	454.8371	16.4900	75.0026 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (243)
Water heating (other fuel)	665.4910	16.4900	109.7395 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	167.9254	16.4900	27.6909 (249)
Energy for lighting	162.7112	16.4900	26.8311 (250)
Additional standing charges			0.0000 (251)
Total energy cost			239.2641 (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] = 0.7274 (257)
SAP value	88.2083
SAP rating (Section 12)	88 (258)
SAP band	B

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

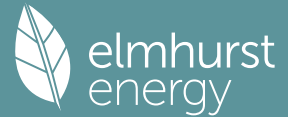
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	454.8371	0.1592	72.4096 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	665.4910	0.1412	93.9543 (264)
Space and water heating			166.3639 (265)
Pumps, fans and electric keep-hot	167.9254	0.1387	23.2933 (267)
Energy for lighting	162.7112	0.1443	23.4843 (268)
Total CO2, kg/year			213.1414 (272)
CO2 emissions per m2			2.9000 (273)
EI value			97.5880
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	73.4100 (1b)	x 2.5000 (2b)	= 183.5250 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.4100		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	183.5250 (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												2.9800 (17)
Infiltration rate												0.1490 (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) =											0.1266 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.2000	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	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
	0.1361	0.1330	0.1330	0.1235	0.1266	0.1077	0.1045	0.1045	0.1077	0.1203	0.1203	0.1235 (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	0.2761	0.2730	0.2730	0.2635	0.2666	0.2477	0.2445	0.2445	0.2477	0.2603	0.2603	0.2635 (25)

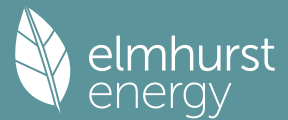
3. Heat losses and heat loss parameter

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 N/E			3.6800	1.3258	4.8788			(27)					
Window S/W			7.5200	1.3258	9.9697			(27)					
Ground Floor			73.4100	0.1100	8.0751	110.0000	8075.1000	(28a)					
EXT Wall	33.5500	11.2000	22.3500	0.1800	4.0230	110.0000	2458.4999	(29a)					
Total net area of external elements Aum(A, m2)			106.9600					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.9466			(33)					
Main dwelling													
Party Wall			55.4800	0.0000	0.0000	45.0000	2496.6000	(32)					
Corridor			23.5600	0.0000	0.0000	45.0000	1060.2000	(32)					
Party Ceiling			73.4100			30.0000	2202.3000	(32b)					
Internal Wall			107.7800			9.0000	970.0200	(32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		17262.7199	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							235.1549	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E7 Party floor between dwellings (in blocks of flats)				13.6300	0.0370	0.5043							
P1 Party wall - Ground floor				29.4900	0.0510	1.5040							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				29.4900	0.0000	0.0000							
E2 Other lintels (including other steel lintels)				5.7700	0.0250	0.1442							
E3 Sill				2.5000	0.0220	0.0550							
E4 Jamb				10.4800	0.0170	0.1782							
E5 Ground floor (normal)				13.6300	0.0670	0.9132							
E16 Corner (normal)				2.6800	0.0420	0.1126							
E18 Party wall between dwellings				5.3600	0.0320	0.1715							
E25 Staggered party wall between dwellings				5.3600	0.0300	0.1608							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.7438	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss					(33) + (36) + (36a) =		30.6904	(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	16.7245	16.5327	16.5327	15.9574	16.1492	14.9986	14.8069	14.8069	14.9986	15.7657	15.7657	15.9574	(38)
Average = Sum(39)m / 12 =	47.4149	47.2231	47.2231	46.6478	46.8396	45.6890	45.4973	45.4973	45.6890	46.4561	46.4561	46.6478	(39)
												46.4401	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6459	0.6433	0.6433	0.6354	0.6381	0.6224	0.6198	0.6198	0.6224	0.6328	0.6328	0.6354	(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												2.3260 (42)
Hot water usage for mixer showers												
Hot water usage for baths	63.2188	62.2688	60.8843	58.2355	56.2807	54.1008	52.8617	54.2356	55.7417	58.0823	60.7881	62.9766 (42a)
Hot water usage for other uses	27.3094	26.9038	26.3327	25.2796	24.4910	23.6167	23.1444	23.7115	24.3290	25.2646	26.3394	27.2171 (42b)
Average daily hot water use (litres/day)	38.4504	37.0522	35.6540	34.2558	32.8576	31.4594	31.4594	32.8576	34.2558	35.6540	37.0522	38.4504 (42c)
												118.5607 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	128.9786	126.2248	122.8710	117.7709	113.6294	109.1769	107.4655	110.8048	114.3266	119.0010	124.1797	128.6441 (44)
Energy content (annual)	204.2706	179.7424	188.8482	161.2225	152.9670	134.2457	129.9702	137.1995	140.9762	161.4833	176.9168	201.4255 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1969.2679
Water storage loss (or HIU loss):	30.6406	26.9614	28.3272	24.1834	22.9451	20.1369	19.4955	20.5799	21.1464	24.2225	26.5375	30.2138 (46)

Full SAP Calculation Printout



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													
	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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													
	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(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													
	67.9200	59.7644	62.7920	53.6065	50.8615	44.6367	43.2151	45.6188	46.8746	53.6932	58.8248	66.9740	(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	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	139.5592	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0335	20.4581	16.6377	12.5958	9.4155	7.9490	8.5891	11.1645	14.9849	19.0268	22.2071	23.6736	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	306.1514	309.3283	301.3227	284.2795	262.7657	242.5456	229.0374	225.8605	233.8662	250.9093	272.4232	292.6432	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	51.2819	(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)	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	-93.0395	(71)
Water heating gains (Table 5)	91.2903	88.9350	84.3979	74.4534	68.3623	61.9954	58.0848	61.3156	65.1036	72.1683	81.7012	90.0188	(72)
Total internal gains	518.2768	516.5231	500.1598	469.1304	438.3450	410.2916	393.5130	396.1423	411.7563	439.9060	474.1331	504.1373	(73)

6. Solar gains

[Jan]													
	Area	Solar flux											
	m2	Table 6a	Specific data	g	Specific data	FF	Access						
		W/m2	or Table 6b		or Table 6c	factor	Table 6d						
North	3.6800	9.3942	0.4000	0.0000	0.7700	10.6478	10.6478 (74)						
South	7.5200	41.2355	0.4000	0.0000	0.7700	95.5081	95.5081 (78)						
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386	93.4882	(83)
Total gains	624.4327	697.8402	750.7607	776.1110	768.5475	744.5018	708.4630	684.0304	686.7691	648.0951	603.9717	597.6255	(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	101.1329	101.5435	101.5435	102.7958	102.3750	104.9530	105.3953	105.3953	104.9530	103.2201	103.2201	102.7958	102.7958
alpha	7.7422	7.7696	7.7696	7.8531	7.8250	7.9969	8.0264	8.0264	7.9969	7.8813	7.8813	7.8531	7.8531
util living area	0.9490	0.8981	0.8061	0.6576	0.4927	0.3252	0.2376	0.2594	0.4189	0.6827	0.8907	0.9596	0.9596 (86)
MIT	20.7345	20.8455	20.9372	20.9875	20.9987	21.0000	21.0000	21.0000	20.9997	20.9861	20.8800	20.7062	20.7062 (87)
Th 2	20.3889	20.3912	20.3912	20.3982	20.3959	20.4099	20.4122	20.4122	20.4099	20.4005	20.4005	20.3982	20.3982 (88)
util rest of house	0.9382	0.8803	0.7797	0.6246	0.4563	0.2890	0.1999	0.2203	0.3798	0.6443	0.8692	0.9507	0.9507 (89)
MIT 2	20.0966	20.2285	20.3299	20.3874	20.3950	20.4099	20.4122	20.4122	20.4097	20.3892	20.2789	20.0708	20.0708 (90)
Living area fraction													
MIT	20.3470	20.4707	20.5683	20.6230	20.6320	20.6415	20.6430	20.6430	20.6414	20.6236	20.5149	20.3203	20.3203 (92)
Temperature adjustment												0.0000	0.0000
adjusted MIT	20.3470	20.4707	20.5683	20.6230	20.6320	20.6415	20.6430	20.6430	20.6414	20.6236	20.5149	20.3203	20.3203 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9374	0.8827	0.7876	0.6371	0.4705	0.3032	0.2147	0.2357	0.3951	0.6588	0.8736	0.9494	(94)
Useful gains	585.3224	616.0040	591.2864	494.4393	361.6310	225.7630	152.0963	161.1951	271.3571	426.9662	527.6157	567.3913	(95)
Ext temp.	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000	(96)
Heat loss rate W													
	718.1935	692.7957	621.8495	500.2042	362.1629	225.7743	152.0968	161.1962	271.4552	433.1362	586.0386	714.6568	(97)
Space heating kWh													
	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655	(98a)
Space heating requirement - total per year (kWh/year)												333.9660	
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													
	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												333.9660	
Space heating per m2													
											(98c) / (4) =	4.5493	(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	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655	(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)	98.8562	51.6040	22.7390	4.1507	0.3957	0.0000	0.0000	0.0000	0.0000	4.5905	42.0645	109.5655	(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	231.2220	204.0856	215.7996	187.3045	179.9184	160.3277	156.9216	164.1509	167.0582	188.4347	202.9988	228.3769	(64)
Efficiency of water heater (217)m	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	343.5958	(216)
Fuel for water heating, kWh/month	67.2948	59.3970	62.8062	54.5130	52.3634	46.6617	45.6704	47.7744	48.6205	54.8420	59.0807	66.4667	(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	14.2622	12.8819	14.2622	13.8021	14.2622	13.8021	14.2622	14.2622	13.8021	14.2622	13.8021	14.2622	(231)
Lighting	20.1610	16.1739	14.5628	10.6694	8.2413	6.7332	7.5180	9.7722	12.6931	16.6540	18.8107	20.7214	(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													333.9660 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													343.5958
Water heating fuel used													665.4910 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)													
mechanical ventilation fans (SFP = 0.7500)													167.9254 (230a)
Total electricity for the above, kWh/year													167.9254 (231)
Electricity for lighting (calculated in Appendix L)													162.7112 (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													1330.0936 (238)

10a. Fuel costs - using BEDF prices (587)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	333.9660	28.4300	94.9465	(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)	665.4910	28.4300	189.1991	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	167.9254	28.4300	47.7412	(249)
Energy for lighting	162.7112	28.4300	46.2588	(250)
Additional standing charges			0.0000	(251)
Total energy cost			378.1456	(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	333.9660	0.1597	53.3303	(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)	665.4910	0.1412	93.9543	(264)
Space and water heating			147.2846	(265)
Pumps, fans and electric keep-hot	167.9254	0.1387	23.2933	(267)
Energy for lighting	162.7112	0.1443	23.4843	(268)
Total CO2, kg/year			194.0621	(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	333.9660	1.5910	531.3501 (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)	665.4910	1.5220	1012.9091 (278)
Space and water heating			1544.2592 (279)
Pumps, fans and electric keep-hot	167.9254	1.5128	254.0375 (281)
Energy for lighting	162.7112	1.5338	249.5718 (282)
Total Primary energy kWh/year			2047.8686 (286)