

Full SAP Calculation Printout



Plot Reference	Plot 29			Issued on Date	22/12/2025	
Assessment Reference	Plot 29	Plot Type Ref				
Plot Address	Flat 7, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2	
SAP Rating	73 C	DER	9.01	TER	18.77	
Environmental	94 A	% DER < TER				52.00
CO ₂ Emissions (t/year)	0.32	DFEE	58.56	TFEE	44.36	
Compliance Check	See BREL	% DFEE < TFEE				-32.02
% DPER < TPER	7.20	DPER	93.24	TPER	100.48	
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	40.4200 (1b)	3.3500 (2b)	135.4070 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	135.4070 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.9700 (17)
Infiltration rate		0.1985 (18)
Number of sides sheltered		2 (19)

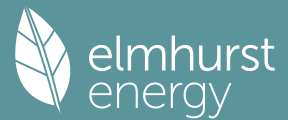
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1687 (21)

	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	0.2151	0.2109	0.2067	0.1856	0.1814	0.1603	0.1603	0.1561	0.1687	0.1814	0.1898	0.1983 (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	0.3551	0.3509	0.3467	0.3256	0.3214	0.3003	0.3003	0.2961	0.3087	0.3214	0.3298	0.3383 (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			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	41.7600		41.7600	0.1200	5.0112	9.0000	375.8400 (30)
Flat Ceiling	4.3500		4.3500	0.1200	0.5220	9.0000	39.1500 (30)
Total net area of external elements Aum (A, m ²)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9837		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000	20.0000	457.8000 (32)
Corridor			41.2400	0.0000	0.0000	20.0000	824.8000 (32)
Party Floor 1			40.4200			40.0000	1616.8000 (32d)
Internal Walls			50.3800			9.0000	453.4200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4137.5500 (34)

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

102.3639 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.8900	0.1690	1.5024
E2 Other lintels (including other steel lintels)	5.9400	0.0070	0.0416
E3 Sill	13.3000	0.0370	0.4921
E4 Jamb	11.1200	0.0370	0.4114
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0890	0.4503
E16 Corner (normal)	5.0600	0.0310	0.1569
E18 Party wall between dwellings	4.5300	0.1320	0.5980
E11 Eaves (insulation at rafter level)	6.5200	0.0320	0.2086
E13 Gable (insulation at rafter level)	20.8300	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072
E25 Staggered party wall between dwellings	9.2600	0.0260	0.2408
R6 Flat ceiling	0.9600	0.2500	0.2400
E12 Gable (insulation at ceiling level)	21.7100	0.1710	3.7124
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 46.6454 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	15.8685	15.6800	15.4915	14.5491	14.3606	13.4182	13.4182	13.2297	13.7952	14.3606	14.7376	15.1146
Heat transfer coeff	62.5139	62.3254	62.1369	61.1945	61.0060	60.0636	60.0636	59.8751	60.4405	61.0060	61.3830	61.7599
Average = Sum(39)m / 12 =												61.1474

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.5466	1.5419	1.5373	1.5140	1.5093	1.4860	1.4860	1.4813	1.4953	1.5093	1.5186	1.5280
HLP (average)												1.5128
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4175 (42)
Hot water usage for mixer showers	47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031	(42a)
Hot water usage for baths	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890	(42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471	(42c)
Average daily hot water use (litres/day)													89.9867 (43)
Daily hot water use	97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392	(44)
Energy content (annual)	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793	(45)
Distribution loss (46)m = 0.15 x (45)m	23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319	(46)
Water storage loss (or HIU loss):													201.0000 (47)
Store volume													1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.8694 (55)
Enter (49) or (54) in (55)													
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307	(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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307	(64)
12Total per year (kWh/year)													1811.9915 (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	51.5504	45.3608	47.6591	40.6872	38.6040	33.8794	32.8001	34.6243	35.5772	40.7524	44.6473	50.8324	(65)

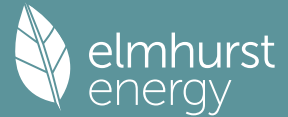
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.8332	68.4581	61.8332	63.8943	61.8332	63.8943	61.8332	61.8332	63.8943	61.8332	63.8943	61.8332	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	122.5912	123.8633	120.6576	113.8331	105.2183	97.1217	91.7127	90.4406	93.6462	100.4708	109.0855	117.1821	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	(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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	(71)
Water heating gains (Table 5)	69.2882	67.5012	64.0579	56.5100	51.8870	47.0547	44.0862	46.5381	49.4128	54.7748	62.0102	68.3231	(72)
Total internal gains	297.9757	304.0857	290.8118	278.5005	263.2017	252.3338	241.8952	243.0749	251.2164	261.3418	279.2531	291.6015	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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North			1.3700	10.6334	0.4000	0.0000	0.7700	4.4869 (74)				
South			19.6100	46.7521	0.3500	0.7000	0.7700	155.6602 (78)				
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)
Total gains	458.1228	567.5917	630.1195	668.9280	677.1901	654.1515	633.0296	617.3191	607.9613	546.5162	469.2987	429.8468 (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	18.3850	18.4406	18.4966	18.7814	18.8395	19.1350	19.1350	19.1953	19.0157	18.8395	18.7238	18.6095
alpha	2.2257	2.2294	2.2331	2.2521	2.2560	2.2757	2.2757	2.2797	2.2677	2.2560	2.2483	2.2406
util living area	0.9035	0.8550	0.8026	0.7269	0.6297	0.5000	0.3821	0.4039	0.5566	0.7427	0.8630	0.9137 (86)
MIT	18.2398	18.7270	19.2636	19.8752	20.3755	20.7442	20.9002	20.8835	20.6500	19.9875	19.0198	18.1593 (87)
Th 2	19.6527	19.6562	19.6597	19.6770	19.6805	19.6980	19.6980	19.7015	19.6910	19.6805	19.6736	19.6666 (88)
util rest of house	0.8890	0.8347	0.7748	0.6876	0.5732	0.4198	0.2809	0.3036	0.4794	0.6975	0.8402	0.9006 (89)
MIT 2	16.5505	17.1486	17.8043	18.5449	19.1197	19.5173	19.6508	19.6427	19.4260	18.6990	17.5349	16.4578 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.5230	18.0573	18.6444	19.3108	19.8427	20.2236	20.3701	20.3570	20.1306	19.4408	18.3897	17.4374 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.5230	18.0573	18.6444	19.3108	19.8427	20.2236	20.3701	20.3570	20.1306	19.4408	18.3897	17.4374 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8592	0.8050	0.7503	0.6755	0.5806	0.4537	0.3348	0.3559	0.5069	0.6883	0.8129	0.8717 (94)
Useful gains	393.6041	456.9322	472.7827	451.8284	393.2051	296.7692	211.9258	219.7306	308.1571	376.1560	381.4732	374.7061 (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	826.6232	820.0319	754.6158	637.0809	496.7522	337.7757	226.4445	236.9265	364.4956	539.3402	692.9978	817.5394 (97)
Space heating kWh	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (98a)
Space heating requirement - total per year (kWh/year)	1661.4484											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1661.4484											
Space heating per m2	(98c) / (4) = 41.1046 (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	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (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)	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	52.0850	46.0109	48.7356	42.4858	40.9414	36.6260	35.9459	37.5160	38.0874	42.7907	45.8944	51.4670 (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	11.7855	10.6450	11.7855	11.4053	11.7855	11.4053	11.7855	11.7855	11.4053	11.7855	11.4053	11.7855 (231)
Lighting	12.6942	10.1838	9.1694	6.7179	5.1891	4.2395	4.7336	6.1530	7.9921	10.4861	11.8440	13.0470 (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	1661.4484 (211)											

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	349.4100	
Water heating fuel used	518.5860	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	138.7651	(230a)
Total electricity for the above, kWh/year	138.7651	(231)
Electricity for lighting (calculated in Appendix L)	102.4497	(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	2421.2492	(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	1661.4484	0.1547	256.9618 (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)	518.5860	0.1411	73.1602 (264)
Space and water heating			330.1219 (265)
Pumps, fans and electric keep-hot	138.7651	0.1387	19.2484 (267)
Energy for lighting	102.4497	0.1443	14.7867 (268)
Total CO2, kg/year			364.1570 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.0100 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1661.4484	1.5726	2612.7439 (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)	518.5860	1.5217	789.1103 (278)
Space and water heating			3401.8542 (279)
Pumps, fans and electric keep-hot	138.7651	1.5128	209.9238 (281)
Energy for lighting	102.4497	1.5338	157.1407 (282)
Total Primary energy kWh/year			3768.9187 (286)
Dwelling Primary energy Rate (DPER)			93.2400 (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	40.4200 (1b)	x 3.3500 (2b)	= 135.4070 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 135.4070 (5)

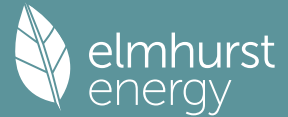
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1477 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3977	(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) =	0.3380 (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)

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Adj infilt rate	0.4310	0.4226	0.4141	0.3719	0.3634	0.3211	0.3211	0.3127	0.3380	0.3634	0.3803	0.3972 (22b)
Effective ac	0.5929	0.5893	0.5857	0.5691	0.5660	0.5516	0.5516	0.5489	0.5571	0.5660	0.5723	0.5789 (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 Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type			7.9800	1.1450	9.1374		(27)
EXT Wall	49.5100	10.1000	39.4100	0.1800	7.0938		(29a)
Warm Sloping Roof	41.7600		41.7600	0.1100	4.5936		(30)
Flat Ceiling	4.3500		4.3500	0.1100	0.4785		(30)
Total net area of external elements Aum(A, m2)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		23.4233		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000		(32)
Corridor			41.2400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							102.3639 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.8900	0.0500	0.4445
E3 Sill	5.9400	0.0500	0.2970
E4 Jamb	13.3000	0.0500	0.6650
E7 Party floor between dwellings (in blocks of flats)	11.1200	0.0700	0.7784
E16 Corner (normal)	5.0600	0.0900	0.4554
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E11 Eaves (insulation at rafter level)	4.5300	0.0400	0.1812
E13 Gable (insulation at rafter level)	6.5200	0.0800	0.5216
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8300	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036
R6 Flat ceiling	9.2600	0.0600	0.5556
E12 Gable (insulation at ceiling level)	0.9600	0.0600	0.0576
P5 Party wall - Roof (insulation at rafter level)	21.7100	0.0800	1.7368
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.3003 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 29.7236 (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	26.4927	26.3315	26.1735	25.4315	25.2927	24.6464	24.6464	24.5267	24.8953	25.2927	25.5735	25.8671 (38)
Heat transfer coeff	56.2163	56.0551	55.8971	55.1551	55.0163	54.3700	54.3700	54.2503	54.6189	55.0163	55.2971	55.5907 (39)
Average = Sum(39)m / 12 =												55.1544
HLP	1.3908	1.3868	1.3829	1.3645	1.3611	1.3451	1.3451	1.3422	1.3513	1.3611	1.3681	1.3753 (40)
HLP (average)												1.3645
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

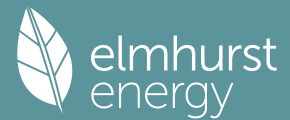
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4175 (42)
Hot water usage for mixer showers												
47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031 (42a)	
Hot water usage for baths												
20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890 (42b)	
Hot water usage for other uses												
29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471 (42c)	
Average daily hot water use (litres/day)												89.9867 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392 (44)	
Energy content (annual)	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1494.6605
23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319 (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												
201.6338	178.5091	189.9304	167.4594	162.6970	146.9847	145.2419	150.7282	152.0910	169.1586	179.3695	199.4742 (62)	
WWHRS	-21.9376	-19.4018	-20.3165	-16.8228	-15.6783	-13.4160	-12.5754	-13.3726	-13.8807	-16.3638	-18.5383	-21.5314 (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												
179.6962	159.1073	169.6140	150.6366	147.0187	133.5687	132.6666	137.3555	138.2102	152.7947	160.8313	177.9428 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1839.4426 (64)
Electric shower(s)												1839 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
88.8264	79.0294	84.9350	76.7607	75.8799	69.9529	70.0761	71.9002	71.6507	78.0283	80.7208	88.1083 (65)	

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

Metabolic gains (Table 5), Watts												
(66)m	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	62.3562	69.0372	62.3562	64.4347	62.3562	64.4347	62.3562	62.3562	64.4347	62.3562	64.4347	62.3562 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	122.5912	123.8633	120.6576	113.8331	105.2183	97.1217	91.7127	90.4406	93.6462	100.4708	109.0855	117.1821 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877 (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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)	119.3903	117.6032	114.1599	106.6121	101.9891	97.1567	94.1883	96.6401	99.5148	104.8768	112.1122	118.4251 (72)
Total internal gains	351.6008	357.7668	344.4368	332.1430	316.8268	302.9763	292.5203	293.7000	301.8589	314.9669	332.8956	345.2266 (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				0.5200	10.6334	0.6300	0.7000	0.7700	1.6898 (74)			
South				7.4600	46.7521	0.6300	0.7000	0.7700	106.5888 (78)			
Solar gains	108.2786	177.7943	227.8523	260.1348	273.7652	264.7461	258.1209	248.5616	238.8840	192.1288	128.4287	93.5112 (83)
Total gains	459.8794	535.5612	572.2891	592.2778	590.5919	567.7224	550.6412	542.2616	540.7430	507.0957	461.3243	438.7378 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	20.4446	20.5034	20.5613	20.8380	20.8905	21.1389	21.1389	21.1855	21.0425	20.8905	20.7844	20.6747	
alpha	2.3630	2.3669	2.3708	2.3892	2.3927	2.4093	2.4093	2.4124	2.4028	2.3927	2.3856	2.3783	
util living area	0.8961	0.8571	0.8135	0.7457	0.6532	0.5230	0.3994	0.4191	0.5715	0.7465	0.8562	0.9046 (86)	
MIT	18.5791	18.9592	19.4106	19.9540	20.4159	20.7620	20.9101	20.8959	20.6844	20.1017	19.2702	18.5196 (87)	
Th 2	19.7704	19.7735	19.7765	19.7906	19.7933	19.8057	19.8057	19.8080	19.8009	19.7933	19.7879	19.7823 (88)	
util rest of house	0.8815	0.8381	0.7882	0.7099	0.6008	0.4470	0.3027	0.3237	0.4993	0.7043	0.8339	0.8912 (89)	
MIT 2	17.0321	17.5005	18.0557	18.7188	19.2550	19.6306	19.7602	19.7521	19.5537	18.9085	17.9052	16.9657 (90)	
Living area fraction									fLA = Living area / (4) =			0.5757 (91)	
MIT	17.9227	18.3403	18.8357	19.4299	19.9233	20.2820	20.4222	20.4106	20.2046	19.5954	18.6910	17.8603 (92)	
Temperature adjustment												0.0000	
adjusted MIT	17.9227	18.3403	18.8357	19.4299	19.9233	20.2820	20.4222	20.4106	20.2046	19.5954	18.6910	17.8603 (93)	

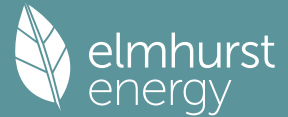
8. Space heating requirement

Utilisation	0.8540	0.8113	0.7657	0.6980	0.6069	0.4787	0.3541	0.3735	0.5249	0.6966	0.8096	0.8642 (94)	
Useful gains	392.7429	434.4855	438.1804	413.4122	358.4218	271.7528	194.9814	202.5170	283.8630	353.2497	373.4701	379.1520 (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	765.8190	753.3974	689.5300	580.7793	452.4171	308.9279	207.8119	217.5768	333.4275	494.8938	640.9508	759.3860 (97)	
Space heating kWh	277.5686	214.3088	187.0041	120.5043	69.9325	0.0000	0.0000	0.0000	0.0000	105.3832	192.5861	282.8941 (98a)	
Space heating requirement - total per year (kWh/year)												1450.1818	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	277.5686	214.3088	187.0041	120.5043	69.9325	0.0000	0.0000	0.0000	0.0000	105.3832	192.5861	282.8941 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1450.1818	
Space heating per m2										(98c) / (4) =		35.8778 (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	277.5686	214.3088	187.0041	120.5043	69.9325	0.0000	0.0000	0.0000	0.0000	105.3832	192.5861	282.8941 (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)	300.7244	232.1872	202.6047	130.5573	75.7665	0.0000	0.0000	0.0000	0.0000	114.1746	208.6523	306.4941 (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	179.6962	159.1073	169.6140	150.6366	147.0187	133.5687	132.6666	137.3555	138.2102	152.7947	160.8313	177.9428 (64)	
Efficiency of water heater (217)m	85.0313	84.7284	84.2792	83.5641	82.4951	79.8000	79.8000	79.8000	79.8000	83.2438	84.4649	79.8000 (216)	
Fuel for water heating, kWh/month	211.3294	187.7851	201.2525	180.2648	178.2151	167.3793	166.2488	172.1247	173.1958	183.5509	190.4120	209.1126 (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)	

Full SAP Calculation Printout



Lighting	12.9564	10.3941	9.3587	6.8566	5.2962	4.3271	4.8314	6.2800	8.1572	10.7026	12.0886	13.3165	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-11.0302	-16.4518	-25.0126	-29.8181	-33.6807	-32.0322	-31.6726	-29.1521	-24.9569	-19.5720	-12.4523	-9.4362	(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	-3.7655	-8.1139	-16.4825	-25.2747	-33.9151	-34.2296	-33.7966	-28.3633	-20.4811	-11.7401	-5.0734	-2.9614	(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												1571.1612	(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												2220.8711	(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)												104.5654	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-499.4649	(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												3483.1328	(238)

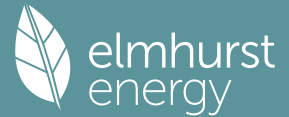
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1571.1612	0.2100	329.9438 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2220.8711	0.2100	466.3829 (264)
Space and water heating			796.3268 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	104.5654	0.1443	15.0920 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-275.2676	0.1334	-36.7165
PV Unit electricity exported	-224.1973	0.1253	-28.0955
Total			-64.8119 (269)
Total CO2, kg/year			758.5361 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.7700 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1571.1612	1.1300	1775.4121 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2220.8711	1.1300	2509.5843 (278)
Space and water heating			4284.9965 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	104.5654	1.5338	160.3860 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-275.2676	1.4929	-410.9464
PV Unit electricity exported	-224.1973	0.4600	-103.1240
Total			-514.0704 (283)
Total Primary energy kWh/year			4061.4128 (286)
Target Primary Energy Rate (TPER)			100.4800 (287)

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Plot Reference	Plot 29				Issued on Date	22/12/2025	
Assessment Reference	Plot 29			Plot Type Ref			
Plot Address	Flat 7, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	73 C	DER	9.01	TER	18.77		
Environmental	94 A	% DER < TER				52.00	
CO ₂ Emissions (t/year)	0.32	DFEE	58.56	TFEE	44.36		
Compliance Check	See BREL	% DFEE < TFEE				-32.02	
% DPER < TPER	7.20	DPER	93.24	TPER	100.48		
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	40.4200 (1b)	3.3500 (2b)	135.4070 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		135.4070 (4)
Dwelling volume			135.4070 (5)

2. Ventilation rate

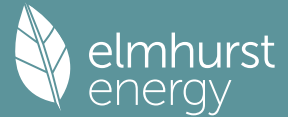
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1477 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9700 (17)
Infiltration rate	0.3462 (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) = 0.2943 (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	0.3752	0.3678	0.3605	0.3237	0.3163	0.2796	0.2796	0.2722	0.2943	0.3163	0.3311	0.3458 (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	0.5704	0.5677	0.5650	0.5524	0.5500	0.5391	0.5391	0.5370	0.5433	0.5500	0.5548	0.5598 (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			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	41.7600		41.7600	0.1200	5.0112	9.0000	375.8400 (30)
Flat Ceiling	4.3500		4.3500	0.1200	0.5220	9.0000	39.1500 (30)
Total net area of external elements A _{um} (A, m ²)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9837		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000	20.0000	457.8000 (32)
Corridor			41.2400	0.0000	0.0000	20.0000	824.8000 (32)
Party Floor 1			40.4200			40.0000	1616.8000 (32d)
Internal Walls			50.3800			9.0000	453.4200 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		4137.5500 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							102.3639 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E2 Other lintels (including other steel lintels)	8.8900	0.1690	1.5024
E3 Sill	5.9400	0.0070	0.0416
E4 Jamb	13.3000	0.0370	0.4921
E7 Party floor between dwellings (in blocks of flats)	11.1200	0.0370	0.4114
E16 Corner (normal)	5.0600	0.0890	0.4503
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	4.5300	0.1320	0.5980
E13 Gable (insulation at rafter level)	6.5200	0.0320	0.2086
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8300	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	9.2600	0.0260	0.2408
E12 Gable (insulation at ceiling level)	0.9600	0.2500	0.2400
P5 Party wall - Roof (insulation at rafter level)	21.7100	0.1710	3.7124
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.6617 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	46.6454 (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	25.4873	25.3652	25.2455	24.6832	24.5780	24.0883	24.0883	23.9976	24.2769	24.5780	24.7908	25.0133	(38)
Heat transfer coeff	72.1327	72.0106	71.8909	71.3286	71.2234	70.7336	70.7336	70.6429	70.9223	71.2234	71.4362	71.6587	(39)
Average = Sum(39)m / 12 =												71.3281	
HLP	1.7846	1.7816	1.7786	1.7647	1.7621	1.7500	1.7500	1.7477	1.7546	1.7621	1.7673	1.7729	(40)
HLP (average)												1.7647	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.4175 (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	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890	(42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471	(42c)
Average daily hot water use (litres/day)												45.7444	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	49.9062	48.5381	47.0440	45.1836	43.5243	41.7998	41.4408	42.9318	44.4611	46.2322	48.1090	49.8361	(44)
Energy content (annual)	79.0393	69.1175	72.3049	61.8541	58.5921	51.3977	50.1190	53.1585	54.8249	62.7366	68.5401	78.0312	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (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													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													
WWHRS	67.1834	58.7499	61.4591	52.5760	49.8033	43.6880	42.6011	45.1847	46.6012	53.3261	58.2591	66.3266	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	67.1834	58.7499	61.4591	52.5760	49.8033	43.6880	42.6011	45.1847	46.6012	53.3261	58.2591	66.3266	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				645.7586	(64)
Electric shower(s)	38.4295	34.2410	37.3899	35.6807	36.3503	34.6746	35.8304	36.3503	35.6807	37.3899	36.6868	38.4295	(64a)
Heat gains from water heating, kWh/month	26.4032	23.2477	24.7123	22.0642	21.5384	19.5907	19.6079	20.3837	20.5705	22.6790	23.7365	26.1890	(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	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.8332	68.4581	61.8332	63.8943	61.8332	63.8943	61.8332	61.8332	63.8943	61.8332	63.8943	61.8332	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	122.5912	123.8633	120.6576	113.8331	105.2183	97.1217	91.7127	90.4406	93.6462	100.4708	109.0855	117.1821	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	(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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	(71)
Water heating gains (Table 5)	35.4882	34.5948	33.2154	30.6447	28.9494	27.2093	26.3547	27.3975	28.5701	30.4825	32.9673	35.2003	(72)
Total internal gains	264.1757	271.1794	259.9693	252.6352	240.2641	232.4884	224.1637	223.9344	230.3738	237.0496	250.2102	258.4787	(73)

6. Solar gains													
[Jan]			Area	Solar flux	g	FF	Access	Gains					
			m2	Table 6a	Specific data	Specific data	factor	W					
				W/m2	or Table 6b	or Table 6c	Table 6d						
North			1.3700	10.6334	0.4000	0.0000	0.7700	4.4869	(74)				
South			19.6100	46.7521	0.3500	0.7000	0.7700	155.6602	(78)				
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453	(83)
Total gains	424.3228	534.6854	599.2770	643.0627	654.2525	634.3061	615.2981	598.1786	587.1186	522.2240	440.2558	396.7240	(84)

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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	15.9334	15.9604	15.9870	16.1130	16.1368	16.2486	16.2486	16.2694	16.2053	16.1368	16.0888	16.0388	
alpha	2.0622	2.0640	2.0658	2.0742	2.0758	2.0832	2.0832	2.0846	2.0804	2.0758	2.0726	2.0693	
util living area	0.9215	0.8797	0.8341	0.7674	0.6790	0.5572	0.4370	0.4612	0.6122	0.7832	0.8876	0.9303 (86)	
MIT	17.6739	18.1809	18.7783	19.4806	20.1027	20.5901	20.8251	20.7973	20.4644	19.6354	18.5263	17.5760 (87)	
Th 2	19.4808	19.4829	19.4850	19.4948	19.4967	19.5052	19.5052	19.5068	19.5019	19.4967	19.4929	19.4891 (88)	
util rest of house	0.9083	0.8605	0.8071	0.7274	0.6182	0.4635	0.3105	0.3368	0.5250	0.7375	0.8662	0.9184 (89)	
MIT 2	16.5798	17.0688	17.6431	18.3109	18.8760	19.2866	19.4457	19.4325	19.1932	18.4742	17.4227	16.4899 (90)	
Living area fraction	17.2097	17.7090	18.2966	18.9843	19.5822	20.0370	20.2398	20.2182	fLA = Living area / (4) =				0.5757 (91)
MIT	17.2097	17.7090	18.2966	18.9843	19.5822	20.0370	20.2398	20.2182	19.9250	19.1427	18.0580	17.1151 (92)	
Temperature adjustment	17.2097	17.7090	18.2966	18.9843	19.5822	20.0370	20.2398	20.2182	19.9250	19.1427	18.0580	0.0000	
adjusted MIT	17.2097	17.7090	18.2966	18.9843	19.5822	20.0370	20.2398	20.2182	19.9250	19.1427	18.0580	17.1151 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8817	0.8320	0.7814	0.7117	0.6220	0.4992	0.3759	0.3994	0.5519	0.7248	0.8399	0.8931 (94)
Useful gains	374.1322	444.8622	468.3046	457.6496	406.9643	316.6768	231.2948	238.9401	324.0145	378.5239	369.7893	354.2949 (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	931.2080	922.3870	848.0709	719.3016	561.3974	384.5818	257.4589	269.7296	413.1249	608.4405	782.7989	925.4816 (97)
Space heating kWh	414.4644	320.8967	282.5461	188.3895	114.8982	0.0000	0.0000	0.0000	0.0000	171.0579	297.3669	424.9629 (98a)
Space heating requirement - total per year (kWh/year)												2214.5826
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	414.4644	320.8967	282.5461	188.3895	114.8982	0.0000	0.0000	0.0000	0.0000	171.0579	297.3669	424.9629 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2214.5826
Space heating per m2										(98c) / (4) =		54.7893 (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	664.8962	523.4289	536.8864	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7024	0.7672	0.7518	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	467.0091	401.5835	403.6507	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	720.5079	699.5289	680.6841	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	182.5192	221.6714	206.1128	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	45.6298	55.4179	51.5282	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												152.5759 (107)
Energy for space heating												54.7893 (99)
Energy for space cooling												3.7748 (108)
Total												58.5640 (109)
Fabric Energy Efficiency (DFEE)												58.6 (109)

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

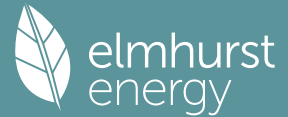
1. Overall dwelling characteristics

Main dwelling		Area (m2)	Storey height (m)	Volume (m3)
Ground floor	40.4200 (1b)	x	3.3500 (2b)	= 135.4070 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	135.4070 (5)

2. Ventilation rate

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

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Number of flueless gas fires

0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
20.0000 / (5) = 0.1477 (8)
Yes
Blower Door
5.0000 (17)
0.3977 (18)
2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3380 (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	0.4310	0.4226	0.4141	0.3719	0.3634	0.3211	0.3211	0.3127	0.3380	0.3634	0.3803	0.3972	(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	0.5929	0.5893	0.5857	0.5691	0.5660	0.5516	0.5516	0.5489	0.5571	0.5660	0.5723	0.5789	(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 Opaque door			2.1200	1.0000	2.1200			(26)
TER Opening Type			7.9800	1.1450	9.1374			(27)
EXT Wall	49.5100	10.1000	39.4100	0.1800	7.0938			(29a)
Warm Sloping Roof	41.7600		41.7600	0.1100	4.5936			(30)
Flat Ceiling	4.3500		4.3500	0.1100	0.4785			(30)
Total net area of external elements Aum(A, m2)			95.6200					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.4233		(33)
Main dwelling								
Party Wall			22.8900	0.0000	0.0000			(32)
Corridor			41.2400	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							102.3639	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.8900	0.0500	0.4445	
E3 Sill	5.9400	0.0500	0.2970	
E4 Jamb	13.3000	0.0500	0.6650	
E7 Party floor between dwellings (in blocks of flats)	11.1200	0.0700	0.7784	
E16 Corner (normal)	5.0600	0.0900	0.4554	
E18 Party wall between dwellings	5.0600	0.0600	0.3036	
E11 Eaves (insulation at rafter level)	4.5300	0.0400	0.1812	
E13 Gable (insulation at rafter level)	6.5200	0.0800	0.5216	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8300	0.0000	0.0000	
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036	
R6 Flat ceiling	9.2600	0.0600	0.5556	
E12 Gable (insulation at ceiling level)	0.9600	0.0600	0.0576	
P5 Party wall - Roof (insulation at rafter level)	21.7100	0.0800	1.7368	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.3003	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	29.7236 (37)

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

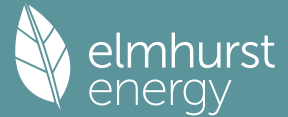
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	26.4927	26.3315	26.1735	25.4315	25.2927	24.6464	24.6464	24.5267	24.8953	25.2927	25.5735	25.8671	(38)
Heat transfer coeff	56.2163	56.0551	55.8971	55.1551	55.0163	54.3700	54.3700	54.2503	54.6189	55.0163	55.2971	55.5907	(39)
Average = Sum(39)m / 12 =												55.1544	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3908	1.3868	1.3829	1.3645	1.3611	1.3451	1.3451	1.3422	1.3513	1.3611	1.3681	1.3753	(40)
HLP (average)												1.3645	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4175 (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	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890	(42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471	(42c)
Average daily hot water use (litres/day)												45.7444	(43)
Daily hot water use	49.9062	48.5381	47.0440	45.1836	43.5243	41.7998	41.4408	42.9318	44.4611	46.2322	48.1090	49.8361	(44)
Energy conte	79.0393	69.1175	72.3049	61.8541	58.5921	51.3977	50.1190	53.1585	54.8249	62.7366	68.5401	78.0312	(45)
Energy content (annual)										Total = Sum(45)m =		759.7160	
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													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	67.1834	58.7499	61.4591	52.5760	49.8033	43.6880	42.6011	45.1847	46.6012	53.3261	58.2591	66.3266	(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	67.1834	58.7499	61.4591	52.5760	49.8033	43.6880	42.6011	45.1847	46.6012	53.3261	58.2591	66.3266	(64)
Total per year (kWh/year) = Sum(64)m =												645.7586	(64)

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12Total per year (kWh/year)	646 (64)											
Electric shower(s)	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											
38.4295	34.2410	37.3899	35.6807	36.3503	34.6746	35.8304	36.3503	35.6807	37.3899	36.6868	38.4295 (64a)	437.1338 (64a)
Heat gains from water heating, kWh/month												
26.4032	23.2477	24.7123	22.0642	21.5384	19.5907	19.6079	20.3837	20.5705	22.6790	23.7365	26.1890 (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
70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
62.3562	69.0372	62.3562	64.4347	62.3562	64.4347	62.3562	64.4347	62.3562	64.4347	62.3562	64.4347	62.3562 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
122.5912	123.8633	120.6576	113.8331	105.2183	97.1217	91.7127	90.4406	93.6462	100.4708	109.0855	117.1821	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877 (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	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)												
35.4882	34.5948	33.2154	30.6447	28.9494	27.2093	26.3547	27.3975	28.5701	30.4825	32.9673	35.2003	(72)
Total internal gains												
264.6987	271.7585	260.4923	253.1756	240.7871	233.0288	224.6867	224.4574	230.9142	237.5726	250.7507	259.0017	(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					0.5200	10.6334	0.6300	0.7000	0.7700		1.6898 (74)	
South					7.4600	46.7521	0.6300	0.7000	0.7700		106.5888 (78)	
Solar gains	108.2786	177.7943	227.8523	260.1348	273.7652	264.7461	258.1209	248.5616	238.8840	192.1288	128.4287	93.5112 (83)
Total gains	372.9773	449.5528	488.3446	513.3104	514.5523	497.7749	482.8076	473.0189	469.7982	429.7014	379.1794	352.5130 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20.4446	20.5034	20.5613	20.8380	20.8905	21.1389	21.1389	21.1855	21.0425	20.8905	20.7844	20.6747	
alpha	2.3630	2.3669	2.3708	2.3892	2.3927	2.4093	2.4093	2.4124	2.4028	2.3927	2.3856	2.3783
util living area												
0.9288	0.8934	0.8539	0.7907	0.7033	0.5731	0.4448	0.4675	0.6251	0.7981	0.8967	0.9363	(86)
MIT												
18.2772	18.6950	19.1869	19.7881	20.3050	20.7076	20.8859	20.8674	20.6128	19.9364	19.0156	18.2108	(87)
Th 2												
19.7704	19.7735	19.7765	19.7906	19.7933	19.8057	19.8057	19.8080	19.8009	19.7933	19.7879	19.7823	(88)
util rest of house												
0.9180	0.8779	0.8323	0.7581	0.6528	0.4949	0.3406	0.3651	0.5524	0.7603	0.8791	0.9266	(89)
MIT 2												
17.3468	17.7529	18.2298	18.8102	19.2858	19.6346	19.7596	19.7511	19.5594	18.9623	18.0830	17.2900	(90)
Living area fraction												
FLA = Living area / (4) =												
17.8824	18.2953	18.7808	19.3731	19.8726	20.2523	20.4080	20.3938	20.1658	19.5231	18.6199	17.8201	(91)
MIT												
17.8824	18.2953	18.7808	19.3731	19.8726	20.2523	20.4080	20.3938	20.1658	19.5231	18.6199	17.8201	(92)
Temperature adjustment												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(93)
adjusted MIT												
17.8824	18.2953	18.7808	19.3731	19.8726	20.2523	20.4080	20.3938	20.1658	19.5231	18.6199	17.8201	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8966	0.8551	0.8114	0.7453	0.6564	0.5258	0.3951	0.4175	0.5760	0.7506	0.8581	0.9062 (94)
Useful gains	334.4129	384.3975	396.2561	382.5793	337.7398	261.7175	190.7564	197.4723	270.6212	322.5357	325.3699	319.4327 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
763.5528	750.8724	686.4609	577.6473	449.6233	307.3172	207.0429	216.6625	331.3098	490.9162	637.0180	757.1528	(97)
Space heating kWh												
319.2801	246.2711	215.9124	140.4489	83.2413	0.0000	0.0000	0.0000	0.0000	125.2751	224.3866	325.6638	(98a)
Space heating requirement - total per year (kWh/year)												
1680.4794												
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												
319.2801	246.2711	215.9124	140.4489	83.2413	0.0000	0.0000	0.0000	0.0000	125.2751	224.3866	325.6638	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
1680.4794												
Space heating per m2												
(98c) / (4) =												
41.5754												(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	511.0780	402.3380	412.3024	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7384	0.8041	0.7916	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	377.4004	323.5135	326.3894	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	560.3401	544.1081	533.8465	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	131.7166	164.1224	154.3481	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	32.9292	41.0306	38.5870	0.0000	0.0000	0.0000	0.0000 (107)

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Space cooling requirement	112.5468	(107)
Energy for space heating	41.5754	(99)
Energy for space cooling	2.7844	(108)
Total	44.3599	(109)
Fabric Energy Efficiency (TFEE)	44.4	(109)

Full SAP Calculation Printout



Plot Reference	Plot 29			Issued on Date	22/12/2025	
Assessment Reference	Plot 29	Plot Type Ref				
Plot Address	Flat 7, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2	
SAP Rating	73 C	DER	9.01	TER	18.77	
Environmental	94 A	% DER < TER				52.00
CO ₂ Emissions (t/year)	0.32	DFEE	58.56	TFEE	44.36	
Compliance Check	See BREL	% DFEE < TFEE				-32.02
% DPER < TPER	7.20	DPER	93.24	TPER	100.48	
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	40.4200 (1b)	3.3500 (2b)	135.4070 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	135.4070 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.9700 (17)
Infiltration rate		0.1985 (18)
Number of sides sheltered		2 (19)

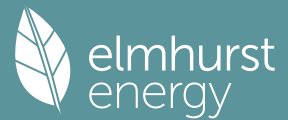
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1687 (21)

	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	0.2151	0.2109	0.2067	0.1856	0.1814	0.1603	0.1603	0.1561	0.1687	0.1814	0.1898	0.1983 (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	0.3551	0.3509	0.3467	0.3256	0.3214	0.3003	0.3003	0.2961	0.3087	0.3214	0.3298	0.3383 (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			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	41.7600		41.7600	0.1200	5.0112	9.0000	375.8400 (30)
Flat Ceiling	4.3500		4.3500	0.1200	0.5220	9.0000	39.1500 (30)
Total net area of external elements Aum (A, m ²)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9837		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000	20.0000	457.8000 (32)
Corridor			41.2400	0.0000	0.0000	20.0000	824.8000 (32)
Party Floor 1			40.4200			40.0000	1616.8000 (32d)
Internal Walls			50.3800			9.0000	453.4200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4137.5500 (34)

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

102.3639 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.8900	0.1690	1.5024
E2 Other lintels (including other steel lintels)	5.9400	0.0070	0.0416
E3 Sill	13.3000	0.0370	0.4921
E4 Jamb	11.1200	0.0370	0.4114
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0890	0.4503
E16 Corner (normal)	5.0600	0.0310	0.1569
E18 Party wall between dwellings	4.5300	0.1320	0.5980
E11 Eaves (insulation at rafter level)	6.5200	0.0320	0.2086
E13 Gable (insulation at rafter level)	20.8300	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072
E25 Staggered party wall between dwellings	9.2600	0.0260	0.2408
R6 Flat ceiling	0.9600	0.2500	0.2400
E12 Gable (insulation at ceiling level)	21.7100	0.1710	3.7124
P5 Party wall - Roof (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.6617 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	46.6454 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	15.8685	15.6800	15.4915	14.5491	14.3606	13.4182	13.4182	13.2297	13.7952	14.3606	14.7376	15.1146 (38)
Heat transfer coeff	62.5139	62.3254	62.1369	61.1945	61.0060	60.0636	60.0636	59.8751	60.4405	61.0060	61.3830	61.7599 (39)
Average = Sum(39)m / 12 =												61.1474
HLP	1.5466	1.5419	1.5373	1.5140	1.5093	1.4860	1.4860	1.4813	1.4953	1.5093	1.5186	1.5280 (40)
HLP (average)												1.5128
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4175 (42)
Hot water usage for mixer showers	47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031 (42a)
Hot water usage for baths	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890 (42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471 (42c)
Average daily hot water use (litres/day)												89.9867 (43)
Daily hot water use	97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392 (44)
Energy content (annual)	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319 (46)
Water storage loss (or HIU loss):												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8694 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (64)
12Total per year (kWh/year)												1811.9915 (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	51.5504	45.3608	47.6591	40.6872	38.6040	33.8794	32.8001	34.6243	35.5772	40.7524	44.6473	50.8324 (65)

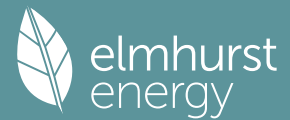
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.8332	68.4581	61.8332	63.8943	61.8332	63.8943	61.8332	61.8332	63.8943	61.8332	63.8943	61.8332 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	122.5912	123.8633	120.6576	113.8331	105.2183	97.1217	91.7127	90.4406	93.6462	100.4708	109.0855	117.1821 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877 (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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)	69.2882	67.5012	64.0579	56.5100	51.8870	47.0547	44.0862	46.5381	49.4128	54.7748	62.0102	68.3231 (72)
Total internal gains	297.9757	304.0857	290.8118	278.5005	263.2017	252.3338	241.8952	243.0749	251.2164	261.3418	279.2531	291.6015 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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North			1.3700			10.6334			0.4000			0.0000			0.7700			4.4869 (74)
South			19.6100			46.7521			0.3500			0.7000			0.7700			155.6602 (78)
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)						
Total gains	458.1228	567.5917	630.1195	668.9280	677.1901	654.1515	633.0296	617.3191	607.9613	546.5162	469.2987	429.8468 (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	18.3850	18.4406	18.4966	18.7814	18.8395	19.1350	19.1350	19.1953	19.0157	18.8395	18.7238	18.6095						
alpha	2.2257	2.2294	2.2331	2.2521	2.2560	2.2757	2.2757	2.2797	2.2677	2.2560	2.2483	2.2406						
util living area	0.9035	0.8550	0.8026	0.7269	0.6297	0.5000	0.3821	0.4039	0.5566	0.7427	0.8630	0.9137 (86)						
MIT	18.2398	18.7270	19.2636	19.8752	20.3755	20.7442	20.9002	20.8835	20.6500	19.9875	19.0198	18.1593 (87)						
Th 2	19.6527	19.6562	19.6597	19.6770	19.6805	19.6980	19.6980	19.7015	19.6910	19.6805	19.6736	19.6666 (88)						
util rest of house	0.8890	0.8347	0.7748	0.6876	0.5732	0.4198	0.2809	0.3036	0.4794	0.6975	0.8402	0.9006 (89)						
MIT 2	16.5505	17.1486	17.8043	18.5449	19.1197	19.5173	19.6508	19.6427	19.4260	18.6990	17.5349	16.4578 (90)						
Living area fraction	fLA = Living area / (4) =												0.5757 (91)					
MIT	17.5230	18.0573	18.6444	19.3108	19.8427	20.2236	20.3701	20.3570	20.1306	19.4408	18.3897	17.4374 (92)						
Temperature adjustment													0.0000					
adjusted MIT	17.5230	18.0573	18.6444	19.3108	19.8427	20.2236	20.3701	20.3570	20.1306	19.4408	18.3897	17.4374 (93)						
8. Space heating requirement																		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Utilisation	0.8592	0.8050	0.7503	0.6755	0.5806	0.4537	0.3348	0.3559	0.5069	0.6883	0.8129	0.8717 (94)						
Useful gains	393.6041	456.9322	472.7827	451.8284	393.2051	296.7692	211.9258	219.7306	308.1571	376.1560	381.4732	374.7061 (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	826.6232	820.0319	754.6158	637.0809	496.7522	337.7757	226.4445	236.9265	364.4956	539.3402	692.9978	817.5394 (97)						
Space heating kWh	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (98a)						
Space heating requirement - total per year (kWh/year)													1661.4484					
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)						
Solar heating contribution - total per year (kWh/year)													0.0000					
Space heating kWh	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (98c)						
Space heating requirement after solar contribution - total per year (kWh/year)													1661.4484					
Space heating per m2													(98c) / (4) = 41.1046 (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	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (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)	322.1661	244.0030	209.6838	133.3818	77.0390	0.0000	0.0000	0.0000	0.0000	121.4090	224.2977	329.4680 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (64)						
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)						
Fuel for water heating, kWh/month	52.0850	46.0109	48.7356	42.4858	40.9414	36.6260	35.9459	37.5160	38.0874	42.7907	45.8944	51.4670 (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	11.7855	10.6450	11.7855	11.4053	11.7855	11.4053	11.7855	11.7855	11.4053	11.7855	11.4053	11.7855 (231)						
Lighting	12.6942	10.1838	9.1694	6.7179	5.1891	4.2395	4.7336	6.1530	7.9921	10.4861	11.8440	13.0470 (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													1661.4484 (211)					

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	349.4100	
Water heating fuel used	518.5860	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	138.7651	(230a)
Total electricity for the above, kWh/year	138.7651	(231)
Electricity for lighting (calculated in Appendix L)	102.4497	(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	2421.2492	(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	1661.4484	0.1547	256.9618 (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)	518.5860	0.1411	73.1602 (264)
Space and water heating			330.1219 (265)
Pumps, fans and electric keep-hot	138.7651	0.1387	19.2484 (267)
Energy for lighting	102.4497	0.1443	14.7867 (268)
Total CO2, kg/year			364.1570 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.0100 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1661.4484	1.5726	2612.7439 (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)	518.5860	1.5217	789.1103 (278)
Space and water heating			3401.8542 (279)
Pumps, fans and electric keep-hot	138.7651	1.5128	209.9238 (281)
Energy for lighting	102.4497	1.5338	157.1407 (282)
Total Primary energy kWh/year			3768.9187 (286)
Dwelling Primary energy Rate (DPER)			93.2400 (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	40.4200 (1b)	x 3.3500 (2b)	= 135.4070 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 135.4070 (5)

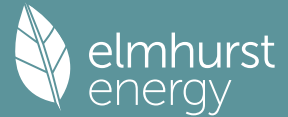
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1477 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3977	(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) =	0.3380 (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)

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Adj infilt rate	0.4310	0.4226	0.4141	0.3719	0.3634	0.3211	0.3211	0.3127	0.3380	0.3634	0.3803	0.3972 (22b)
Effective ac	0.5929	0.5893	0.5857	0.5691	0.5660	0.5516	0.5516	0.5489	0.5571	0.5660	0.5723	0.5789 (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 Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type			7.9800	1.1450	9.1374		(27)
EXT Wall	49.5100	10.1000	39.4100	0.1800	7.0938		(29a)
Warm Sloping Roof	41.7600		41.7600	0.1100	4.5936		(30)
Flat Ceiling	4.3500		4.3500	0.1100	0.4785		(30)
Total net area of external elements Aum(A, m2)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		23.4233		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000		(32)
Corridor			41.2400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							102.3639 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.8900	0.0500	0.4445
E3 Sill	5.9400	0.0500	0.2970
E4 Jamb	13.3000	0.0500	0.6650
E7 Party floor between dwellings (in blocks of flats)	11.1200	0.0700	0.7784
E16 Corner (normal)	5.0600	0.0900	0.4554
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E11 Eaves (insulation at rafter level)	4.5300	0.0400	0.1812
E13 Gable (insulation at rafter level)	6.5200	0.0800	0.5216
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8300	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036
R6 Flat ceiling	9.2600	0.0600	0.5556
E12 Gable (insulation at ceiling level)	0.9600	0.0600	0.0576
P5 Party wall - Roof (insulation at rafter level)	21.7100	0.0800	1.7368
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.3003 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 29.7236 (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	26.4927	26.3315	26.1735	25.4315	25.2927	24.6464	24.6464	24.5267	24.8953	25.2927	25.5735	25.8671 (38)
Heat transfer coeff	56.2163	56.0551	55.8971	55.1551	55.0163	54.3700	54.3700	54.2503	54.6189	55.0163	55.2971	55.5907 (39)
Average = Sum(39)m / 12 =												55.1544
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3908	1.3868	1.3829	1.3645	1.3611	1.3451	1.3451	1.3422	1.3513	1.3611	1.3681	1.3753 (40)
HLP (average)												1.3645
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

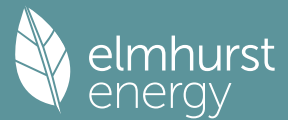
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4175 (42)
Hot water usage for mixer showers												
47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031	(42a)
Hot water usage for baths												
20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890	(42b)
Hot water usage for other uses												
29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471	(42c)
Average daily hot water use (litres/day)												89.9867 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392 (44)
Energy conte	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793 (45)
Energy content (annual)										Total = Sum(45)m =		1494.6605
Distribution loss (46)m = 0.15 x (45)m												
23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319	(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	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												
201.6338	178.5091	189.9304	167.4594	162.6970	146.9847	145.2419	150.7282	152.0910	169.1586	179.3695	199.4742	(62)
WWHRS	-21.9376	-19.4018	-20.3165	-16.8228	-15.6783	-13.4160	-12.5754	-13.3726	-13.8807	-16.3638	-18.5383	-21.5314 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												
179.6962	159.1073	169.6140	150.6366	147.0187	133.5687	132.6666	137.3555	138.2102	152.7947	160.8313	177.9428	(64)
12Total per year (kWh/year)												
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
88.8264	79.0294	84.9350	76.7607	75.8799	69.9529	70.0761	71.9002	71.6507	78.0283	80.7208	88.1083	(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	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772	70.8772 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	62.3562	69.0372	62.3562	64.4347	62.3562	64.4347	62.3562	62.3562	64.4347	62.3562	64.4347	62.3562 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	122.5912	123.8633	120.6576	113.8331	105.2183	97.1217	91.7127	90.4406	93.6462	100.4708	109.0855	117.1821 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877	30.0877 (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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)	119.3903	117.6032	114.1599	106.6121	101.9891	97.1567	94.1883	96.6401	99.5148	104.8768	112.1122	118.4251 (72)
Total internal gains	351.6008	357.7668	344.4368	332.1430	316.8268	302.9763	292.5203	293.7000	301.8589	314.9669	332.8956	345.2266 (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					0.5200	10.6334	0.6300		0.7000		0.7700	1.6898 (74)	
South					7.4600	46.7521	0.6300		0.7000		0.7700	106.5888 (78)	
Solar gains	108.2786	177.7943	227.8523	260.1348	273.7652	264.7461	258.1209	248.5616	238.8840	192.1288	128.4287	93.5112 (83)	
Total gains	459.8794	535.5612	572.2891	592.2778	590.5919	567.7224	550.6412	542.2616	540.7430	507.0957	461.3243	438.7378 (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	20.4446	20.5034	20.5613	20.8380	20.8905	21.1389	21.1389	21.1855	21.0425	20.8905	20.7844	20.6747
alpha	2.3630	2.3669	2.3708	2.3892	2.3927	2.4093	2.4093	2.4124	2.4028	2.3927	2.3856	2.3783
util living area	0.8961	0.8571	0.8135	0.7457	0.6532	0.5230	0.3994	0.4191	0.5715	0.7465	0.8562	0.9046 (86)
MIT	18.5791	18.9592	19.4106	19.9540	20.4159	20.7620	20.9101	20.8959	20.6844	20.1017	19.2702	18.5196 (87)
Th 2	19.7704	19.7735	19.7765	19.7906	19.7933	19.8057	19.8057	19.8080	19.8009	19.7933	19.7879	19.7823 (88)
util rest of house	0.8815	0.8381	0.7882	0.7099	0.6008	0.4470	0.3027	0.3237	0.4993	0.7043	0.8339	0.8912 (89)
MIT 2	17.0321	17.5005	18.0557	18.7188	19.2550	19.6306	19.7602	19.7521	19.5537	18.9085	17.9052	16.9657 (90)
Living area fraction	17.9227	18.3403	18.8357	19.4299	19.9233	20.2820	20.4222	20.4106	20.2046	19.5954	18.6910	17.8603 (92)
MIT	17.9227	18.3403	18.8357	19.4299	19.9233	20.2820	20.4222	20.4106	20.2046	19.5954	18.6910	17.8603 (93)
Temperature adjustment												0.0000
adjusted MIT	17.9227	18.3403	18.8357	19.4299	19.9233	20.2820	20.4222	20.4106	20.2046	19.5954	18.6910	17.8603 (93)

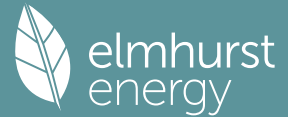
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8540	0.8113	0.7657	0.6980	0.6069	0.4787	0.3541	0.3735	0.5249	0.6966	0.8096	0.8642 (94)
Useful gains	392.7429	434.4855	438.1804	413.4122	358.4218	271.7528	194.9814	202.5170	283.8630	353.2497	373.4701	379.1520 (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	765.8190	753.3974	689.5300	580.7793	452.4171	308.9279	207.8119	217.5768	333.4275	494.8938	640.9508	759.3860 (97)
Space heating kWh	277.5686	214.3088	187.0041	120.5043	69.9325	0.0000	0.0000	0.0000	0.0000	105.3832	192.5861	282.8941 (98a)
Space heating requirement - total per year (kWh/year)												1450.1818
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	277.5686	214.3088	187.0041	120.5043	69.9325	0.0000	0.0000	0.0000	0.0000	105.3832	192.5861	282.8941 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1450.1818
Space heating per m2										(98c) / (4) =		35.8778 (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	277.5686	214.3088	187.0041	120.5043	69.9325	0.0000	0.0000	0.0000	0.0000	105.3832	192.5861	282.8941 (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)	300.7244	232.1872	202.6047	130.5573	75.7665	0.0000	0.0000	0.0000	0.0000	114.1746	208.6523	306.4941 (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	179.6962	159.1073	169.6140	150.6366	147.0187	133.5687	132.6666	137.3555	138.2102	152.7947	160.8313	177.9428 (64)
Efficiency of water heater	85.0313	84.7284	84.2792	83.5641	82.4951	79.8000	79.8000	79.8000	79.8000	83.2438	84.4649	79.8000 (216)
Fuel for water heating, kWh/month	211.3294	187.7851	201.2525	180.2648	178.2151	167.3793	166.2488	172.1247	173.1958	183.5509	190.4120	209.1126 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)

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Lighting	12.9564	10.3941	9.3587	6.8566	5.2962	4.3271	4.8314	6.2800	8.1572	10.7026	12.0886	13.3165	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-11.0302	-16.4518	-25.0126	-29.8181	-33.6807	-32.0322	-31.6726	-29.1521	-24.9569	-19.5720	-12.4523	-9.4362	(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	-3.7655	-8.1139	-16.4825	-25.2747	-33.9151	-34.2296	-33.7966	-28.3633	-20.4811	-11.7401	-5.0734	-2.9614	(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												1571.1612	(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												2220.8711	(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)												104.5654	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-499.4649	(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												3483.1328	(238)

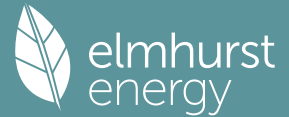
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1571.1612	0.2100	329.9438 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2220.8711	0.2100	466.3829 (264)
Space and water heating			796.3268 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	104.5654	0.1443	15.0920 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-275.2676	0.1334	-36.7165
PV Unit electricity exported	-224.1973	0.1253	-28.0955
Total			-64.8119 (269)
Total CO2, kg/year			758.5361 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.7700 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1571.1612	1.1300	1775.4121 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2220.8711	1.1300	2509.5843 (278)
Space and water heating			4284.9965 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	104.5654	1.5338	160.3860 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-275.2676	1.4929	-410.9464
PV Unit electricity exported	-224.1973	0.4600	-103.1240
Total			-514.0704 (283)
Total Primary energy kWh/year			4061.4128 (286)
Target Primary Energy Rate (TPER)			100.4800 (287)

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Plot Reference	Plot 29				Issued on Date	22/12/2025	
Assessment Reference	Plot 29			Plot Type Ref			
Plot Address	Flat 7, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	73 C	DER	9.01	TER	18.77		
Environmental	94 A	% DER < TER				52.00	
CO ₂ Emissions (t/year)	0.32	DFEE	58.56	TFEE	44.36		
Compliance Check	See BREL	% DFEE < TFEE				-32.02	
% DPER < TPER	7.20	DPER	93.24	TPER	100.48		
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	40.4200 (1b)	3.3500 (2b)	135.4070 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	135.4070 (5)

2. Ventilation rate

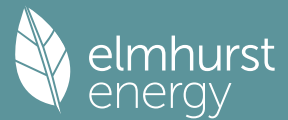
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.9700 (17)
Infiltration rate	0.1985 (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) = 0.1687 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.2151	0.2109	0.2067	0.1856	0.1814	0.1603	0.1603	0.1561	0.1687	0.1814	0.1898	0.1983 (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	0.3551	0.3509	0.3467	0.3256	0.3214	0.3003	0.3003	0.2961	0.3087	0.3214	0.3298	0.3383 (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			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	41.7600		41.7600	0.1200	5.0112	9.0000	375.8400 (30)
Flat Ceiling	4.3500		4.3500	0.1200	0.5220	9.0000	39.1500 (30)
Total net area of external elements Aum (A, m ²)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9837		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000	20.0000	457.8000 (32)
Corridor			41.2400	0.0000	0.0000	20.0000	824.8000 (32)
Party Floor 1			40.4200			40.0000	1616.8000 (32d)
Internal Walls			50.3800			9.0000	453.4200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4137.5500 (34)

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

102.3639 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.8900	0.1690	1.5024
E2 Other lintels (including other steel lintels)	5.9400	0.0070	0.0416
E3 Sill	13.3000	0.0370	0.4921
E4 Jamb	11.1200	0.0370	0.4114
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0890	0.4503
E16 Corner (normal)	5.0600	0.0310	0.1569
E18 Party wall between dwellings	4.5300	0.1320	0.5980
E11 Eaves (insulation at rafter level)	6.5200	0.0320	0.2086
E13 Gable (insulation at rafter level)	20.8300	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072
E25 Staggered party wall between dwellings	9.2600	0.0260	0.2408
R6 Flat ceiling	0.9600	0.2500	0.2400
E12 Gable (insulation at ceiling level)	21.7100	0.1710	3.7124
P5 Party wall - Roof (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.6617 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	46.6454 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	15.8685	15.6800	15.4915	14.5491	14.3606	13.4182	13.4182	13.2297	13.7952	14.3606	14.7376	15.1146 (38)
Heat transfer coeff	62.5139	62.3254	62.1369	61.1945	61.0060	60.0636	60.0636	59.8751	60.4405	61.0060	61.3830	61.7599 (39)
Average = Sum(39)m / 12 =												61.1474
HLP	1.5466	1.5419	1.5373	1.5140	1.5093	1.4860	1.4860	1.4813	1.4953	1.5093	1.5186	1.5280 (40)
HLP (average)												1.5128
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4175 (42)
Hot water usage for mixer showers	47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031 (42a)
Hot water usage for baths	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890 (42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471 (42c)
Average daily hot water use (litres/day)												89.9867 (43)
Daily hot water use	97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392 (44)
Energy conte	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793 (45)
Energy content (annual)										Total = Sum(45)m =		1494.6605
Distribution loss (46)m = 0.15 x (45)m	23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319 (46)
Water storage loss (or HIU loss):												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8694 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (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	51.5504	45.3608	47.6591	40.6872	38.6040	33.8794	32.8001	34.6243	35.5772	40.7524	44.6473	50.8324 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

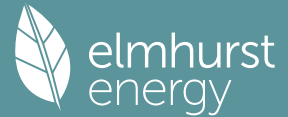
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.5028	12.8813	10.4758	7.9308	5.9284	5.0050	5.4081	7.0296	9.4351	11.9801	13.9825	14.9059 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.9719	184.8706	180.0860	169.9001	157.0423	144.9578	136.8846	134.9859	139.7705	149.9563	162.8142	174.8987 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228 (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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)	69.2882	67.5012	64.0579	56.5100	51.8870	47.0547	44.0862	46.5381	49.4128	54.7748	62.0102	68.3231 (72)
Total internal gains	340.0366	338.5266	327.8932	307.6146	288.1314	270.2911	259.6525	261.8272	271.8921	289.9848	312.0805	331.4013 (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
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North	1.3700	10.6334	0.4000	0.0000	0.7700	4.4869 (74)
South	19.6100	46.7521	0.3500	0.7000	0.7700	155.6602 (78)

Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)
Total gains	500.1837	602.0326	667.2010	698.0421	702.1198	672.1088	650.7870	636.0715	628.6369	575.1592	502.1261	469.6466 (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	18.3850	18.4406	18.4966	18.7814	18.8395	19.1350	19.1350	19.1953	19.0157	18.8395	18.7238	18.6095
alpha	2.2257	2.2294	2.2331	2.2521	2.2560	2.2757	2.2757	2.2797	2.2677	2.2560	2.2483	2.2406
util living area	0.8883	0.8415	0.7865	0.7127	0.6164	0.4902	0.3734	0.3941	0.5442	0.7261	0.8479	0.8996 (86)
MIT	18.3730	18.8204	19.3472	19.9250	20.4038	20.7548	20.9049	20.8894	20.6665	20.0393	19.1114	18.2904 (87)
Th 2	19.6527	19.6562	19.6597	19.6770	19.6805	19.6980	19.6980	19.7015	19.6910	19.6805	19.6736	19.6666 (88)
util rest of house	0.8721	0.8199	0.7575	0.6726	0.5598	0.4107	0.2739	0.2955	0.4675	0.6798	0.8234	0.8849 (89)
MIT 2	16.7130	17.2600	17.9009	18.5992	19.1474	19.5254	19.6533	19.6459	19.4397	18.7544	17.6433	16.6185 (90)
Living area fraction									fLA = Living area / (4) =			0.5757 (91)
MIT	17.6687	18.1583	18.7335	19.3625	19.8707	20.2332	20.3739	20.3618	20.1460	19.4941	18.4885	17.5810 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6687	18.1583	18.7335	19.3625	19.8707	20.2332	20.3739	20.3618	20.1460	19.4941	18.4885	17.5810 (93)

8. Space heating requirement

Utilisation	0.8417	0.7908	0.7344	0.6621	0.5685	0.4448	0.3270	0.3472	0.4956	0.6724	0.7967	0.8551 (94)
Useful gains	420.9974	476.0695	489.9924	462.1617	399.1578	298.9478	212.8347	220.8685	311.5605	386.7642	400.0562	401.5892 (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	835.7283	826.3307	760.1539	640.2446	498.4627	338.3480	226.6714	237.2119	365.4209	542.5961	699.0603	826.4112 (97)
Space heating kWh	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (98a)
Space heating requirement - total per year (kWh/year)												1594.3274
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	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1594.3274
Space heating per m2										(98c) / (4) =		39.4440 (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	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (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)	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	52.0850	46.0109	48.7356	42.4858	40.9414	36.6260	35.9459	37.5160	38.0874	42.7907	45.8944	51.4670 (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	11.7855	10.6450	11.7855	11.4053	11.7855	11.4053	11.7855	11.7855	11.4053	11.7855	11.4053	11.7855 (231)
Lighting	12.6942	10.1838	9.1694	6.7179	5.1891	4.2395	4.7336	6.1530	7.9921	10.4861	11.8440	13.0470 (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												1594.3274 (211)
Space heating fuel - main system 2												0.0000 (213)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	349.4100
Water heating fuel used	518.5860 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	138.7651 (230a)
Total electricity for the above, kWh/year	138.7651 (231)
Electricity for lighting (calculated in Appendix L)	102.4497 (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	2354.1282 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1594.3274	16.4900	262.9046 (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)	518.5860	16.4900	85.5148 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	138.7651	16.4900	22.8824 (249)
Energy for lighting	102.4497	16.4900	16.8939 (250)
Additional standing charges			0.0000 (251)
Total energy cost			388.1957 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.6360 (257)
SAP value	73.4798
SAP rating (Section 12)	73 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1594.3274	0.1547	246.5907 (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)	518.5860	0.1411	73.1602 (264)
Space and water heating			319.7509 (265)
Pumps, fans and electric keep-hot	138.7651	0.1387	19.2484 (267)
Energy for lighting	102.4497	0.1443	14.7867 (268)
Total CO2, kg/year			353.7860 (272)
CO2 emissions per m2			8.7500 (273)
EI value			94.4501
EI rating			94 (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

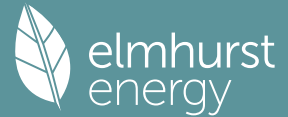
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	40.4200 (1b)	x 3.3500 (2b)	= 135.4070 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 135.4070 (5)

2. Ventilation rate

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

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.9700 (17)
Infiltration rate 0.1985 (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) = 0.1687 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	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)
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	0.1814	0.1772	0.1772	0.1645	0.1687	0.1434	0.1392	0.1392	0.1434	0.1603	0.1603	0.1645	(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	0.3214	0.3172	0.3172	0.3045	0.3087	0.2834	0.2792	0.2792	0.2834	0.3003	0.3003	0.3045	(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			1.3700	1.3258	1.8163			(27)
Window S/W			19.6100	1.2357	24.2329			(27)
Door			2.1200	1.4000	2.9680			(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400	(29a)
Warm Sloping Roof	41.7600		41.7600	0.1200	5.0112	9.0000	375.8400	(30)
Flat Ceiling	4.3500		4.3500	0.1200	0.5220	9.0000	39.1500	(30)
Total net area of external elements Aum(A, m2)			95.6200					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 37.9837			(33)
Main dwelling								
Party Wall			22.8900	0.0000	0.0000	20.0000	457.8000	(32)
Corridor			41.2400	0.0000	0.0000	20.0000	824.8000	(32)
Party Floor 1			40.4200			40.0000	1616.8000	(32d)
Internal Walls			50.3800			9.0000	453.4200	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 4137.5500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 102.3639 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	8.8900	0.1690	1.5024	
E2 Other lintels (including other steel lintels)	5.9400	0.0070	0.0416	
E3 Sill	13.3000	0.0370	0.4921	
E4 Jamb	11.1200	0.0370	0.4114	
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0890	0.4503	
E16 Corner (normal)	5.0600	0.0310	0.1569	
E18 Party wall between dwellings	4.5300	0.1320	0.5980	
E11 Eaves (insulation at rafter level)	6.5200	0.0320	0.2086	
E13 Gable (insulation at rafter level)	20.8300	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072	
E25 Staggered party wall between dwellings	9.2600	0.0260	0.2408	
R6 Flat ceiling	0.9600	0.2500	0.2400	
E12 Gable (insulation at ceiling level)	21.7100	0.1710	3.7124	
P5 Party wall - Roof (insulation at rafter level)				8.6617 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000
Point Thermal bridges				(36a) =
Total fabric heat loss				(33) + (36) + (36a) = 46.6454 (37)

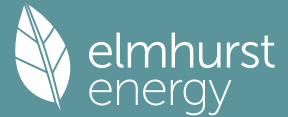
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	14.3606	14.1721	14.1721	13.6067	13.7952	12.6643	12.4758	12.4758	12.6643	13.4182	13.4182	13.6067	(38)
Average = Sum(39)m / 12 =	61.0060	60.8175	60.8175	60.2521	60.4405	59.3096	59.1212	59.1212	59.3096	60.0636	60.0636	60.2521	(39)
												60.0479	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5093	1.5046	1.5046	1.4906	1.4953	1.4673	1.4627	1.4627	1.4673	1.4860	1.4860	1.4906	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4175 (42)
Hot water usage for mixer showers	47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031	(42a)
Hot water usage for baths	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890	(42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471	(42c)
Average daily hot water use (litres/day)													89.9867 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392	(44)
Energy content (annual)	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793	(45)
Distribution loss (46)m = 0.15 x (45)m	23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319	(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													

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WWHRS	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (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	51.5504	45.3608	47.6591	40.6872	38.6040	33.8794	32.8001	34.6243	35.5772	40.7524	44.6473	50.8324 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.5028	12.8813	10.4758	7.9308	5.9284	5.0050	5.4081	7.0296	9.4351	11.9801	13.9825	14.9059 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.9719	184.8706	180.0860	169.9001	157.0423	144.9578	136.8846	134.9859	139.7705	149.9563	162.8142	174.8987 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228 (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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)	69.2882	67.5012	64.0579	56.5100	51.8870	47.0547	44.0862	46.5381	49.4128	54.7748	62.0102	68.3231 (72)
Total internal gains	340.0366	338.5266	327.8932	307.6146	288.1314	270.2911	259.6525	261.8272	271.8921	289.9848	312.0805	331.4013 (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						1.3700	9.3942	0.4000	0.0000			0.7700	3.9640 (74)
South						19.6100	41.2355	0.3500	0.7000			0.7700	137.2930 (78)
Solar gains	141.2570	238.3980	320.7220	376.5211	389.5723	387.1771	367.7729	347.2820	346.5035	271.4082	172.2620		124.7200 (83)
Total gains	481.2936	576.9247	648.6152	684.1357	677.7037	657.4683	627.4254	609.1092	618.3956	561.3930	484.3425		456.1213 (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	18.8395	18.8978	18.8978	19.0752	19.0157	19.3783	19.4401	19.4401	19.3783	19.1350	19.1350	19.0752
alpha	2.2560	2.2599	2.2599	2.2717	2.2677	2.2919	2.2960	2.2960	2.2919	2.2757	2.2757	2.2717
util living area	0.8833	0.8350	0.7724	0.6864	0.5758	0.4277	0.3278	0.3522	0.5111	0.7075	0.8399	0.8947 (86)
MIT	18.6131	19.0358	19.5529	20.1125	20.5580	20.8512	20.9412	20.9278	20.7416	20.1726	19.3042	18.5227 (87)
Th 2	19.6805	19.6840	19.6840	19.6945	19.6910	19.7121	19.7156	19.7156	19.7121	19.6980	19.6980	19.6945 (88)
util rest of house	0.8658	0.8117	0.7406	0.6416	0.5106	0.3386	0.2217	0.2456	0.4295	0.6568	0.8131	0.8787 (89)
MIT 2	17.0287	17.5438	18.1663	18.8305	19.3233	19.6239	19.6942	19.6867	19.5299	18.9213	17.8962	16.9249 (90)
Living area fraction									FLA = Living area / (4) =			0.5757 (91)
MIT	17.9408	18.4027	18.9646	19.5686	20.0341	20.3304	20.4121	20.4012	20.2275	19.6417	18.7068	17.8448 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9408	18.4027	18.9646	19.5686	20.0341	20.3304	20.4121	20.4012	20.2275	19.6417	18.7068	17.8448 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8365	0.7845	0.7208	0.6369	0.5287	0.3828	0.2806	0.3041	0.4637	0.6543	0.7886	0.8498 (94)
Ext temp.	402.6129	452.5973	467.5204	435.7440	358.3033	251.7096	176.0745	185.2164	286.7807	367.3472	381.9657	387.6211 (95)
Heat loss rate W	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)
Space heating kWh	777.2675	766.4672	703.3288	582.5508	431.1908	274.6303	183.9907	195.1733	327.8342	501.0299	649.0952	773.9239 (97)
Space heating requirement - total per year (kWh/year)	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092 (98a)
Solar heating kWh												1404.2366
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	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1404.2366
Space heating per m2										(98c) / (4) =		34.7411 (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)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092	(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)	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307	(64)
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	52.0850	46.0109	48.7356	42.4858	40.9414	36.6260	35.9459	37.5160	38.0874	42.7907	45.8944	51.4670	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	11.7855	10.6450	11.7855	11.4053	11.7855	11.4053	11.7855	11.7855	11.4053	11.7855	11.4053	11.7855	(231)
Lighting	12.6942	10.1838	9.1694	6.7179	5.1891	4.2395	4.7336	6.1530	7.9921	10.4861	11.8440	13.0470	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1404.2366	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												518.5860	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												138.7651	(230a)
Total electricity for the above, kWh/year												138.7651	(231)
Electricity for lighting (calculated in Appendix L)												102.4497	(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												2164.0374	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1404.2366	28.4300	399.2245	(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)	518.5860	28.4300	147.4340	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	138.7651	28.4300	39.4509	(249)
Energy for lighting	102.4497	28.4300	29.1264	(250)
Additional standing charges			0.0000	(251)
Total energy cost			615.2358	(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	1404.2366	0.1550	217.7149	(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)	518.5860	0.1411	73.1602	(264)
Space and water heating			290.8750	(265)
Pumps, fans and electric keep-hot	138.7651	0.1387	19.2484	(267)
Energy for lighting	102.4497	0.1443	14.7867	(268)
Total CO2, kg/year			324.9101	(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	1404.2366	1.5740	2210.2421	(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)	518.5860	1.5217	789.1103	(278)

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Space and water heating			2999.3524 (279)
Pumps, fans and electric keep-hot	138.7651	1.5128	209.9238 (281)
Energy for lighting	102.4497	1.5338	157.1407 (282)
Total Primary energy kWh/year			3366.4169 (286)

SAP 10 EPC IMPROVEMENTS

Plot 29

Current energy efficiency rating: C 73
Current environmental impact rating: A 94

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

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

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

Potential energy efficiency rating: C 73
Potential environmental impact rating: A 94

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 £615	Potential £615	£0 Saving
Electricity			
Space heating	£439	£439	£0
Water heating	£147	£147	£0
Lighting	£29	£29	£0
Total cost of fuels	£615	£615	£0
Total cost of uses	£615	£615	£0
Delivered energy	54 kWh/m²	54 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	8 kg/m²	8 kg/m²	0 kg/m²
Primary energy	83 kWh/m²	83 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	40.4200 (1b)	x 3.3500 (2b)	= 135.4070 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 135.4070 (5)

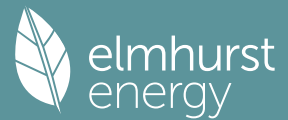
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.9700 (17)
Infiltration rate		0.1985 (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) =	0.1687 (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												

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	0.2151	0.2109	0.2067	0.1856	0.1814	0.1603	0.1603	0.1561	0.1687	0.1814	0.1898	0.1983 (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	0.3551	0.3509	0.3467	0.3256	0.3214	0.3003	0.3003	0.2961	0.3087	0.3214	0.3298	0.3383 (25)

3. Heat losses and heat loss parameter

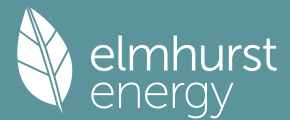
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window N/E			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	41.7600		41.7600	0.1200	5.0112	9.0000	375.8400 (30)
Flat Ceiling	4.3500		4.3500	0.1200	0.5220	9.0000	39.1500 (30)
Total net area of external elements Aum(A, m2)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.9837		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000	20.0000	457.8000 (32)
Corridor			41.2400	0.0000	0.0000	20.0000	824.8000 (32)
Party Floor 1			40.4200			40.0000	1616.8000 (32d)
Internal Walls			50.3800			9.0000	453.4200 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 4137.5500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							102.3639 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				8.8900	0.1690		1.5024
E3 Sill				5.9400	0.0070		0.0416
E4 Jamb				13.3000	0.0370		0.4921
E7 Party floor between dwellings (in blocks of flats)				11.1200	0.0370		0.4114
E16 Corner (normal)				5.0600	0.0890		0.4503
E18 Party wall between dwellings				5.0600	0.0310		0.1569
E11 Eaves (insulation at rafter level)				4.5300	0.1320		0.5980
E13 Gable (insulation at rafter level)				6.5200	0.0320		0.2086
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				20.8300	0.0000		0.0000
E25 Staggered party wall between dwellings				5.0600	0.1200		0.6072
R6 Flat ceiling				9.2600	0.0260		0.2408
E12 Gable (insulation at ceiling level)				0.9600	0.2500		0.2400
P5 Party wall - Roof (insulation at rafter level)				21.7100	0.1710		3.7124
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.6617 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 46.6454 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.8685	15.6800	15.4915	14.5491	14.3606	13.4182	13.4182	13.2297	13.7952	14.3606	14.7376	15.1146 (38)
Average = Sum(39)m / 12 =	62.5139	62.3254	62.1369	61.1945	61.0060	60.0636	60.0636	59.8751	60.4405	61.0060	61.3830	61.7599 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.5466	1.5419	1.5373	1.5140	1.5093	1.4860	1.4860	1.4813	1.4953	1.5093	1.5186	1.5280 (40)
HLP (average)												1.5128
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4175 (42)
Hot water usage for mixer showers	47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031 (42a)
Hot water usage for baths	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890 (42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471 (42c)
Average daily hot water use (litres/day)												89.9867 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392 (44)
Energy content (annual)	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Output from w/h	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (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	51.5504	45.3608	47.6591	40.6872	38.6040	33.8794	32.8001	34.6243	35.5772	40.7524	44.6473	50.8324 (65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.5028	12.8813	10.4758	7.9308	5.9284	5.0050	5.4081	7.0296	9.4351	11.9801	13.9825	14.9059 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.9719	184.8706	180.0860	169.9001	157.0423	144.9578	136.8846	134.9859	139.7705	149.9563	162.8142	174.8987 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228 (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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)	69.2882	67.5012	64.0579	56.5100	51.8870	47.0547	44.0862	46.5381	49.4128	54.7748	62.0102	68.3231 (72)
Total internal gains	340.0366	338.5266	327.8932	307.6146	288.1314	270.2911	259.6525	261.8272	271.8921	289.9848	312.0805	331.4013 (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	1.3700		10.6334		0.4000		0.0000		0.7700		4.4869 (74)	
South	19.6100		46.7521		0.3500		0.7000		0.7700		155.6602 (78)	
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)
Total gains	500.1837	602.0326	667.2010	698.0421	702.1198	672.1088	650.7870	636.0715	628.6369	575.1592	502.1261	469.6466 (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	18.3850	18.4406	18.4966	18.7814	18.8395	19.1350	19.1350	19.1953	19.0157	18.8395	18.7238	18.6095
alpha	2.2257	2.2294	2.2331	2.2521	2.2560	2.2757	2.2757	2.2797	2.2677	2.2560	2.2483	2.2406
util living area	0.8883	0.8415	0.7865	0.7127	0.6164	0.4902	0.3734	0.3941	0.5442	0.7261	0.8479	0.8996 (86)
MIT	18.3730	18.8204	19.3472	19.9250	20.4038	20.7548	20.9049	20.8894	20.6665	20.0393	19.1114	18.2904 (87)
Th 2	19.6527	19.6562	19.6597	19.6770	19.6805	19.6980	19.6980	19.7015	19.6910	19.6805	19.6736	19.6666 (88)
util rest of house	0.8721	0.8199	0.7575	0.6726	0.5598	0.4107	0.2739	0.2955	0.4675	0.6798	0.8234	0.8849 (89)
MIT 2	16.7130	17.2600	17.9009	18.5992	19.1474	19.5254	19.6533	19.6459	19.4397	18.7544	17.6433	16.6185 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.6687	18.1583	18.7335	19.3625	19.8707	20.2332	20.3739	20.3618	20.1460	19.4941	18.4885	17.5810 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6687	18.1583	18.7335	19.3625	19.8707	20.2332	20.3739	20.3618	20.1460	19.4941	18.4885	17.5810 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8417	0.7908	0.7344	0.6621	0.5685	0.4448	0.3270	0.3472	0.4956	0.6724	0.7967	0.8551 (94)
Useful gains	420.9974	476.0695	489.9924	462.1617	399.1578	298.9478	212.8347	220.8685	311.5605	386.7642	400.0562	401.5892 (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	835.7283	826.3307	760.1539	640.2446	498.4627	338.3480	226.6714	237.2119	365.4209	542.5961	699.0603	826.4112 (97)
Space heating kWh	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (98a)
Space heating requirement - total per year (kWh/year)												1594.3274
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	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1594.3274
Space heating per m2												(98c) / (4) = 39.4440 (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	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (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)	308.5598	235.3756	201.0001	128.2197	73.8828	0.0000	0.0000	0.0000	0.0000	115.9390	215.2829	316.0675 (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)

10a. Fuel costs - using Table 12 prices11a. SAP rating - Individual heating systems12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

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

Full SAP Calculation Printout



1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.4200 (1b)	x 3.3500 (2b)	= 135.4070 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 135.4070 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			3.9700 (17)
Infiltration rate			0.1985 (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) =		0.1687 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.4000	3.4000	3.8000	3.8000	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	0.1814	0.1772	0.1772	0.1645	0.1687	0.1434	0.1392	0.1392	0.1434	0.1603	0.1603	0.1645 (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	0.3214	0.3172	0.3172	0.3045	0.3087	0.2834	0.2792	0.2792	0.2834	0.3003	0.3003	0.3045 (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			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	41.7600		41.7600	0.1200	5.0112	9.0000	375.8400 (30)
Flat Ceiling	4.3500		4.3500	0.1200	0.5220	9.0000	39.1500 (30)
Total net area of external elements Aum(A, m ²)			95.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9837		(33)
Main dwelling							
Party Wall			22.8900	0.0000	0.0000	20.0000	457.8000 (32)
Corridor			41.2400	0.0000	0.0000	20.0000	824.8000 (32)
Party Floor 1			40.4200			40.0000	1616.8000 (32d)
Internal Walls			50.3800			9.0000	453.4200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	4137.5500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		102.3639 (35)

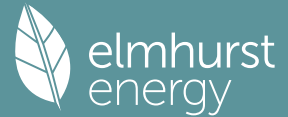
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.8900	0.1690	1.5024
E3 Sill	5.9400	0.0070	0.0416
E4 Jamb	13.3000	0.0370	0.4921
E7 Party floor between dwellings (in blocks of flats)	11.1200	0.0370	0.4114
E16 Corner (normal)	5.0600	0.0890	0.4503
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	4.5300	0.1320	0.5980
E13 Gable (insulation at rafter level)	6.5200	0.0320	0.2086
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8300	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	9.2600	0.0260	0.2408
E12 Gable (insulation at ceiling level)	0.9600	0.2500	0.2400
P5 Party wall - Roof (insulation at rafter level)	21.7100	0.1710	3.7124

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.6617 (36)
Point Thermal bridges		0.0000
Total fabric heat loss	(33) + (36) + (36a) =	46.6454 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	14.3606	14.1721	14.1721	13.6067	13.7952	12.6643	12.4758	12.4758	12.6643	13.4182	13.4182	13.6067 (38)
Average = Sum(39)m / 12 =	61.0060	60.8175	60.8175	60.2521	60.4405	59.3096	59.1212	59.1212	59.3096	60.0636	60.0636	60.2521 (39)
												60.0479
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.5093	1.5046	1.5046	1.4906	1.4953	1.4673	1.4627	1.4627	1.4673	1.4860	1.4860	1.4906 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4175 (42)
Hot water usage for mixer showers	47.9869	47.2658	46.2149	44.2043	42.7205	41.0658	40.1253	41.1682	42.3114	44.0880	46.1419	47.8031 (42a)
Hot water usage for baths	20.7592	20.4509	20.0167	19.2162	18.6168	17.9522	17.5932	18.0243	18.4937	19.2049	20.0219	20.6890 (42b)
Hot water usage for other uses	29.1471	28.0872	27.0273	25.9674	24.9075	23.8476	23.8476	24.9075	25.9674	27.0273	28.0872	29.1471 (42c)
Average daily hot water use (litres/day)												89.9867 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	97.8932	95.8038	93.2589	89.3879	86.2448	82.8656	81.5660	84.0999	86.7725	90.3202	94.2509	97.6392 (44)
Distribution loss (46)m = 0.15 x (45)m	155.0389	136.4234	143.3355	122.3676	116.1021	101.8929	98.6470	104.1333	106.9991	122.5637	134.2777	152.8793 (45)
Water storage loss (or HIU loss):	23.2558	20.4635	21.5003	18.3551	17.4153	15.2839	14.7971	15.6200	16.0499	18.3845	20.1417	22.9319 (46)
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307 (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	51.5504	45.3608	47.6591	40.6872	38.6040	33.8794	32.8001	34.6243	35.5772	40.7524	44.6473	50.8324 (65)
Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m = 0.0000 (64a)												

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526	85.0526 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.5028	12.8813	10.4758	7.9308	5.9284	5.0050	5.4081	7.0296	9.4351	11.9801	13.9825	14.9059 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.9719	184.8706	180.0860	169.9001	157.0423	144.9578	136.8846	134.9859	139.7705	149.9563	162.8142	174.8987 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228	44.9228 (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)	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017	-56.7017 (71)
Water heating gains (Table 5)	69.2882	67.5012	64.0579	56.5100	51.8870	47.0547	44.0862	46.5381	49.4128	54.7748	62.0102	68.3231 (72)
Total internal gains	340.0366	338.5266	327.8932	307.6146	288.1314	270.2911	259.6525	261.8272	271.8921	289.9848	312.0805	331.4013 (73)

6. Solar gains

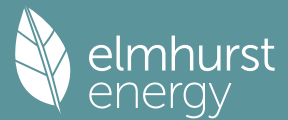
[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North						1.3700	9.3942	0.4000	0.0000	0.7700	3.9640 (74)	
South						19.6100	41.2355	0.3500	0.7000	0.7700	137.2930 (78)	
Solar gains	141.2570	238.3980	320.7220	376.5211	389.5723	387.1771	367.7729	347.2820	346.5035	271.4082	172.2620	124.7200 (83)
Total gains	481.2936	576.9247	648.6152	684.1357	677.7037	657.4683	627.4254	609.1092	618.3956	561.3930	484.3425	456.1213 (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	18.8395	18.8978	18.8978	19.0752	19.0157	19.3783	19.4401	19.4401	19.3783	19.1350	19.1350	19.0752
alpha	2.2560	2.2599	2.2599	2.2717	2.2677	2.2919	2.2960	2.2960	2.2919	2.2757	2.2757	2.2717
util living area	0.8833	0.8350	0.7724	0.6864	0.5758	0.4277	0.3278	0.3522	0.5111	0.7075	0.8399	0.8947 (86)
MIT	18.6131	19.0358	19.5529	20.1125	20.5580	20.8512	20.9412	20.9278	20.7416	20.1726	19.3042	18.5227 (87)
Th 2	19.6805	19.6840	19.6840	19.6945	19.6910	19.7121	19.7156	19.7156	19.7121	19.6980	19.6980	19.6945 (88)
util rest of house	0.8658	0.8117	0.7406	0.6416	0.5106	0.3386	0.2217	0.2456	0.4295	0.6568	0.8131	0.8787 (89)
MIT 2	17.0287	17.5438	18.1663	18.8305	19.3233	19.6239	19.6942	19.6867	19.5299	18.9213	17.8962	16.9249 (90)
Living area fraction	17.9408	18.4027	18.9646	19.5686	20.0341	20.3304	20.4121	20.4012	20.2275	19.6417	18.7068	17.8448 (91)
MIT	17.9408	18.4027	18.9646	19.5686	20.0341	20.3304	20.4121	20.4012	20.2275	19.6417	18.7068	17.8448 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9408	18.4027	18.9646	19.5686	20.0341	20.3304	20.4121	20.4012	20.2275	19.6417	18.7068	17.8448 (93)

8. Space heating requirement

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8365	0.7845	0.7208	0.6369	0.5287	0.3828	0.2806	0.3041	0.4637	0.6543	0.7886	0.8498	(94)
Useful gains	402.6129	452.5973	467.5204	435.7440	358.3033	251.7096	176.0745	185.2164	286.7807	367.3472	381.9657	387.6211	(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	777.2675	766.4672	703.3288	582.5508	431.1908	274.6303	183.9907	195.1733	327.8342	501.0299	649.0952	773.9239	(97)
Space heating kWh	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092	(98a)
Space heating requirement - total per year (kWh/year)												1404.2366	
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	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1404.2366	
Space heating per m2										(98c) / (4) =		34.7411	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092	(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)	278.7431	210.9205	175.4414	105.7009	54.2284	0.0000	0.0000	0.0000	0.0000	99.4599	192.3332	287.4092	(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	181.9903	160.7666	170.2869	148.4496	143.0535	127.9749	125.5984	131.0847	133.0811	149.5151	160.3597	179.8307	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	52.0850	46.0109	48.7356	42.4858	40.9414	36.6260	35.9459	37.5160	38.0874	42.7907	45.8944	51.4670	(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	11.7855	10.6450	11.7855	11.4053	11.7855	11.4053	11.7855	11.7855	11.4053	11.7855	11.4053	11.7855	(231)
Lighting	12.6942	10.1838	9.1694	6.7179	5.1891	4.2395	4.7336	6.1530	7.9921	10.4861	11.8440	13.0470	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1404.2366	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												518.5860	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													138.7651 (230a)
Total electricity for the above, kWh/year													138.7651 (231)
Electricity for lighting (calculated in Appendix L)													102.4497 (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												2164.0374	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1404.2366	28.4300	399.2245 (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)	518.5860	28.4300	147.4340 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	138.7651	28.4300	39.4509 (249)
Energy for lighting	102.4497	28.4300	29.1264 (250)

Full SAP Calculation Printout



Additional standing charges
Total energy cost

0.0000 (251)
615.2358 (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	1404.2366	0.1550	217.7149	(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)	518.5860	0.1411	73.1602	(264)
Space and water heating			290.8750	(265)
Pumps, fans and electric keep-hot	138.7651	0.1387	19.2484	(267)
Energy for lighting	102.4497	0.1443	14.7867	(268)
Total CO2, kg/year			324.9101	(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	1404.2366	1.5740	2210.2421	(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)	518.5860	1.5217	789.1103	(278)
Space and water heating			2999.3524	(279)
Pumps, fans and electric keep-hot	138.7651	1.5128	209.9238	(281)
Energy for lighting	102.4497	1.5338	157.1407	(282)
Total Primary energy kWh/year			3366.4169	(286)