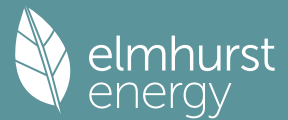


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Plot Reference	Plot 08				Issued on Date	22/12/2025	
Assessment Reference	Plot 08			Plot Type Ref			
Plot Address	Flat 1, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	84 B	DER	4.51	TER	14.35		
Environmental	97 A	% DER < TER				68.57	
CO ₂ Emissions (t/year)	0.24	DFEE	31.80	TFEE	37.84		
Compliance Check	See BREL	% DFEE < TFEE				15.98	
% DPER < TPER	38.73	DPER	46.82	TPER	76.42		
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	64.2600 (1b)	2.5000 (2b)	160.6500 (1b)	- (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	160.6500 (5)	

2. Ventilation rate

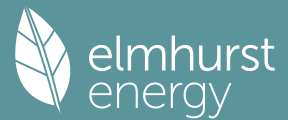
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8800 (17)
Infiltration rate	0.1440 (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) = 0.1224 (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	0.1561	0.1530	0.1499	0.1346	0.1316	0.1163	0.1163	0.1132	0.1224	0.1316	0.1377	0.1438 (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	0.2961	0.2930	0.2899	0.2746	0.2716	0.2563	0.2563	0.2532	0.2624	0.2716	0.2777	0.2838 (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			6.3400	1.3258	8.4053		(27)
Window S/W			1.1500	1.3258	1.5246		(27)
Ground Floor			64.2600	0.1100	7.0686	110.0000	7068.6000 (28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502	110.0000	6752.8997 (29a)
Flat Roof	5.5500		5.5500	0.1500	0.8325	9.0000	49.9500 (30)
Total net area of external elements A _{um} (A, m ²)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.8812		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000	45.0000	709.2000 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Ceiling			58.7100			30.0000	1761.3000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity C _m = Sum (A x k)					(28)...(30) + (32) + (32a)...(32e) =		18324.1997 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							285.1572 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0370	0.9509
P1 Party wall - Ground floor	16.7500	0.0510	0.8542
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0250	0.1375
E3 Sill	3.2000	0.0220	0.0704
E4 Jamb	15.3800	0.0170	0.2615
E5 Ground floor (normal)	25.7000	0.0670	1.7219
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.0400	0.0664
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.1500	0.6240
E14 Flat roof	4.8000	0.1600	0.7680
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.8461 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.7273 (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	15.6955	15.5332	15.3710	14.5599	14.3977	13.5866	13.5866	13.4243	13.9110	14.3977	14.7221	15.0466	(38)
Average = Sum(39)m / 12 =	50.4228	50.2606	50.0983	49.2872	49.1250	48.3139	48.3139	48.1516	48.6383	49.1250	49.4494	49.7739	(39)
												49.2467	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.7847	0.7821	0.7796	0.7670	0.7645	0.7518	0.7518	0.7493	0.7569	0.7645	0.7695	0.7746	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.7664	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0992 (42)
Hot water usage for mixer showers													
59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	59.1881	(42a)
Hot water usage for baths													
25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	25.5872	(42b)
Hot water usage for other uses													
36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	36.1276	(42c)
Average daily hot water use (litres/day)													111.4265 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029	120.9029	(44)
Energy conte	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
28.7968	25.3390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957	28.3957	(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	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	216.2561	(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													
218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	216.2561	(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	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													
63.8329	56.1681	59.0137	50.3809	47.8011	41.9509	40.6147	42.8738	44.0539	50.4622	55.2851	62.9438	62.9438	(65)

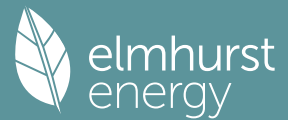
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
103.4228	114.5038	103.4228	106.8702	103.4228	106.8702	103.4228	103.4228	103.4228	106.8702	103.4228	106.8702	103.4228	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
183.5490	185.4537	180.6540	170.4360	157.5376	145.4150	137.3163	135.4117	140.2114	150.4293	163.3277	175.4503	175.4503	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	(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)													
-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	(71)
Water heating gains (Table 5)													
85.7969	83.5835	79.3195	69.9734	64.2488	58.2651	54.5897	57.6260	61.1860	67.8255	76.7848	84.6019	84.6019	(72)
Total internal gains													
427.2563	438.0286	417.8838	401.7672	379.6968	365.0379	349.8164	350.9481	362.7551	376.1652	401.4703	417.9626	417.9626	(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	1.8400	10.6334	0.4000	0.0000	0.7700	6.0262 (74)
East	4.5000	19.6403	0.4000	0.0000	0.7700	27.2214 (76)
Southeast	1.1500	36.7938	0.4000	0.0000	0.7700	13.0324 (77)

Solar gains	46.2799	86.9661	137.6391	196.9674	241.2430	247.6360	235.4299	201.7719	158.4112	101.4298	56.9857	38.5623 (83)
Total gains	473.5362	524.9947	555.5230	598.7346	620.9398	612.6739	585.2463	552.7200	521.1663	477.5951	458.4560	456.5249 (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	100.9475	101.2733	101.6013	103.2733	103.6144	105.3539	105.3539	105.7089	104.6511	103.6144	102.9345	102.2636
alpha	7.7298	7.7516	7.7734	7.8849	7.9076	8.0236	8.0236	8.0473	7.9767	7.9076	7.8623	7.8176
util living area	0.9949	0.9874	0.9677	0.8857	0.7174	0.5036	0.3632	0.4006	0.6370	0.9153	0.9858	0.9960 (86)
MIT	20.4076	20.5354	20.6982	20.8941	20.9817	20.9990	20.9999	20.9999	20.9942	20.8818	20.6231	20.3897 (87)
Th 2	20.2666	20.2688	20.2710	20.2820	20.2842	20.2953	20.2953	20.2975	20.2908	20.2842	20.2798	20.2754 (88)
util rest of house	0.9931	0.9834	0.9575	0.8565	0.6686	0.4487	0.3050	0.3395	0.5747	0.8860	0.9805	0.9946 (89)
MIT 2	19.5806	19.7437	19.9470	20.1830	20.2708	20.2947	20.2952	20.2974	20.2875	20.1761	19.8643	19.5650 (90)
Living area fraction	19.9920	20.1376	20.3207	20.5368	20.6245	20.6451	20.6458	20.6469	20.6391	20.5272	20.2418	0.4975 (91)
MIT	19.9920	20.1376	20.3207	20.5368	20.6245	20.6451	20.6458	20.6469	20.6391	20.5272	20.2418	19.9753 (92)
Temperature adjustment	19.9920	20.1376	20.3207	20.5368	20.6245	20.6451	20.6458	20.6469	20.6391	20.5272	20.2418	0.0000
adjusted MIT	19.9920	20.1376	20.3207	20.5368	20.6245	20.6451	20.6458	20.6469	20.6391	20.5272	20.2418	19.9753 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9923	0.9825	0.9583	0.8675	0.6922	0.4760	0.3340	0.3699	0.6056	0.8968	0.9801	0.9939 (94)
Useful gains	469.9003	515.8146	532.3457	519.3801	429.8080	291.6617	195.4502	204.4518	315.6089	428.2975	449.3503	453.7468 (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	791.2364	765.8490	692.3941	573.5456	438.4143	292.0627	195.4698	204.4949	318.0500	487.6723	649.8560	785.1985 (97)
Space heating kWh	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (98a)
Space heating requirement - total per year (kWh/year)												1006.7144
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1006.7144
Space heating per m2										(98c) / (4) =		15.6663 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561 (64)
Efficiency of water heater (217)m	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550 (216)
Fuel for water heating, kWh/month	63.3011	55.8818	59.1104	51.3520	49.3600	44.0213	43.1108	45.0753	45.8501	51.6741	55.6166	62.5280 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.4845	11.2763	12.4845	12.0818	12.4845	12.0818	12.4845	12.4845	12.0818	12.4845	12.0818	12.4845 (231)
Lighting	19.3025	15.4852	13.9427	10.2150	7.8904	6.4465	7.1979	9.3561	12.1526	15.9449	18.0097	19.8390 (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												1006.7144 (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	345.8550	
Water heating fuel used	626.8816	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	146.9948	(230a)
Total electricity for the above, kWh/year	146.9948	(231)
Electricity for lighting (calculated in Appendix L)	155.7826	(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	1936.3734	(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	1006.7144	0.1574	158.4961 (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)	626.8816	0.1412	88.4898 (264)
Space and water heating			246.9858 (265)
Pumps, fans and electric keep-hot	146.9948	0.1387	20.3900 (267)
Energy for lighting	155.7826	0.1443	22.4842 (268)
Total CO2, kg/year			289.8601 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.5100 (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	1006.7144	1.5828	1593.4635 (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)	626.8816	1.5220	954.0927 (278)
Space and water heating			2547.5562 (279)
Pumps, fans and electric keep-hot	146.9948	1.5128	222.3737 (281)
Energy for lighting	155.7826	1.5338	238.9446 (282)
Total Primary energy kWh/year			3008.8744 (286)
Dwelling Primary energy Rate (DPER)			46.8200 (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	64.2600 (1b)	x 2.5000 (2b)	= 160.6500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 160.6500 (5)

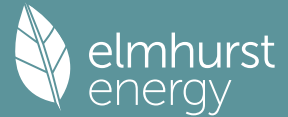
2. Ventilation rate

	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) = 0.1245 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3745	(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) =	0.3183 (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	0.4059	0.3979	0.3899	0.3502	0.3422	0.3024	0.3024	0.2944	0.3183	0.3422	0.3581	0.3740 (22b)
Effective ac	0.5824	0.5792	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5507	0.5585	0.5641	0.5699 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			7.4900	1.1450	8.5763		(27)
Ground Floor			64.2600	0.1300	8.3538		(28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502		(29a)
Flat Roof	5.5500		5.5500	0.1100	0.6105		(30)
Total net area of external elements Aum (A, m2)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5908		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000		(32)
Corridor			29.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							285.1572 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0700	1.7990
P1 Party wall - Ground floor	16.7500	0.0800	1.3400
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0500	0.2750
E3 Sill	3.2000	0.0500	0.1600
E4 Jamb	15.3800	0.0500	0.7690
E5 Ground floor (normal)	25.7000	0.1600	4.1120
E16 Corner (normal)	5.3600	0.0900	0.4824
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	2.6800	0.0600	0.1608
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.1200	0.1992
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.2400	0.9984
E14 Flat roof	4.8000	0.0800	0.3840
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.8406 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	39.4314 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	30.8735	30.7040	30.5378	29.7572	29.6112	28.9313	28.9313	28.8054	29.1932	29.6112	29.9066	30.2155 (38)
Heat transfer coeff	70.3050	70.1354	69.9692	69.1886	69.0426	68.3627	68.3627	68.2368	68.6246	69.0426	69.3381	69.6469 (39)
Average = Sum(39)m / 12 =												69.1879
HLP	1.0941	1.0914	1.0888	1.0767	1.0744	1.0638	1.0638	1.0619	1.0679	1.0744	1.0790	1.0838 (40)
HLP (average)												1.0767
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

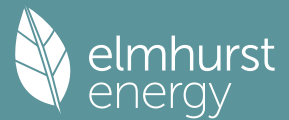
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0992 (42)
Hot water usage for mixer showers												
59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	(42a)
Hot water usage for baths												
25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	(42b)
Hot water usage for other uses												
36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	(42c)
Average daily hot water use (litres/day)												111.4265 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029 (44)
Energy conte	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047 (45)
Energy content (annual)										Total = Sum(45)m =		1850.7701
Distribution loss (46)m = 0.15 x (45)m												
28.7968	25.3390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957	(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	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage												
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month												
238.5736	211.0124	224.0797	196.6132	190.3577	171.2599	168.7445	175.5386	177.5848	198.3609	211.3627	235.8996	(62)
WWHRS	-27.1624	-24.0227	-25.1552	-20.8295	-19.4123	-16.6112	-15.5704	-16.5576	-17.1866	-20.2612	-22.9534	-26.6594 (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												
211.4111	186.9898	198.9245	175.7838	170.9453	154.6486	153.1741	158.9810	160.3981	178.0997	188.4093	209.2402	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2147.0057 (64)
Electric shower(s)												2147 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
101.1088	89.8367	96.2896	86.4543	85.0770	78.0243	77.8907	80.1497	80.1274	87.7381	91.3585	100.2198	(65)

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

Metabolic gains (Table 5), Watts												
(66)m	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												

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103.4228	114.5038	103.4228	106.8702	103.4228	106.8702	103.4228	103.4228	106.8702	103.4228	106.8702	103.4228	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
183.5490	185.4537	180.6540	170.4360	157.5376	145.4150	137.3163	135.4117	140.2114	150.4293	163.3277	175.4503	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	(71)
Water heating gains (Table 5)												
135.8990	133.6856	129.4215	120.0755	114.3509	108.3671	104.6918	107.7281	111.2880	117.9276	126.8868	134.7040	(72)
Total internal gains												
480.3583	491.1306	470.9859	454.8693	432.7989	415.1399	399.9185	401.0501	412.8572	429.2673	454.5723	471.0647	(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					1.8400	10.6334	0.6300	0.7000			0.7700	5.9795 (74)	
East					4.5000	19.6403	0.6300	0.7000			0.7700	27.0104 (76)	
Southeast					1.1500	36.7938	0.6300	0.7000			0.7700	12.9314 (77)	
Solar gains	45.9213	86.2921	136.5724	195.4409	239.3733	245.7168	233.6053	200.2082	157.1835	100.6438	56.5441	38.2634 (83)	
Total gains	526.2796	577.4227	607.5583	650.3101	672.1722	660.8568	633.5237	601.2583	570.0406	529.9110	511.1164	509.3281 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	72.3996	72.5747	72.7470	73.5678	73.7234	74.4566	74.4566	74.5940	74.1725	73.7234	73.4093	73.0837
alpha	5.8266	5.8383	5.8498	5.9045	5.9149	5.9638	5.9638	5.9729	5.9448	5.9149	5.8940	5.8722
util living area												
	0.9948	0.9902	0.9794	0.9391	0.8351	0.6418	0.4718	0.5169	0.7662	0.9505	0.9887	0.9957 (86)
MIT	20.0143	20.1550	20.3638	20.6559	20.8772	20.9796	20.9972	20.9952	20.9441	20.6742	20.3036	19.9939 (87)
Th 2	20.0057	20.0078	20.0100	20.0199	20.0218	20.0305	20.0305	20.0321	20.0271	20.0218	20.0180	20.0141 (88)
util rest of house												
	0.9930	0.9866	0.9717	0.9165	0.7807	0.5537	0.3696	0.4110	0.6831	0.9272	0.9839	0.9942 (89)
MIT 2	18.8749	19.0550	19.3193	19.6819	19.9246	20.0201	20.0297	20.0306	19.9933	19.7113	19.2524	18.8552 (90)
Living area fraction												
	19.4418	19.6023	19.8390	20.1665	20.3985	20.4975	20.5110	20.5105	20.4663	20.1904	19.7754	19.4217 (91)
fLA = Living area / (4) = 0.4975 (91)												
MIT	19.4418	19.6023	19.8390	20.1665	20.3985	20.4975	20.5110	20.5105	20.4663	20.1904	19.7754	19.4217 (92)
Temperature adjustment												
adjusted MIT	19.4418	19.6023	19.8390	20.1665	20.3985	20.4975	20.5110	20.5105	20.4663	20.1904	19.7754	19.4217 (93)
0.0000												

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9916	0.9848	0.9701	0.9204	0.8031	0.5972	0.4206	0.4639	0.7227	0.9319	0.9824	0.9929 (94)
Useful gains	521.8541	568.6520	589.3872	598.5179	539.8382	394.6418	266.4646	278.9080	411.9711	493.8479	502.1395	505.7311 (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												
	1064.5427	1031.1489	933.3181	779.5108	600.5700	403.1658	267.3677	280.4903	436.8860	662.1430	878.8863	1060.1439 (97)
Space heating kWh	403.7603	310.7979	255.8846	130.3149	45.1845	0.0000	0.0000	0.0000	0.0000	125.2115	271.2577	412.4831 (98a)
Space heating requirement - total per year (kWh/year)												1954.8945
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	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	403.7603	310.7979	255.8846	130.3149	45.1845	0.0000	0.0000	0.0000	0.0000	125.2115	271.2577	412.4831 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1954.8945
Space heating per m2											(98c) / (4) =	30.4216 (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	403.7603	310.7979	255.8846	130.3149	45.1845	0.0000	0.0000	0.0000	0.0000	125.2115	271.2577	412.4831	(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)	437.4435	336.7258	277.2314	141.1862	48.9539	0.0000	0.0000	0.0000	0.0000	135.6571	293.8870	446.8939	(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	211.4111	186.9898	198.9245	175.7838	170.9453	154.6486	153.1741	158.9810	160.3981	178.0997	188.4093	209.2402	(64)
Efficiency of water heater	85.4866	85.1908	84.6255	83.3985	81.5275	79.8000	79.8000	79.8000	79.8000	83.2846	84.8764	85.5527	(216)
Fuel for water heating, kWh/month	247.3032	219.4952	235.0644	210.7757	209.6782	193.7952	191.9475	199.2243	201.0002	213.8448	221.9808	244.5747	(217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
(221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(221)
Pumps and Fa													(231)

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Lighting	21.4892	17.2394	15.5222	11.3722	8.7842	7.1768	8.0133	10.4160	13.5293	17.7512	20.0499	22.0865	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2970	-25.6648	-38.7998	-45.9564	-51.6094	-48.9334	-48.3542	-44.6430	-38.4343	-30.3845	-19.4715	-14.8100	(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	-6.2253	-13.3900	-27.1694	-41.6305	-55.8549	-56.4102	-55.7292	-46.7955	-33.8033	-19.3957	-8.3909	-4.8998	(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												2117.9789	(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												2588.6842	(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)												173.4303	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-794.0529	(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												4172.0404	(238)

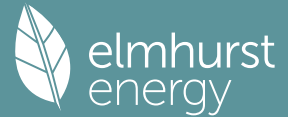
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2117.9789	0.2100	444.7756 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2588.6842	0.2100	543.6237 (264)
Space and water heating			988.3992 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	173.4303	0.1443	25.0314 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-424.3582	0.1335	-56.6612
PV Unit electricity exported	-369.6947	0.1253	-46.3305
Total			-102.9917 (269)
Total CO2, kg/year			922.3682 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.3500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2117.9789	1.1300	2393.3161 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2588.6842	1.1300	2925.2131 (278)
Space and water heating			5318.5292 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	173.4303	1.5338	266.0132 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-424.3582	1.4934	-633.7427
PV Unit electricity exported	-369.6947	0.4600	-170.0547
Total			-803.7974 (283)
Total Primary energy kWh/year			4910.8458 (286)
Target Primary Energy Rate (TPER)			76.4200 (287)

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Plot Reference	Plot 08			Issued on Date	22/12/2025
Assessment Reference	Plot 08	Plot Type Ref			
Plot Address	Flat 1, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	84 B	DER	4.51	TER	14.35
Environmental	97 A	% DER < TER			68.57
CO ₂ Emissions (t/year)	0.24	DFEE	31.80	TFEE	37.84
Compliance Check	See BREL	% DFEE < TFEE			15.98
% DPER < TPER	38.73	DPER	46.82	TPER	76.42
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client	J Greenwood (Builders) Limited, Steve Brown				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	64.2600 (1b)	2.5000 (2b)	160.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		160.6500 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	160.6500 (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)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1245 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.8800	(17)
Infiltration rate	0.2685	(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) =	0.2282 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.2910	0.2853	0.2796	0.2510	0.2453	0.2168	0.2168	0.2111	0.2282	0.2453	0.2567	0.2682 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5423	0.5407	0.5391	0.5315	0.5301	0.5235	0.5235	0.5223	0.5260	0.5301	0.5330	0.5360 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			6.3400	1.3258	8.4053		(27)
Window S/W			1.1500	1.3258	1.5246		(27)
Ground Floor			64.2600	0.1100	7.0686	110.0000	7068.6000 (28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502	110.0000	6752.8997 (29a)
Flat Roof	5.5500		5.5500	0.1500	0.8325	9.0000	49.9500 (30)
Total net area of external elements Aum(A, m ²)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.8812		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000	45.0000	709.2000 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Ceiling			58.7100			30.0000	1761.3000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	18324.1997 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							285.1572 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				25.7000	0.0370	0.9509	

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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
tau	80.1850	80.2952	80.4036	80.9164	81.0131	81.4662	81.4662	81.5507	81.2911	81.0131	80.8177
alpha	6.3457	6.3530	6.3602	6.3944	6.4009	6.4311	6.4311	6.4367	6.4194	6.4009	6.3878
util living area											
	0.9980	0.9954	0.9885	0.9563	0.8588	0.6606	0.4856	0.5378	0.7995	0.9703	0.9950
											0.9985 (86)
MIT	20.0295	20.1691	20.3727	20.6614	20.8834	20.9824	20.9978	20.9960	20.9443	20.6613	20.2973
Th 2	20.0935	20.0946	20.0957	20.1009	20.1019	20.1065	20.1065	20.1073	20.1047	20.1019	20.0999
util rest of house											
	0.9973	0.9937	0.9840	0.9392	0.8102	0.5771	0.3884	0.4362	0.7232	0.9551	0.9929
MIT 2	19.2112	19.3510	19.5531	19.8348	20.0280	20.0993	20.1060	20.1063	20.0773	19.8399	19.4833
Living area fraction											
											0.4975 (91)
MIT	19.6183	19.7580	19.9608	20.2460	20.4536	20.5387	20.5497	20.5489	20.5087	20.2486	19.8883
Temperature adjustment											0.0000
adjusted MIT	19.6183	19.7580	19.9608	20.2460	20.4536	20.5387	20.5497	20.5489	20.5087	20.2486	19.8883
											19.5937 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9968	0.9929	0.9831	0.9424	0.8306	0.6185	0.4369	0.4870	0.7597	0.9580	0.9922	0.9975 (94)
Useful gains	430.2925	480.7872	508.6101	534.0690	492.1642	363.7302	246.0906	257.6218	376.3363	428.7419	419.2077	414.4526 (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												
	972.3909	941.8776	852.1572	713.7245	549.9878	371.0521	246.7790	258.9598	401.2801	606.2205	805.4307	971.9660 (97)
Space heating kWh												
	403.3212	309.8527	255.5990	129.3519	43.0207	0.0000	0.0000	0.0000	0.0000	132.0440	278.0805	414.7899 (98a)
Space heating requirement - total per year (kWh/year)												1966.0601
Solar heating kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	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												
	403.3212	309.8527	255.5990	129.3519	43.0207	0.0000	0.0000	0.0000	0.0000	132.0440	278.0805	414.7899 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1966.0601
Space heating per m2												(98c) / (4) = 30.5954 (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	587.3174	462.3562	474.3605	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9001	0.9547	0.9339	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	528.6439	441.4172	443.0143	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	640.9005	614.2168	576.2568	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	80.8248	128.5629	99.1324	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												
Intermittency factor (Table 10b)									fc = cooled area / (4) =			1.0000 (105)
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	20.2062	32.1407	24.7831	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												77.1300 (107)
Energy for space heating												30.5954 (99)
Energy for space cooling												1.2003 (108)
Total												31.7957 (109)
Fabric Energy Efficiency (DFEE)												31.8 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

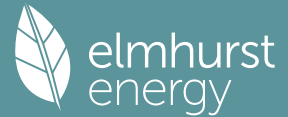
1. Overall dwelling characteristics

		Area (m2)	Storey height (m)	Volume (m3)
Main dwelling		64.2600 (1b)	x 2.5000 (2b)	= 160.6500 (1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)		64.2600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	160.6500 (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) = 0.1245 (8)
Yes
Blower Door
5.0000 (17)
0.3745 (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) = 0.3183 (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	0.4059	0.3979	0.3899	0.3502	0.3422	0.3024	0.3024	0.2944	0.3183	0.3422	0.3581	0.3740 (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	0.5824	0.5792	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5507	0.5585	0.5641	0.5699 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			7.4900	1.1450	8.5763		(27)
Ground Floor			64.2600	0.1300	8.3538		(28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502		(29a)
Flat Roof	5.5500		5.5500	0.1100	0.6105		(30)
Total net area of external elements Aum(A, m2)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 28.5908		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000		(32)
Corridor			29.1300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 285.1572 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0700	1.7990
P1 Party wall - Ground floor	16.7500	0.0800	1.3400
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0500	0.2750
E3 Sill	3.2000	0.0500	0.1600
E4 Jamb	15.3800	0.0500	0.7690
E5 Ground floor (normal)	25.7000	0.1600	4.1120
E16 Corner (normal)	5.3600	0.0900	0.4824
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	2.6800	0.0600	0.1608
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.1200	0.1992
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.2400	0.9984
E14 Flat roof	4.8000	0.0800	0.3840

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

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 39.4314 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	30.8735	30.7040	30.5378	29.7572	29.6112	28.9313	28.9313	28.8054	29.1932	29.6112	29.9066	30.2155 (38)
Heat transfer coeff	70.3050	70.1354	69.9692	69.1886	69.0426	68.3627	68.3627	68.2368	68.6246	69.0426	69.3381	69.6469 (39)
Average = Sum(39)m / 12 =												69.1879

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0941	1.0914	1.0888	1.0767	1.0744	1.0638	1.0638	1.0619	1.0679	1.0744	1.0790	1.0838 (40)
HLP (average)												1.0767
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0992 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

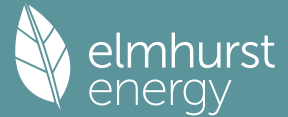
Hot water usage for baths 25.6740 25.2927 24.7557 23.7657 23.0244 22.2024 21.7584 22.2916 22.8721 23.7517 24.7621 25.5872 (42b)

Hot water usage for other uses 36.1276 34.8139 33.5001 32.1864 30.8727 29.5589 29.5589 30.8727 32.1864 33.5001 34.8139 36.1276 (42c)

Average daily hot water use (litres/day) 56.6471 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	61.8016	60.1065	58.2559	55.9521	53.8971	51.7613	51.3173	53.1642	55.0585	57.2518	59.5760	61.7148 (44)
Energy conte	97.8786	85.5909	89.5371	76.5956	72.5558	63.6466	62.0638	65.8284	67.8926	77.6902	84.8769	96.6304 (45)
Energy content (annual)										Total = Sum(45)m =		940.7870
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	83.1968	72.7523	76.1065	65.1063	61.6724	54.0996	52.7543	55.9542	57.7088	66.0366	72.1453	82.1359 (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	83.1968	72.7523	76.1065	65.1063	61.6724	54.0996	52.7543	55.9542	57.7088	66.0366	72.1453	82.1359 (64)
Total per year (kWh/year) = Sum(64)m =												799.6690 (64)
12Total per year (kWh/year)												800 (64)

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Electric shower(s)	47.5821	42.3961	46.2949	44.1787	45.0077	42.9329	44.3640	45.0077	44.1787	46.2949	45.4244	47.5821 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												541.2441 (64a)
Heat gains from water heating, kWh/month	32.6947	28.7871	30.6004	27.3212	26.6700	24.2581	24.2796	25.2405	25.4719	28.0829	29.3924	32.4295 (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	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.4228	114.5038	103.4228	106.8702	103.4228	106.8702	103.4228	103.4228	106.8702	103.4228	106.8702	103.4228	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	183.5490	185.4537	180.6540	170.4360	157.5376	145.4150	137.3163	135.4117	140.2114	150.4293	163.3277	175.4503	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	(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)	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	(71)
Water heating gains (Table 5)	43.9445	42.8379	41.1295	37.9462	35.8468	33.6919	32.6338	33.9253	35.3776	37.7458	40.8228	43.5880	(72)
Total internal gains	385.4039	397.2830	379.6939	369.7400	351.2948	340.4646	327.8605	327.2474	336.9467	346.0855	365.5083	376.9487	(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					1.8400	10.6334		0.6300	0.7000	0.7700		5.9795 (74)	
East					4.5000	19.6403		0.6300	0.7000	0.7700		27.0104 (76)	
Southeast					1.1500	36.7938		0.6300	0.7000	0.7700		12.9314 (77)	
Solar gains	45.9213	86.2921	136.5724	195.4409	239.3733	245.7168	233.6053	200.2082	157.1835	100.6438	56.5441	38.2634 (83)	
Total gains	431.3252	483.5751	516.2663	565.1808	590.6682	586.1815	561.4658	527.4556	494.1302	446.7293	422.0524	415.2121 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	72.3996	72.5747	72.7470	73.5678	73.7234	74.4566	74.4566	74.5940	74.1725	73.7234	73.4093	73.0837
alpha	5.8266	5.8383	5.8498	5.9045	5.9149	5.9638	5.9638	5.9729	5.9448	5.9149	5.8940	5.8722
util living area	0.9981	0.9959	0.9905	0.9658	0.8885	0.7084	0.5296	0.5839	0.8371	0.9763	0.9957	0.9985 (86)
MIT	19.8734	20.0184	20.2369	20.5573	20.8218	20.9660	20.9948	20.9910	20.9089	20.5715	20.1743	19.8534 (87)
Th 2	20.0057	20.0078	20.0100	20.0199	20.0218	20.0305	20.0305	20.0321	20.0271	20.0218	20.0180	20.0141 (88)
util rest of house	0.9974	0.9944	0.9866	0.9513	0.8433	0.6174	0.4163	0.4671	0.7614	0.9633	0.9937	0.9980 (89)
MIT 2	18.9845	19.1306	19.3489	19.6678	19.9056	20.0163	20.0293	20.0299	19.9807	19.6871	19.2945	18.9713 (90)
Living area fraction	fLA = Living area / (4) =											0.4975 (91)
MIT	19.4267	19.5723	19.7907	20.1103	20.3614	20.4888	20.5097	20.5081	20.4425	20.1271	19.7322	19.4102 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4267	19.5723	19.7907	20.1103	20.3614	20.4888	20.5097	20.5081	20.4425	20.1271	19.7322	19.4102 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	429.9880	480.4382	508.7887	538.5243	508.3348	388.1052	265.5911	277.2733	393.5998	431.1180	419.0754	414.1787	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1063.4844	1029.0467	929.9382	775.6271	598.0038	402.5743	267.2746	280.3211	435.2506	657.7756	875.8939	1059.3414	(97)
Space heating kWh	471.3213	368.6649	313.3352	170.7140	66.7138	0.0000	0.0000	0.0000	0.0000	168.6332	328.9093	480.0010	(98a)
Space heating requirement - total per year (kWh/year)												2368.2928	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	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	471.3213	368.6649	313.3352	170.7140	66.7138	0.0000	0.0000	0.0000	0.0000	168.6332	328.9093	480.0010	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2368.2928	
Space heating per m ²												(98c) / (4) =	36.8549 (99)

8c. Space cooling requirement

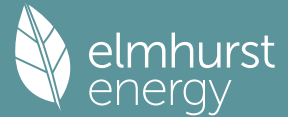
Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	642.6096	505.8842	518.5999	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8537	0.9242	0.8965	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	548.6245	467.5425	464.9170	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	638.6573	612.0842	574.4291	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	64.8237	107.5390	81.4770	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction												fc = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	16.2059	26.8847	20.3693	0.0000	0.0000	0.0000	0.0000	(107)

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Space cooling requirement	63.4599	(107)
Energy for space heating	36.8549	(99)
Energy for space cooling	0.9875	(108)
Total	37.8424	(109)
Fabric Energy Efficiency (TFEE)	37.8	(109)

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Plot Reference	Plot 08			Issued on Date	22/12/2025
Assessment Reference	Plot 08	Plot Type Ref			
Plot Address	Flat 1, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	84 B	DER	4.51	TER	14.35
Environmental	97 A	% DER < TER			68.57
CO ₂ Emissions (t/year)	0.24	DFEE	31.80	TFEE	37.84
Compliance Check	See BREL	% DFEE < TFEE			15.98
% DPER < TPER	38.73	DPER	46.82	TPER	76.42
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	64.2600 (1b)	2.5000 (2b)	160.6500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	160.6500 (5)

2. Ventilation rate

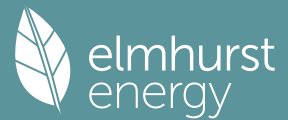
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8800 (17)
Infiltration rate	0.1440 (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) = 0.1224 (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	0.1561	0.1530	0.1499	0.1346	0.1316	0.1163	0.1163	0.1132	0.1224	0.1316	0.1377	0.1438 (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	0.2961	0.2930	0.2899	0.2746	0.2716	0.2563	0.2563	0.2532	0.2624	0.2716	0.2777	0.2838 (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			6.3400	1.3258	8.4053		(27)
Window S/W			1.1500	1.3258	1.5246		(27)
Ground Floor			64.2600	0.1100	7.0686	110.0000	7068.6000 (28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502	110.0000	6752.8997 (29a)
Flat Roof	5.5500		5.5500	0.1500	0.8325	9.0000	49.9500 (30)
Total net area of external elements Aum(A, m ²)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.8812		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000	45.0000	709.2000 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Ceiling			58.7100			30.0000	1761.3000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	18324.1997 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							285.1572 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0370	0.9509
P1 Party wall - Ground floor	16.7500	0.0510	0.8542
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0250	0.1375
E3 Sill	3.2000	0.0220	0.0704
E4 Jamb	15.3800	0.0170	0.2615
E5 Ground floor (normal)	25.7000	0.0670	1.7219
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.0400	0.0664
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.1500	0.6240
E14 Flat roof	4.8000	0.1600	0.7680
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.8461 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.7273 (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	15.6955	15.5332	15.3710	14.5599	14.3977	13.5866	13.5866	13.4243	13.9110	14.3977	14.7221	15.0466	(38)
Average = Sum(39)m / 12 =	50.4228	50.2606	50.0983	49.2872	49.1250	48.3139	48.3139	48.1516	48.6383	49.1250	49.4494	49.7739	(39)
												49.2467	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.7847	0.7821	0.7796	0.7670	0.7645	0.7518	0.7518	0.7493	0.7569	0.7645	0.7695	0.7746	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.7664	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0992 (42)
Hot water usage for mixer showers													
	59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	(42a)
Hot water usage for baths													
	25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	(42b)
Hot water usage for other uses													
	36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	(42c)
Average daily hot water use (litres/day)													111.4265 (43)
Daily hot water use													
	121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029	(44)
Energy conte	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047	(45)
Energy content (annual)										Total = Sum(45)m =		1850.7701	
Distribution loss (46)m = 0.15 x (45)m													
	28.7968	25.3390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957	(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													
	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(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													
	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2168.1011	(64)
Electric shower(s)												2168	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month													
	63.8329	56.1681	59.0137	50.3809	47.8011	41.9509	40.6147	42.8738	44.0539	50.4622	55.2851	62.9438	(65)

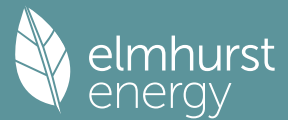
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	103.4228	114.5038	103.4228	106.8702	103.4228	106.8702	103.4228	103.4228	106.8702	103.4228	106.8702	103.4228	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	183.5490	185.4537	180.6540	170.4360	157.5376	145.4150	137.3163	135.4117	140.2114	150.4293	163.3277	175.4503	(68)
Pumps, fans	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	(69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	(71)
Water heating gains (Table 5)	85.7969	83.5835	79.3195	69.9734	64.2488	58.2651	54.5897	57.6260	61.1860	67.8255	76.7848	84.6019	(72)
Total internal gains	427.2563	438.0286	417.8838	401.7672	379.6968	365.0379	349.8164	350.9481	362.7551	376.1652	401.4703	417.9626	(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	1.8400	10.6334	0.4000	0.0000	0.7700	6.0262 (74)
East	4.5000	19.6403	0.4000	0.0000	0.7700	27.2214 (76)
Southeast	1.1500	36.7938	0.4000	0.0000	0.7700	13.0324 (77)

Solar gains	46.2799	86.9661	137.6391	196.9674	241.2430	247.6360	235.4299	201.7719	158.4112	101.4298	56.9857	38.5623 (83)
Total gains	473.5362	524.9947	555.5230	598.7346	620.9398	612.6739	585.2463	552.7200	521.1663	477.5951	458.4560	456.5249 (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	100.9475	101.2733	101.6013	103.2733	103.6144	105.3539	105.3539	105.7089	104.6511	103.6144	102.9345	102.2636
alpha	7.7298	7.7516	7.7734	7.8849	7.9076	8.0236	8.0236	8.0473	7.9767	7.9076	7.8623	7.8176
util living area	0.9949	0.9874	0.9677	0.8857	0.7174	0.5036	0.3632	0.4006	0.6370	0.9153	0.9858	0.9960 (86)
MIT	20.4076	20.5354	20.6982	20.8941	20.9817	20.9990	20.9999	20.9999	20.9942	20.8818	20.6231	20.3897 (87)
Th 2	20.2666	20.2688	20.2710	20.2820	20.2842	20.2953	20.2953	20.2975	20.2908	20.2842	20.2798	20.2754 (88)
util rest of house	0.9931	0.9834	0.9575	0.8565	0.6686	0.4487	0.3050	0.3395	0.5747	0.8860	0.9805	0.9946 (89)
MIT 2	19.5806	19.7437	19.9470	20.1830	20.2708	20.2947	20.2952	20.2974	20.2875	20.1761	19.8643	19.5650 (90)
Living area fraction	19.9920	20.1376	20.3207	20.5368	20.6245	20.6451	20.6458	20.6469	20.6391	20.5272	20.2418	19.9753 (92)
MIT	19.9920	20.1376	20.3207	20.5368	20.6245	20.6451	20.6458	20.6469	20.6391	20.5272	20.2418	19.9753 (93)
Temperature adjustment												0.0000
adjusted MIT	19.9920	20.1376	20.3207	20.5368	20.6245	20.6451	20.6458	20.6469	20.6391	20.5272	20.2418	19.9753 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9923	0.9825	0.9583	0.8675	0.6922	0.4760	0.3340	0.3699	0.6056	0.8968	0.9801	0.9939 (94)
Useful gains	469.9003	515.8146	532.3457	519.3801	429.8080	291.6617	195.4502	204.4518	315.6089	428.2975	449.3503	453.7468 (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	791.2364	765.8490	692.3941	573.5456	438.4143	292.0627	195.4698	204.4949	318.0500	487.6723	649.8560	785.1985 (97)
Space heating kWh	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (98a)
Space heating requirement - total per year (kWh/year)												1006.7144
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1006.7144
Space heating per m2										(98c) / (4) =		15.6663 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	239.0740	168.0231	119.0760	38.9991	6.4030	0.0000	0.0000	0.0000	0.0000	44.1749	144.3641	246.6001 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561 (64)
Efficiency of water heater (217)m	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550 (216)
Fuel for water heating, kWh/month	63.3011	55.8818	59.1104	51.3520	49.3600	44.0213	43.1108	45.0753	45.8501	51.6741	55.6166	62.5280 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.4845	11.2763	12.4845	12.0818	12.4845	12.0818	12.4845	12.4845	12.0818	12.4845	12.0818	12.4845 (231)
Lighting	19.3025	15.4852	13.9427	10.2150	7.8904	6.4465	7.1979	9.3561	12.1526	15.9449	18.0097	19.8390 (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												1006.7144 (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	345.8550	
Water heating fuel used	626.8816	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	146.9948	(230a)
Total electricity for the above, kWh/year	146.9948	(231)
Electricity for lighting (calculated in Appendix L)	155.7826	(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	1936.3734	(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	1006.7144	0.1574	158.4961 (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)	626.8816	0.1412	88.4898 (264)
Space and water heating			246.9858 (265)
Pumps, fans and electric keep-hot	146.9948	0.1387	20.3900 (267)
Energy for lighting	155.7826	0.1443	22.4842 (268)
Total CO2, kg/year			289.8601 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.5100 (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	1006.7144	1.5828	1593.4635 (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)	626.8816	1.5220	954.0927 (278)
Space and water heating			2547.5562 (279)
Pumps, fans and electric keep-hot	146.9948	1.5128	222.3737 (281)
Energy for lighting	155.7826	1.5338	238.9446 (282)
Total Primary energy kWh/year			3008.8744 (286)
Dwelling Primary energy Rate (DPER)			46.8200 (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	64.2600 (1b)	x 2.5000 (2b)	= 160.6500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 160.6500 (5)

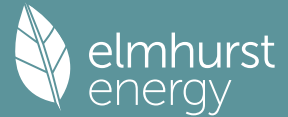
2. Ventilation rate

	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) =	0.1245 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3745	(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) =		0.3183 (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	0.4059	0.3979	0.3899	0.3502	0.3422	0.3024	0.3024	0.2944	0.3183	0.3422	0.3581	0.3740 (22b)
Effective ac	0.5824	0.5792	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5507	0.5585	0.5641	0.5699 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			7.4900	1.1450	8.5763		(27)
Ground Floor			64.2600	0.1300	8.3538		(28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502		(29a)
Flat Roof	5.5500		5.5500	0.1100	0.6105		(30)
Total net area of external elements Aum (A, m2)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5908		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000		(32)
Corridor			29.1300	0.0000	0.0000		(32)

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

285.1572 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0700	1.7990
P1 Party wall - Ground floor	16.7500	0.0800	1.3400
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0500	0.2750
E3 Sill	3.2000	0.0500	0.1600
E4 Jamb	15.3800	0.0500	0.7690
E5 Ground floor (normal)	25.7000	0.1600	4.1120
E16 Corner (normal)	5.3600	0.0900	0.4824
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	2.6800	0.0600	0.1608
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.1200	0.1992
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.2400	0.9984
E14 Flat roof	4.8000	0.0800	0.3840

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

10.8406 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 39.4314 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	30.8735	30.7040	30.5378	29.7572	29.6112	28.9313	28.9313	28.8054	29.1932	29.6112	29.9066	30.2155 (38)
Heat transfer coeff	70.3050	70.1354	69.9692	69.1886	69.0426	68.3627	68.3627	68.2368	68.6246	69.0426	69.3381	69.6469 (39)
Average = Sum(39)m / 12 =												69.1879

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0941	1.0914	1.0888	1.0767	1.0744	1.0638	1.0638	1.0619	1.0679	1.0744	1.0790	1.0838 (40)
HLP (average)												1.0767
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

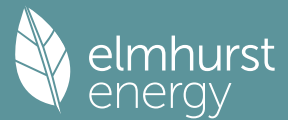
Assumed occupancy													2.0992 (42)
Hot water usage for mixer showers													
59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	(42a)	
Hot water usage for baths													
25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	(42b)	
Hot water usage for other uses													
36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	(42c)	
Average daily hot water use (litres/day)													111.4265 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029 (44)
Energy content (annual)	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047 (45)
Distribution loss (46)m = 0.15 x (45)m	28.7968	25.3390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957 (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	0.0000 (61)
Total heat required for water heating calculated for each month	238.5736	211.0124	224.0797	196.6132	190.3577	171.2599	168.7445	175.5386	177.5848	198.3609	211.3627	235.8996 (62)
WWHRS	-27.1624	-24.0227	-25.1552	-20.8295	-19.4123	-16.6112	-15.5704	-16.5576	-17.1866	-20.2612	-22.9534	-26.6594 (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	211.4111	186.9898	198.9245	175.7838	170.9453	154.6486	153.1741	158.9810	160.3981	178.0997	188.4093	209.2402 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2147.0057 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	101.1088	89.8367	96.2896	86.4543	85.0770	78.0243	77.8907	80.1497	80.1274	87.7381	91.3585	100.2198 (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	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585	104.9585 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												

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103.4228	114.5038	103.4228	106.8702	103.4228	106.8702	103.4228	103.4228	106.8702	103.4228	106.8702	103.4228	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
183.5490	185.4537	180.6540	170.4360	157.5376	145.4150	137.3163	135.4117	140.2114	150.4293	163.3277	175.4503	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	33.4959	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	(71)
Water heating gains (Table 5)												
135.8990	133.6856	129.4215	120.0755	114.3509	108.3671	104.6918	107.7281	111.2880	117.9276	126.8868	134.7040	(72)
Total internal gains												
480.3583	491.1306	470.9859	454.8693	432.7989	415.1399	399.9185	401.0501	412.8572	429.2673	454.5723	471.0647	(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					1.8400	10.6334	0.6300	0.7000			0.7700	5.9795 (74)	
East					4.5000	19.6403	0.6300	0.7000			0.7700	27.0104 (76)	
Southeast					1.1500	36.7938	0.6300	0.7000			0.7700	12.9314 (77)	
Solar gains	45.9213	86.2921	136.5724	195.4409	239.3733	245.7168	233.6053	200.2082	157.1835	100.6438	56.5441	38.2634 (83)	
Total gains	526.2796	577.4227	607.5583	650.3101	672.1722	660.8568	633.5237	601.2583	570.0406	529.9110	511.1164	509.3281 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	72.3996	72.5747	72.7470	73.5678	73.7234	74.4566	74.4566	74.5940	74.1725	73.7234	73.4093	73.0837
alpha	5.8266	5.8383	5.8498	5.9045	5.9149	5.9638	5.9638	5.9729	5.9448	5.9149	5.8940	5.8722
util living area												
	0.9948	0.9902	0.9794	0.9391	0.8351	0.6418	0.4718	0.5169	0.7662	0.9505	0.9887	0.9957 (86)
MIT	20.0143	20.1550	20.3638	20.6559	20.8772	20.9796	20.9972	20.9952	20.9441	20.6742	20.3036	19.9939 (87)
Th 2	20.0057	20.0078	20.0100	20.0199	20.0218	20.0305	20.0305	20.0321	20.0271	20.0218	20.0180	20.0141 (88)
util rest of house												
	0.9930	0.9866	0.9717	0.9165	0.7807	0.5537	0.3696	0.4110	0.6831	0.9272	0.9839	0.9942 (89)
MIT 2	18.8749	19.0550	19.3193	19.6819	19.9246	20.0201	20.0297	20.0306	19.9933	19.7113	19.2524	18.8552 (90)
Living area fraction												
	19.4418	19.6023	19.8390	20.1665	20.3985	20.4975	20.5110	20.5105	20.4663	20.1904	19.7754	19.4217 (91)
fLA = Living area / (4) = 0.4975 (91)												
MIT	19.4418	19.6023	19.8390	20.1665	20.3985	20.4975	20.5110	20.5105	20.4663	20.1904	19.7754	19.4217 (92)
Temperature adjustment												
adjusted MIT	19.4418	19.6023	19.8390	20.1665	20.3985	20.4975	20.5110	20.5105	20.4663	20.1904	19.7754	19.4217 (93)
0.0000												

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9916	0.9848	0.9701	0.9204	0.8031	0.5972	0.4206	0.4639	0.7227	0.9319	0.9824	0.9929 (94)
Useful gains	521.8541	568.6520	589.3872	598.5179	539.8382	394.6418	266.4646	278.9080	411.9711	493.8479	502.1395	505.7311 (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												
Space heating	1064.5427	1031.1489	933.3181	779.5108	600.5700	403.1658	267.3677	280.4903	436.8860	662.1430	878.8863	1060.1439 (97)
kWh												
	403.7603	310.7979	255.8846	130.3149	45.1845	0.0000	0.0000	0.0000	0.0000	125.2115	271.2577	412.4831 (98a)
Space heating requirement - total per year (kWh/year)												1954.8945
Solar heating kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	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												
	403.7603	310.7979	255.8846	130.3149	45.1845	0.0000	0.0000	0.0000	0.0000	125.2115	271.2577	412.4831 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1954.8945
Space heating per m2												
										(98c) / (4) =		30.4216 (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	403.7603	310.7979	255.8846	130.3149	45.1845	0.0000	0.0000	0.0000	0.0000	125.2115	271.2577	412.4831	(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)	437.4435	336.7258	277.2314	141.1862	48.9539	0.0000	0.0000	0.0000	0.0000	135.6571	293.8870	446.8939	(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	211.4111	186.9898	198.9245	175.7838	170.9453	154.6486	153.1741	158.9810	160.3981	178.0997	188.4093	209.2402	(64)
Efficiency of water heater (217)m	85.4866	85.1908	84.6255	83.3985	81.5275	79.8000	79.8000	79.8000	79.8000	83.2846	84.8764	85.5527	(217)
Fuel for water heating, kWh/month	247.3032	219.4952	235.0644	210.7757	209.6782	193.7952	191.9475	199.2243	201.0002	213.8448	221.9808	244.5747	(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)

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Lighting	21.4892	17.2394	15.5222	11.3722	8.7842	7.1768	8.0133	10.4160	13.5293	17.7512	20.0499	22.0865	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2970	-25.6648	-38.7998	-45.9564	-51.6094	-48.9334	-48.3542	-44.6430	-38.4343	-30.3845	-19.4715	-14.8100	(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	-6.2253	-13.3900	-27.1694	-41.6305	-55.8549	-56.4102	-55.7292	-46.7955	-33.8033	-19.3957	-8.3909	-4.8998	(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												2117.9789	(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												2588.6842	(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)												173.4303	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-794.0529	(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												4172.0404	(238)

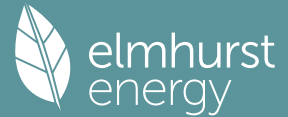
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2117.9789	0.2100	444.7756 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2588.6842	0.2100	543.6237 (264)
Space and water heating			988.3992 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	173.4303	0.1443	25.0314 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-424.3582	0.1335	-56.6612
PV Unit electricity exported	-369.6947	0.1253	-46.3305
Total			-102.9917 (269)
Total CO2, kg/year			922.3682 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.3500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2117.9789	1.1300	2393.3161 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2588.6842	1.1300	2925.2131 (278)
Space and water heating			5318.5292 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	173.4303	1.5338	266.0132 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-424.3582	1.4934	-633.7427
PV Unit electricity exported	-369.6947	0.4600	-170.0547
Total			-803.7974 (283)
Total Primary energy kWh/year			4910.8458 (286)
Target Primary Energy Rate (TPER)			76.4200 (287)

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Plot Reference	Plot 08				Issued on Date	22/12/2025	
Assessment Reference	Plot 08			Plot Type Ref			
Plot Address	Flat 1, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	84 B	DER	4.51	TER	14.35		
Environmental	97 A	% DER < TER				68.57	
CO ₂ Emissions (t/year)	0.24	DFEE	31.80	TFEE	37.84		
Compliance Check	See BREL	% DFEE < TFEE				15.98	
% DPER < TPER	38.73	DPER	46.82	TPER	76.42		
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	64.2600 (1b)	2.5000 (2b)	160.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	160.6500 (5)

2. Ventilation rate

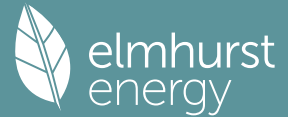
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8800 (17)
Infiltration rate	0.1440 (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) = 0.1224 (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	0.1561	0.1530	0.1499	0.1346	0.1316	0.1163	0.1163	0.1132	0.1224	0.1316	0.1377	0.1438 (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	0.2961	0.2930	0.2899	0.2746	0.2716	0.2563	0.2563	0.2532	0.2624	0.2716	0.2777	0.2838 (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			6.3400	1.3258	8.4053		(27)
Window S/W			1.1500	1.3258	1.5246		(27)
Ground Floor			64.2600	0.1100	7.0686	110.0000	7068.6000 (28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502	110.0000	6752.8997 (29a)
Flat Roof	5.5500		5.5500	0.1500	0.8325	9.0000	49.9500 (30)
Total net area of external elements Aum(A, m ²)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.8812		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000	45.0000	709.2000 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Ceiling			58.7100			30.0000	1761.3000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		18324.1997 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							285.1572 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0370	0.9509
P1 Party wall - Ground floor	16.7500	0.0510	0.8542
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0250	0.1375
E3 Sill	3.2000	0.0220	0.0704
E4 Jamb	15.3800	0.0170	0.2615
E5 Ground floor (normal)	25.7000	0.0670	1.7219
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.0400	0.0664
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.1500	0.6240
E14 Flat roof	4.8000	0.1600	0.7680
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.8461 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.7273 (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	15.6955	15.5332	15.3710	14.5599	14.3977	13.5866	13.5866	13.4243	13.9110	14.3977	14.7221	15.0466	(38)
Heat transfer coeff	50.4228	50.2606	50.0983	49.2872	49.1250	48.3139	48.3139	48.1516	48.6383	49.1250	49.4494	49.7739	(39)
Average = Sum(39)m / 12 =												49.2467	
HLP	0.7847	0.7821	0.7796	0.7670	0.7645	0.7518	0.7518	0.7493	0.7569	0.7645	0.7695	0.7746	(40)
HLP (average)												0.7664	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0992 (42)
Hot water usage for mixer showers													
59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	59.1881	(42a)
Hot water usage for baths													
25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	25.5872	(42b)
Hot water usage for other uses													
36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	36.1276	(42c)
Average daily hot water use (litres/day)												111.4265	(43)
Daily hot water use													
121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029	120.9029	(44)
Energy conte	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
28.7968	25.3390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957	28.3957	(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	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	216.2561	(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													
218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	216.2561	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month													
63.8329	56.1681	59.0137	50.3809	47.8011	41.9509	40.6147	42.8738	44.0539	50.4622	55.2851	62.9438	62.9438	(65)

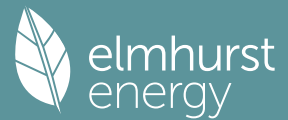
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
22.0526	19.5870	15.9292	12.0594	9.0146	7.6105	8.2234	10.6891	14.3468	18.2166	21.2615	22.6656	22.6656	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
273.9537	276.7965	269.6328	254.3821	235.1308	217.0373	204.9497	202.1070	209.2707	224.5214	243.7727	261.8662	261.8662	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	(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)													
-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	(71)
Water heating gains (Table 5)													
85.7969	83.5835	79.3195	69.9734	64.2488	58.2651	54.5897	57.6260	61.1860	67.8255	76.7848	84.6019	84.6019	(72)
Total internal gains													
473.4809	471.6446	456.5591	428.0925	400.0718	374.5905	359.4404	362.0997	376.4811	402.2411	433.4965	460.8112	460.8112	(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	1.8400	10.6334	0.4000	0.0000	0.7700	6.0262 (74)

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East	4.5000		19.6403		0.4000		0.0000		0.7700		27.2214 (76)	
Southeast	1.1500		36.7938		0.4000		0.0000		0.7700		13.0324 (77)	
Solar gains	46.2799	86.9661	137.6391	196.9674	241.2430	247.6360	235.4299	201.7719	158.4112	101.4298	56.9857	38.5623 (83)
Total gains	519.7608	558.6107	594.1982	625.0599	641.3147	622.2265	594.8703	563.8716	534.8922	503.6710	490.4823	499.3735 (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	100.9475	101.2733	101.6013	103.2733	103.6144	105.3539	105.3539	105.7089	104.6511	103.6144	102.9345	102.2636
alpha	7.7298	7.7516	7.7734	7.8849	7.9076	8.0236	8.0236	8.0473	7.9767	7.9076	7.8623	7.8176
util living area	0.9907	0.9818	0.9539	0.8655	0.6976	0.4960	0.3573	0.3927	0.6217	0.8940	0.9788	0.9928 (86)
MIT	20.4776	20.5834	20.7449	20.9113	20.9848	20.9991	20.9999	20.9999	20.9951	20.9028	20.6681	20.4554 (87)
Th 2	20.2666	20.2688	20.2710	20.2820	20.2842	20.2953	20.2953	20.2975	20.2908	20.2842	20.2798	20.2754 (88)
util rest of house	0.9877	0.9762	0.9405	0.8340	0.6492	0.4419	0.3001	0.3328	0.5604	0.8608	0.9712	0.9904 (89)
MIT 2	19.6689	19.8032	20.0022	20.2004	20.2732	20.2948	20.2952	20.2974	20.2881	20.1975	19.9195	19.6482 (90)
Living area fraction	fLA = Living area / (4) = 0.4975 (91)											
MIT	20.0712	20.1913	20.3717	20.5541	20.6272	20.6452	20.6458	20.6469	20.6398	20.5484	20.2919	20.0498 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.0712	20.1913	20.3717	20.5541	20.6272	20.6452	20.6458	20.6469	20.6398	20.5484	20.2919	20.0498 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9867	0.9755	0.9426	0.8465	0.6727	0.4688	0.3286	0.3626	0.5908	0.8739	0.9714	0.9895 (94)
Useful gains	512.8662	544.9046	560.0650	529.1279	431.4428	291.7074	195.4527	204.4584	316.0244	440.1589	476.4314	494.1459 (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	795.2284	768.5513	694.9497	574.3978	438.5506	292.0665	195.4700	204.4955	318.0846	488.7155	652.3343	788.9059 (97)
Space heating kWh	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (98a)
Space heating requirement - total per year (kWh/year)	880.6824											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	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	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	880.6824											
Space heating per m2	(98c) / (4) = 13.7050 (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	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (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)	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561 (64)
Efficiency of water heater	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550 (216)
Fuel for water heating, kWh/month	63.3011	55.8818	59.1104	51.3520	49.3600	44.0213	43.1108	45.0753	45.8501	51.6741	55.6166	62.5280 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	12.4845	11.2763	12.4845	12.0818	12.4845	12.0818	12.4845	12.4845	12.0818	12.4845	12.0818	12.4845 (231)
Lighting	19.3025	15.4852	13.9427	10.2150	7.8904	6.4465	7.1979	9.3561	12.1526	15.9449	18.0097	19.8390 (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												880.6824 (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	345.8550
Water heating fuel used	626.8816 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	146.9948 (230a)
Total electricity for the above, kWh/year	146.9948 (231)
Electricity for lighting (calculated in Appendix L)	155.7826 (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	1810.3414 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	880.6824	16.4900	145.2245 (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)	626.8816	16.4900	103.3728 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	146.9948	16.4900	24.2394 (249)
Energy for lighting	155.7826	16.4900	25.6886 (250)
Additional standing charges			0.0000 (251)
Total energy cost			298.5253 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.9836 (257)
SAP value	84.0557
SAP rating (Section 12)	84 (258)
SAP band	B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	880.6824	0.1576	138.7858 (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)	626.8816	0.1412	88.4898 (264)
Space and water heating			227.2756 (265)
Pumps, fans and electric keep-hot	146.9948	0.1387	20.3900 (267)
Energy for lighting	155.7826	0.1443	22.4842 (268)
Total CO2, kg/year			270.1498 (272)
CO2 emissions per m2			4.2000 (273)
EI value			96.6868
EI rating			97 (274)
EI band			A

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

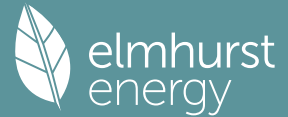
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	64.2600 (1b)	x 2.5000 (2b)	= 160.6500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	160.6500 (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 2.8800 (17)
Infiltration rate 0.1440 (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) = 0.1224 (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	0.1316	0.1285	0.1285	0.1193	0.1224	0.1040	0.1010	0.1010	0.1040	0.1163	0.1163	0.1193	(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	0.2716	0.2685	0.2685	0.2593	0.2624	0.2440	0.2410	0.2410	0.2440	0.2563	0.2563	0.2593	(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			6.3400	1.3258	8.4053			(27)
Window S/W			1.1500	1.3258	1.5246			(27)
Ground Floor			64.2600	0.1100	7.0686	110.0000	7068.6000	(28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502	110.0000	6752.8997	(29a)
Flat Roof	5.5500		5.5500	0.1500	0.8325	9.0000	49.9500	(30)
Total net area of external elements Aum (A, m2)			138.6900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		28.8812			(33)
Main dwelling								
Party Wall			15.7600	0.0000	0.0000	45.0000	709.2000	(32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500	(32)
Party Ceiling			58.7100			30.0000	1761.3000	(32b)
Internal Wall			74.6000			9.0000	671.4000	(32c)

Heat capacity Cm = Sum(A x k) (28) ... (30) + (32) + (32a) ... (32e) = 18324.1997 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 285.1572 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0370	0.9509
P1 Party wall - Ground floor	16.7500	0.0510	0.8542
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0250	0.1375
E3 Sill	3.2000	0.0220	0.0704
E4 Jamb	15.3800	0.0170	0.2615
E5 Ground floor (normal)	25.7000	0.0670	1.7219
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.0400	0.0664
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.1500	0.6240
E14 Flat roof	4.8000	0.1600	0.7680

Thermal bridges (Sum(L x Psi) calculated using Appendix K) (36a) = 5.8461 (36)
Point Thermal bridges 0.0000
Total fabric heat loss (33) + (36) + (36a) = 34.7273 (37)

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

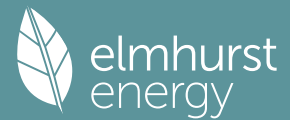
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	14.3977	14.2355	14.2355	13.7488	13.9110	12.9377	12.7754	12.7754	12.9377	13.5866	13.5866	13.7488	(38)
Heat transfer coeff	49.1250	48.9628	48.9628	48.4761	48.6383	47.6650	47.5027	47.5027	47.6650	48.3139	48.3139	48.4761	(39)
Average = Sum(39)m / 12 =												48.3004	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7645	0.7619	0.7619	0.7544	0.7569	0.7418	0.7392	0.7392	0.7418	0.7518	0.7518	0.7544	(40)
HLP (average)												0.7516	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0992 (42)
Hot water usage for mixer showers													
59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	59.1881	(42a)
Hot water usage for baths													
25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	25.5872	(42b)
Hot water usage for other uses													
36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	36.1276	(42c)
Average daily hot water use (litres/day)												111.4265	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029	(44)
Energy conte	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047	(45)
Energy content (annual)										Total = Sum(45)m =		1850.7701	
Distribution loss (46)m = 0.15 x (45)m													
28.7968	25.5390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957	28.3957	(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	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	216.2561	(62)

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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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(64)
Total per year (kWh/year) = Sum(64)m =													2168.1011 (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	63.8329	56.1681	59.0137	50.3809	47.8011	41.9509	40.6147	42.8738	44.0539	50.4622	55.2851	62.9438	(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	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.0526	19.5870	15.9292	12.0594	9.0146	7.6105	8.2234	10.6891	14.3468	18.2166	21.2615	22.6656	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	273.9537	276.7965	269.6328	254.3821	235.1308	217.0373	204.9497	202.1070	209.2707	224.5214	243.7727	261.8662	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	(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)	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	(71)
Water heating gains (Table 5)	85.7969	83.5835	79.3195	69.9734	64.2488	58.2651	54.5897	57.6260	61.1860	67.8255	76.7848	84.6019	(72)
Total internal gains	473.4809	471.6446	456.5591	428.0925	400.0718	374.5905	359.4404	362.0997	376.4811	402.2411	433.4965	460.8112	(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			1.8400	9.3942		0.4000	0.0000		0.7700		5.3239 (74)	
East			4.5000	17.3606		0.4000	0.0000		0.7700		24.0618 (76)	
Southeast			1.1500	32.4665		0.4000	0.0000		0.7700		11.4996 (77)	
Solar gains	40.8853	78.8200	130.3512	190.2876	227.3344	238.8976	221.6534	187.5409	154.1575	96.7137	51.7380	34.8419 (83)
Total gains	514.3662	550.4646	586.9103	618.3801	627.4062	613.4880	581.0939	549.6406	530.6386	498.9548	485.2345	495.6532 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	103.6144	103.9577	103.9577	105.0014	104.6511	106.7882	107.1529	107.1529	106.7882	105.3539	105.3539	105.0014	
alpha	7.9076	7.9305	7.9305	8.0001	7.9767	8.1192	8.1435	8.1435	8.1192	8.0236	8.0236	8.0001	
util living area	0.9866	0.9745	0.9356	0.8181	0.6221	0.4116	0.3025	0.3370	0.5635	0.8594	0.9696	0.9898	(86)
MIT	20.5694	20.6668	20.8127	20.9484	20.9942	20.9998	21.0000	21.0000	20.9979	20.9360	20.7391	20.5424	(87)
Th 2	20.2842	20.2864	20.2864	20.2930	20.2908	20.3041	20.3063	20.3063	20.3041	20.2953	20.2953	20.2930	(88)
util rest of house	0.9823	0.9665	0.9174	0.7799	0.5701	0.3577	0.2458	0.2771	0.5024	0.8189	0.9587	0.9864	(89)
MIT 2	19.7994	19.9218	20.0961	20.2487	20.2871	20.3040	20.3063	20.3063	20.3031	20.2417	20.0198	19.7730	(90)
Living area fraction	fLA = Living area / (4) =												0.4975 (91)
MIT	20.1825	20.2924	20.4526	20.5968	20.6389	20.6502	20.6514	20.6514	20.6488	20.5871	20.3777	20.1558	(92)
Temperature adjustment													0.0000
adjusted MIT	20.1825	20.2924	20.4526	20.5968	20.6389	20.6502	20.6514	20.6514	20.6488	20.5871	20.3777	20.1558	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9815	0.9666	0.9220	0.7969	0.5958	0.3845	0.2740	0.3069	0.5328	0.8366	0.9602	0.9856	(94)
Ext temp.	504.8658	532.0833	541.1251	492.7957	373.8219	235.8888	159.1987	168.6940	282.7304	417.4129	465.9153	488.5270	(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	736.0147	709.5894	639.0919	518.5388	376.4056	235.9508	159.2017	168.7018	283.5475	448.6964	602.8443	734.6945	(97)
Space heating requirement - total per year (kWh/year)	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													689.6160
Space heating per m ²													(98c) / (4) = 10.7317 (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	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(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)	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(64)
Efficiency of water heater	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	(216)
Fuel for water heating, kWh/month	63.3011	55.8818	59.1104	51.3520	49.3600	44.0213	43.1108	45.0753	45.8501	51.6741	55.6166	62.5280	(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	12.4845	11.2763	12.4845	12.0818	12.4845	12.0818	12.4845	12.4845	12.0818	12.4845	12.0818	12.4845	(231)
Lighting	19.3025	15.4852	13.9427	10.2150	7.8904	6.4465	7.1979	9.3561	12.1526	15.9449	18.0097	19.8390	(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												689.6160	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												345.8550	
Water heating fuel used												626.8816	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)													
mechanical ventilation fans (SFP = 0.7500)												146.9948	(230a)
Total electricity for the above, kWh/year												146.9948	(231)
Electricity for lighting (calculated in Appendix L)												155.7826	(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												1619.2749	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	689.6160	28.4300	196.0578	(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)	626.8816	28.4300	178.2224	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	146.9948	28.4300	41.7906	(249)
Energy for lighting	155.7826	28.4300	44.2890	(250)
Additional standing charges			0.0000	(251)
Total energy cost			460.3599	(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	689.6160	0.1582	109.0789	(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)	626.8816	0.1412	88.4898	(264)
Space and water heating			197.5687	(265)
Pumps, fans and electric keep-hot	146.9948	0.1387	20.3900	(267)
Energy for lighting	155.7826	0.1443	22.4842	(268)
Total CO2, kg/year			240.4429	(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	689.6160	1.5855	1093.4049	(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)	626.8816	1.5220	954.0927	(278)

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Space and water heating			2047.4976 (279)
Pumps, fans and electric keep-hot	146.9948	1.5128	222.3737 (281)
Energy for lighting	155.7826	1.5338	238.9446 (282)
Total Primary energy kWh/year			2508.8159 (286)

SAP 10 EPC IMPROVEMENTS

Plot 08

Current energy efficiency rating: B 84
Current environmental impact rating: A 97

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

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

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

Potential energy efficiency rating: B 84
Potential environmental impact rating: A 97

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 £460	Potential £460	Saving £0
Electricity			
Space heating	£238	£238	£0
Water heating	£178	£178	£0
Lighting	£44	£44	£0
Total cost of fuels	£460	£460	£0
Total cost of uses	£460	£460	£0
Delivered energy	25 kWh/m²	25 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	39 kWh/m²	39 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	64.2600 (1b)	x 2.5000 (2b)	= 160.6500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 160.6500 (5)

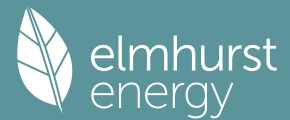
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure Test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		2.8800 (17)
Infiltration rate		0.1440 (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) =	0.1224 (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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	0.1561	0.1530	0.1499	0.1346	0.1316	0.1163	0.1163	0.1132	0.1224	0.1316	0.1377	0.1438 (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	0.2961	0.2930	0.2899	0.2746	0.2716	0.2563	0.2563	0.2532	0.2624	0.2716	0.2777	0.2838 (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			6.3400	1.3258	8.4053			(27)
Window S/W			1.1500	1.3258	1.5246			(27)
Ground Floor			64.2600	0.1100	7.0686	110.0000	7068.6000	(28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502	110.0000	6752.8997	(29a)
Flat Roof	5.5500		5.5500	0.1500	0.8325	9.0000	49.9500	(30)
Total net area of external elements Aum(A, m2)			138.6900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	28.8812		(33)
Main dwelling								
Party Wall			15.7600	0.0000	0.0000	45.0000	709.2000	(32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500	(32)
Party Ceiling			58.7100			30.0000	1761.3000	(32b)
Internal Wall			74.6000			9.0000	671.4000	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 18324.1997 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 285.1572 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0370	0.9509	
P1 Party wall - Ground floor	16.7500	0.0510	0.8542	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.5000	0.0250	0.1375	
E3 Sill	3.2000	0.0220	0.0704	
E4 Jamb	15.3800	0.0170	0.2615	
E5 Ground floor (normal)	25.7000	0.0670	1.7219	
E16 Corner (normal)	5.3600	0.0420	0.2251	
E18 Party wall between dwellings	2.6800	0.0320	0.0858	
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804	
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.0400	0.0664	
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.1500	0.6240	
E14 Flat roof	4.8000	0.1600	0.7680	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.8461 (36)
Point Thermal bridges				0.0000
Total fabric heat loss			(33) + (36) + (36a) =	34.7273 (37)

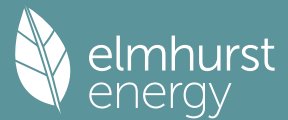
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	15.6955	15.5332	15.3710	14.5599	14.3977	13.5866	13.5866	13.4243	13.9110	14.3977	14.7221	15.0466	(38)
Average = Sum(39)m / 12 =	50.4228	50.2606	50.0983	49.2872	49.1250	48.3139	48.3139	48.1516	48.6383	49.1250	49.4494	49.7739	(39)
HLP	0.7847	0.7821	0.7796	0.7670	0.7645	0.7518	0.7518	0.7493	0.7569	0.7645	0.7695	0.7746	(40)
HLP (average)												0.7664	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0992 (42)
Hot water usage for mixer showers													
59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	59.1881	(42a)
Hot water usage for baths													
25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	25.5872	(42b)
Hot water usage for other uses													
36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	36.1276	(42c)
Average daily hot water use (litres/day)												111.4265	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029	120.9029	(44)
Energy conte	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047	(45)
Energy content (annual)										Total = Sum(45)m =	1850.7701		
Distribution loss (46)m = 0.15 x (45)m	28.7968	25.3390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957	(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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(64)
Total per year (kWh/year) = Sum(64)m =												2168.1011	(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	63.8329	56.1681	59.0137	50.3809	47.8011	41.9509	40.6147	42.8738	44.0539	50.4622	55.2851	62.9438	(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	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.0526	19.5870	15.9292	12.0594	9.0146	7.6105	8.2234	10.6891	14.3468	18.2166	21.2615	22.6656 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	273.9537	276.7965	269.6328	254.3821	235.1308	217.0373	204.9497	202.1070	209.2707	224.5214	243.7727	261.8662 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942 (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)	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668 (71)
Water heating gains (Table 5)	85.7969	83.5835	79.3195	69.9734	64.2488	58.2651	54.5897	57.6260	61.1860	67.8255	76.7848	84.6019 (72)
Total internal gains	473.4809	471.6446	456.5591	428.0925	400.0718	374.5905	359.4404	362.0997	376.4811	402.2411	433.4965	460.8112 (73)

6. Solar gains

[Jan]												Area m2	Solar flux Table 6a		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
North												1.8400	10.6334		0.4000	0.0000	0.7700		6.0262 (74)	
East												4.5000	19.6403		0.4000	0.0000	0.7700		27.2214 (76)	
Southeast												1.1500	36.7938		0.4000	0.0000	0.7700		13.0324 (77)	
Solar gains	46.2799	86.9661	137.6391	196.9674	241.2430	247.6360	235.4299	201.7719	158.4112	101.4298	56.9857	38.5623 (83)								
Total gains	519.7608	558.6107	594.1982	625.0599	641.3147	622.2265	594.8703	563.8716	534.8922	503.6710	490.4823	499.3735 (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	100.9475	101.2733	101.6013	103.2733	103.6144	105.3539	105.3539	105.7089	104.6511	103.6144	102.9345	102.2636
alpha	7.7298	7.7516	7.7734	7.8849	7.9076	8.0236	8.0236	8.0473	7.9767	7.9076	7.8623	7.8176
util living area	0.9907	0.9818	0.9539	0.8655	0.6976	0.4960	0.3573	0.3927	0.6217	0.8940	0.9788	0.9928 (86)
MIT	20.4776	20.5834	20.7449	20.9113	20.9848	20.9991	20.9999	20.9999	20.9951	20.9028	20.6681	20.4554 (87)
Th 2	20.2666	20.2688	20.2710	20.2820	20.2842	20.2953	20.2953	20.2975	20.2908	20.2842	20.2798	20.2754 (88)
util rest of house	0.9877	0.9762	0.9405	0.8340	0.6492	0.4419	0.3001	0.3328	0.5604	0.8608	0.9712	0.9904 (89)
MIT 2	19.6689	19.8032	20.0022	20.2004	20.2732	20.2948	20.2952	20.2974	20.2881	20.1975	19.9195	19.6482 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	20.0712	20.1913	20.3717	20.5541	20.6272	20.6452	20.6458	20.6469	20.6398	20.5484	20.2919	20.0498 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0712	20.1913	20.3717	20.5541	20.6272	20.6452	20.6458	20.6469	20.6398	20.5484	20.2919	20.0498 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9867	0.9755	0.9426	0.8465	0.6727	0.4688	0.3286	0.3626	0.5908	0.8739	0.9714	0.9895 (94)
Useful gains	512.8662	544.9046	560.0650	529.1279	431.4428	291.7074	195.4527	204.4584	316.0244	440.1589	476.4314	494.1459 (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	795.2284	768.5513	694.9497	574.3978	438.5506	292.0665	195.4700	204.4955	318.0846	488.7155	652.3343	788.9059 (97)
Space heating kWh	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (98a)
Space heating requirement - total per year (kWh/year)												880.6824
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	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	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												880.6824
Space heating per m ²										(98c) / (4) =		13.7050 (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	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (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)	210.0774	150.2906	100.3542	32.5943	5.2882	0.0000	0.0000	0.0000	0.0000	36.1261	126.6501	219.3014 (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)

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Water heating													
Water heating requirement	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(64)
Efficiency of water heater												345.8550	(216)
(217)m	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	(217)
Fuel for water heating, kWh/month	63.3011	55.8818	59.1104	51.3520	49.3600	44.0213	43.1108	45.0753	45.8501	51.6741	55.6166	62.5280	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.4845	11.2763	12.4845	12.0818	12.4845	12.0818	12.4845	12.4845	12.0818	12.4845	12.0818	12.4845	(231)
Lighting	19.3025	15.4852	13.9427	10.2150	7.8904	6.4465	7.1979	9.3561	12.1526	15.9449	18.0097	19.8390	(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												880.6824	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												345.8550	
Water heating fuel used												626.8816	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)													
mechanical ventilation fans (SFP = 0.7500)												146.9948	(230a)
Total electricity for the above, kWh/year												146.9948	(231)
Electricity for lighting (calculated in Appendix L)												155.7826	(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												1810.3414	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	880.6824	16.4900	145.2245	(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)	626.8816	16.4900	103.3728	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	146.9948	16.4900	24.2394	(249)
Energy for lighting	155.7826	16.4900	25.6886	(250)
Additional standing charges			0.0000	(251)
Total energy cost			298.5253	(255)

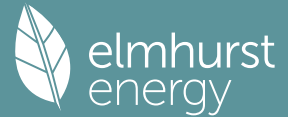
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.9836	(257)
SAP value		84.0557	
SAP rating (Section 12)		84	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	880.6824	0.1576	138.7858	(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)	626.8816	0.1412	88.4898	(264)
Space and water heating			227.2756	(265)
Pumps, fans and electric keep-hot	146.9948	0.1387	20.3900	(267)
Energy for lighting	155.7826	0.1443	22.4842	(268)
Total CO2, kg/year			270.1498	(272)
CO2 emissions per m2			4.2000	(273)
EI value			96.6868	
EI rating			97	(274)
EI band			A	

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1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.2600 (1b)	x 2.5000 (2b)	= 160.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 160.6500 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		2.8800	(17)
Infiltration rate		0.1440	(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) =	0.1224	(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
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
Adj infilt rate	0.1316	0.1285	0.1285	0.1193	0.1224	0.1040	0.1010	0.1010	0.1040	0.1163	0.1163	0.1193
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	0.2716	0.2685	0.2685	0.2593	0.2624	0.2440	0.2410	0.2410	0.2440	0.2563	0.2563	0.2593

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			6.3400	1.3258	8.4053		(27)
Window S/W			1.1500	1.3258	1.5246		(27)
Ground Floor			64.2600	0.1100	7.0686	110.0000	7068.6000 (28a)
EXT Wall	68.8800	7.4900	61.3900	0.1800	11.0502	110.0000	6752.8997 (29a)
Flat Roof	5.5500		5.5500	0.1500	0.8325	9.0000	49.9500 (30)
Total net area of external elements Aum(A, m ²)			138.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.8812		(33)
Main dwelling							
Party Wall			15.7600	0.0000	0.0000	45.0000	709.2000 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Ceiling			58.7100			30.0000	1761.3000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18324.1997 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		285.1572 (35)

List of Thermal Bridges

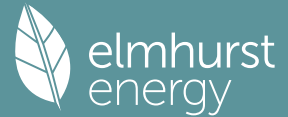
K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	25.7000	0.0370	0.9509
P1 Party wall - Ground floor	16.7500	0.0510	0.8542
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.5000	0.0250	0.1375
E3 Sill	3.2000	0.0220	0.0704
E4 Jamb	15.3800	0.0170	0.2615
E5 Ground floor (normal)	25.7000	0.0670	1.7219
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
P4 Party wall - Roof (insulation at ceiling level)	1.6600	0.0400	0.0664
E24 Eaves (insulation at ceiling level - inverted)	4.1600	0.1500	0.6240
E14 Flat roof	4.8000	0.1600	0.7680

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.8461 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	34.7273 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)		
(38)m	Jan 14.3977	Feb 14.2355
Heat transfer coeff	Mar 14.2355	Apr 13.7488
	May 13.9110	Jun 12.9377
	Jul 12.7754	Aug 12.7754
	Sep 12.9377	Oct 13.5866
	Nov 13.5866	Dec 13.7488
Average = Sum(39)m / 12 =	49.1250	48.9628
	48.9628	48.4761
	48.6383	47.6650
	47.5027	47.5027
	47.6650	48.3139
	48.3139	48.3139
	48.4761	48.3004

HLP	Jan 0.7645	Feb 0.7619	Mar 0.7619	Apr 0.7544	May 0.7569	Jun 0.7418	Jul 0.7392	Aug 0.7392	Sep 0.7418	Oct 0.7518	Nov 0.7518	Dec 0.7544
HLP (average)												0.7516
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0992 (42)
Hot water usage for mixer showers												
59.4158	58.5229	57.2217	54.7323	52.8951	50.8463	49.6817	50.9730	52.3885	54.5883	57.1313	59.1881	(42a)
Hot water usage for baths												
25.6740	25.2927	24.7557	23.7657	23.0244	22.2024	21.7584	22.2916	22.8721	23.7517	24.7621	25.5872	(42b)
Hot water usage for other uses												
36.1276	34.8139	33.5001	32.1864	30.8727	29.5589	29.5589	30.8727	32.1864	33.5001	34.8139	36.1276	(42c)
Average daily hot water use (litres/day)												111.4265 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
121.2174	118.6294	115.4776	110.6844	106.7921	102.6076	100.9991	104.1373	107.4470	111.8401	116.7072	120.9029	(44)
Energy content (annual)	191.9787	168.9267	177.4848	151.5214	143.7627	126.1680	122.1496	128.9437	132.4929	151.7660	166.2708	189.3047 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1850.7701
28.7968	25.3390	26.6227	22.7282	21.5644	18.9252	18.3224	19.3416	19.8739	22.7649	24.9406	28.3957	(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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561 (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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561 (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	63.8329	56.1681	59.0137	50.3809	47.8011	41.9509	40.6147	42.8738	44.0539	50.4622	55.2851	62.9438 (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	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502	125.9502 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.0526	19.5870	15.9292	12.0594	9.0146	7.6105	8.2234	10.6891	14.3468	18.2166	21.2615	22.6656 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	273.9537	276.7965	269.6328	254.3821	235.1308	217.0373	204.9497	202.1070	209.2707	224.5214	243.7727	261.8662 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942	49.6942 (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)	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668	-83.9668 (71)
Water heating gains (Table 5)	85.7969	83.5835	79.3195	69.9734	64.2488	58.2651	54.5897	57.6260	61.1860	67.8255	76.7848	84.6019 (72)
Total internal gains	473.4809	471.6446	456.5591	428.0925	400.0718	374.5905	359.4404	362.0997	376.4811	402.2411	433.4965	460.8112 (73)

6. Solar gains

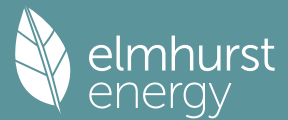
[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				1.8400	9.3942		0.4000		0.0000		0.7700		5.3239 (74)
East				4.5000	17.3606		0.4000		0.0000		0.7700		24.0618 (76)
Southeast				1.1500	32.4665		0.4000		0.0000		0.7700		11.4996 (77)
Solar gains	40.8853	78.8200	130.3512	190.2876	227.3344	238.8976	221.6534	187.5409	154.1575	96.7137	51.7380	34.8419	(83)
Total gains	514.3662	550.4646	586.9103	618.3801	627.4062	613.4880	581.0939	549.6406	530.6386	498.9548	485.2345	495.6532	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	103.6144	103.9577	103.9577	105.0014	104.6511	106.7882	107.1529	107.1529	106.7882	105.3539	105.3539	105.0014
alpha	7.9076	7.9305	7.9305	8.0001	7.9767	8.1192	8.1435	8.1435	8.1192	8.0236	8.0236	8.0001
util living area	0.9866	0.9745	0.9356	0.8181	0.6221	0.4116	0.3025	0.3370	0.5635	0.8594	0.9696	0.9898 (86)
MIT	20.5694	20.6668	20.8127	20.9484	20.9942	20.9998	21.0000	21.0000	20.9979	20.9360	20.7391	20.5424 (87)
Th 2	20.2842	20.2864	20.2864	20.2930	20.2908	20.3041	20.3063	20.3063	20.3041	20.2953	20.2953	20.2930 (88)
util rest of house	0.9823	0.9665	0.9174	0.7799	0.5701	0.3577	0.2458	0.2771	0.5024	0.8189	0.9587	0.9864 (89)
MIT 2	19.7994	19.9218	20.0961	20.2487	20.2871	20.3040	20.3063	20.3063	20.3031	20.2417	20.0198	19.7730 (90)
Living area fraction	20.1825	20.2924	20.4526	20.5968	20.6389	20.6502	20.6514	20.6514	20.6488	20.5871	20.3777	20.1558 (91)
MIT	20.1825	20.2924	20.4526	20.5968	20.6389	20.6502	20.6514	20.6514	20.6488	20.5871	20.3777	20.1558 (92)
Temperature adjustment	20.1825	20.2924	20.4526	20.5968	20.6389	20.6502	20.6514	20.6514	20.6488	20.5871	20.3777	20.1558 (93)
adjusted MIT	20.1825	20.2924	20.4526	20.5968	20.6389	20.6502	20.6514	20.6514	20.6488	20.5871	20.3777	20.1558 (93)

8. Space heating requirement

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9815	0.9666	0.9220	0.7969	0.5958	0.3845	0.2740	0.3069	0.5328	0.8366	0.9602	0.9856	(94)
Useful gains	504.8658	532.0833	541.1251	492.7957	373.8219	235.8888	159.1987	168.6940	282.7304	417.4129	465.9153	488.5270	(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	736.0147	709.5894	639.0919	518.5388	376.4056	235.9508	159.2017	168.7018	283.5475	448.6964	602.8443	734.6945	(97)
Space heating kWh	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(98a)
Space heating requirement - total per year (kWh/year)												689.6160	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	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	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												689.6160	
Space heating per m2										(98c) / (4) =		10.7317	(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	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(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)	171.9747	119.2841	72.8873	18.5350	1.9223	0.0000	0.0000	0.0000	0.0000	23.2749	98.5889	183.1486	(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	218.9301	193.2699	204.4362	177.6034	170.7141	152.2500	149.1010	155.8951	158.5749	178.7174	192.3528	216.2561	(64)	
Efficiency of water heater													345.8550	(216)
(217)m	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	345.8550	(217)	
Fuel for water heating, kWh/month	63.3011	55.8818	59.1104	51.3520	49.3600	44.0213	43.1108	45.0753	45.8501	51.6741	55.6166	62.5280	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	12.4845	11.2763	12.4845	12.0818	12.4845	12.0818	12.4845	12.4845	12.0818	12.4845	12.0818	12.4845	(231)	
Lighting	19.3025	15.4852	13.9427	10.2150	7.8904	6.4465	7.1979	9.3561	12.1526	15.9449	18.0097	19.8390	(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													689.6160	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													345.8550	
Water heating fuel used													626.8816	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)														
mechanical ventilation fans (SFP = 0.7500)													146.9948	(230a)
Total electricity for the above, kWh/year													146.9948	(231)
Electricity for lighting (calculated in Appendix L)													155.7826	(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													1619.2749	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	689.6160	28.4300	196.0578	(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)	626.8816	28.4300	178.2224	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	146.9948	28.4300	41.7906	(249)
Energy for lighting	155.7826	28.4300	44.2890	(250)

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Additional standing charges	0.0000 (251)
Total energy cost	460.3599 (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	689.6160	0.1582	109.0789	(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)	626.8816	0.1412	88.4898	(264)
Space and water heating			197.5687	(265)
Pumps, fans and electric keep-hot	146.9948	0.1387	20.3900	(267)
Energy for lighting	155.7826	0.1443	22.4842	(268)
Total CO2, kg/year			240.4429	(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	689.6160	1.5855	1093.4049	(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)	626.8816	1.5220	954.0927	(278)
Space and water heating			2047.4976	(279)
Pumps, fans and electric keep-hot	146.9948	1.5128	222.3737	(281)
Energy for lighting	155.7826	1.5338	238.9446	(282)
Total Primary energy kWh/year			2508.8159	(286)