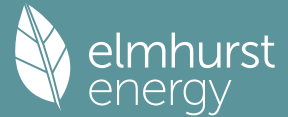


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Plot Reference	Plot 06				Issued on Date	22/12/2025	
Assessment Reference	Plot 06			Plot Type Ref			
Plot Address	Flat 1, 4 Cross Road Manchester, M21 9SX				SAP Version	10.2	
SAP Rating	89 B	DER	3.37	TER	13.43		
Environmental	98 A	% DER < TER				74.91	
CO ₂ Emissions (t/year)	0.15	DFEE	22.45	TFEE	27.42		
Compliance Check	See BREL	% DFEE < TFEE				18.14	
% DPER < TPER	50.50	DPER	35.43	TPER	71.58		
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	50.3000 (1b)	2.5000 (2b)	125.7500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	125.7500 (5)

2. Ventilation rate

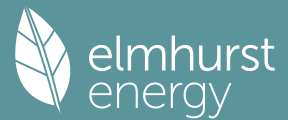
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.8900 (17)
Infiltration rate	0.1445 (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) = 0.1228 (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	0.1566	0.1535	0.1505	0.1351	0.1320	0.1167	0.1167	0.1136	0.1228	0.1320	0.1382	0.1443 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2966	0.2935	0.2905	0.2751	0.2720	0.2567	0.2567	0.2536	0.2628	0.2720	0.2782	0.2843 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.9400	1.3258	2.4394		(27)
Window S/W			5.7300	1.3258	7.5966		(27)
Ground Floor			50.3000	0.1100	5.5330	110.0000	5533.0000 (28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060	110.0000	2387.0001 (29a)
Total net area of external elements Aum(A, m ²)			79.5700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.4750		(33)
Main dwelling							
Party Wall			53.5200	0.0000	0.0000	45.0000	2408.4000 (32)
Corridor			24.6800	0.0000	0.0000	45.0000	1110.6000 (32)
Party Ceiling			50.3000			30.0000	1509.0000 (32b)
Internal Wall			39.0000			9.0000	351.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13299.0001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							264.3936 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	10.9200	0.0370	0.4040
P1 Party wall - Ground floor	29.1800	0.0510	1.4882
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	3.7400	0.0250	0.0935
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	7.5400	0.0170	0.1282
E5 Ground floor (normal)	10.9200	0.0670	0.7316
E16 Corner (normal)	8.0400	0.0420	0.3377
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5377 (36)
Point Thermal Bridges			0.0000 (36a) =
Total fabric heat loss			23.0127 (37) (33) + (36) + (36a) =

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.3082	12.1808	12.0534	11.4163	11.2889	10.6517	10.6517	10.5243	10.9066	11.2889	11.5437	11.7985	(38)
Heat transfer coeff	35.3209	35.1935	35.0661	34.4289	34.3015	33.6644	33.6644	33.5370	33.9192	34.3015	34.5564	34.8112	(39)
Average = Sum(39)m / 12 =												34.3971	
HLP	0.7022	0.6997	0.6971	0.6845	0.6819	0.6693	0.6693	0.6667	0.6743	0.6819	0.6870	0.6921	(40)
HLP (average)												0.6838	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers	52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031	(42a)
Hot water usage for baths	22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	(42b)
Hot water usage for other uses	32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	(42c)
Average daily hot water use (litres/day)												98.8376	(43)
Daily hot water use	107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430	(44)
Energy conte	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167	(45)
Energy content (annual)										Total = Sum(45)m =		1641.6717	
Distribution loss (46)m = 0.15 x (45)m	25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875	(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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1959.0027	(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	56.6210	49.8223	52.3465	44.6890	42.4008	37.2115	36.0262	38.0299	39.0766	44.7609	49.0389	55.8323	(65)

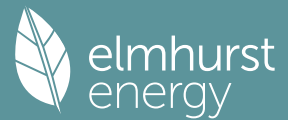
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.8635	87.3132	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	81.4923	78.8635	81.4923	78.8635	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.0131	149.5490	145.6785	137.4388	127.0376	117.2620	110.7313	109.1954	113.0658	121.3055	131.7067	141.4824	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	(71)
Water heating gains (Table 5)	76.1034	74.1404	70.3583	62.0681	56.9903	51.6826	48.4223	51.1155	54.2731	60.1624	68.1095	75.0434	(72)
Total internal gains	351.4641	359.4866	343.3844	329.4833	311.3755	298.9210	286.5012	287.6584	297.3152	308.8156	329.7926	343.8733	(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)
South	5.7300	46.7521	0.4000	0.0000	0.7700	82.5099 (78)

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Solar gains	88.5361	146.6463	191.7006	225.9789	245.0720	240.4285	232.9445	218.6981	203.3401	159.4590	105.2364	76.3199 (83)
Total gains	440.0002	506.1329	535.0850	555.4622	556.4475	539.3495	519.4456	506.3566	500.6553	468.2746	435.0290	420.1932 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	104.5887	104.9674	105.3488	107.2983	107.6969	109.7351	109.7351	110.1521	108.9106	107.6969	106.9027	106.1200
alpha	7.9726	7.9978	8.0233	8.1532	8.1798	8.3157	8.3157	8.3435	8.2607	8.1798	8.1268	8.0747
util living area	0.9735	0.9322	0.8652	0.7306	0.5707	0.3994	0.2852	0.3047	0.4670	0.7404	0.9292	0.9795 (86)
MIT	20.6429	20.7903	20.8993	20.9762	20.9968	20.9999	21.0000	21.0000	20.9995	20.9778	20.8312	20.6162 (87)
Th 2	20.3389	20.3411	20.3434	20.3546	20.3568	20.3681	20.3681	20.3703	20.3636	20.3568	20.3523	20.3478 (88)
util rest of house	0.9668	0.9178	0.8413	0.6968	0.5322	0.3600	0.2442	0.2630	0.4241	0.7010	0.9119	0.9741 (89)
MIT 2	19.9385	20.1171	20.2432	20.3337	20.3545	20.3680	20.3681	20.3703	20.3633	20.3386	20.1780	19.9134 (90)
Living area fraction									fLA = Living area / (4) =			0.5352 (91)
MIT	20.3155	20.4774	20.5943	20.6775	20.6982	20.7062	20.7063	20.7073	20.7038	20.6807	20.5276	20.2896 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3155	20.4774	20.5943	20.6775	20.6982	20.7062	20.7063	20.7073	20.7038	20.6807	20.5276	20.2896 (93)

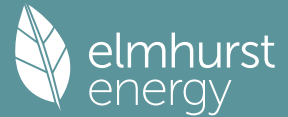
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9665	0.9209	0.8508	0.7140	0.5527	0.3810	0.2661	0.2853	0.4471	0.7212	0.9169	0.9735 (94)
Useful gains	425.2658	466.1197	455.2327	396.5745	307.5405	205.5183	138.2331	144.4510	223.8333	337.7126	398.8704	409.0651 (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	565.6828	548.2222	494.2325	405.4884	308.6534	205.5601	138.2348	144.4539	223.9945	345.7823	464.0091	560.0969 (97)
Space heating kWh	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (98a)
Space heating requirement - total per year (kWh/year)												361.1763
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												361.1763
Space heating per m2										(98c) / (4) =		7.1804 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	56.4494	49.8511	52.7703	45.9303	44.2095	39.4941	38.7227	40.4473	41.0995	46.2410	49.6744	55.7706 (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	9.7723	8.8266	9.7723	9.4571	9.7723	9.4571	9.7723	9.7723	9.4571	9.7723	9.4571	9.7723 (231)
Lighting	14.6001	11.7127	10.5460	7.7264	5.9681	4.8760	5.4443	7.0767	9.1920	12.0604	13.6222	15.0058 (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												361.1763 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												349.4100
Water heating fuel used												560.6602 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	115.0612 (230a)
Total electricity for the above, kWh/year	115.0612 (231)
Electricity for lighting (calculated in Appendix L)	117.8308 (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	1154.7285 (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	361.1763	0.1593	57.5371 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	560.6602	0.1411	79.1169 (264)
Space and water heating			136.6541 (265)
Pumps, fans and electric keep-hot	115.0612	0.1387	15.9604 (267)
Energy for lighting	117.8308	0.1443	17.0066 (268)
Total CO2, kg/year			169.6211 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3700 (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	361.1763	1.5896	574.1367 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	560.6602	1.5218	853.2118 (278)
Space and water heating			1427.3486 (279)
Pumps, fans and electric keep-hot	115.0612	1.5128	174.0647 (281)
Energy for lighting	117.8308	1.5338	180.7328 (282)
Total Primary energy kWh/year			1782.1461 (286)
Dwelling Primary energy Rate (DPER)			35.4300 (287)

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

1. Overall dwelling characteristics

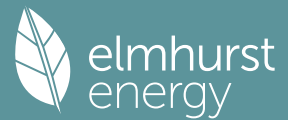
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.3000 (1b)	x 2.5000 (2b)	= 125.7500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.7500 (5)

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) = 0.1590 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4090 (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) = 0.3477 (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	0.4433	0.4346	0.4259	0.3825	0.3738	0.3303	0.3303	0.3216	0.3477	0.3738	0.3911	0.4085 (22b)
Effective ac	0.5983	0.5944	0.5907	0.5731	0.5699	0.5546	0.5546	0.5517	0.5604	0.5699	0.5765	0.5835 (25)

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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			7.5700	1.1450	8.6679			(27)
Ground Floor			50.3000	0.1300	6.5390			(28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060			(29a)
Total net area of external elements Aum(A, m2)			79.5700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.1129			(33)
Main dwelling								
Party Wall			53.5200	0.0000	0.0000			(32)
Corridor			24.6800	0.0000	0.0000			(32)

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

264.3936 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	10.9200	0.0700	0.7644	
P1 Party wall - Ground floor	29.1800	0.0800	2.3344	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	3.7400	0.0500	0.1870	
E3 Sill	1.2500	0.0500	0.0625	
E4 Jamb	7.5400	0.0500	0.3770	
E5 Ground floor (normal)	10.9200	0.1600	1.7472	
E16 Corner (normal)	8.0400	0.0900	0.7236	
E18 Party wall between dwellings	2.6800	0.0600	0.1608	
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824	

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

6.8393 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 25.9522 (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	
24.8262	24.6679	24.5127	23.7838	23.6474	23.0125	23.0125	22.8949	23.2570	23.6474	23.9233	24.2117	24.2117	(38)
Heat transfer coeff	50.7785	50.6202	50.4650	49.7360	49.5996	48.9647	48.9647	48.8471	49.2093	49.5996	49.8755	50.1640	(39)
Average = Sum(39)m / 12 =												49.7353	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0095	1.0064	1.0033	0.9888	0.9861	0.9735	0.9735	0.9711	0.9783	0.9861	0.9916	0.9973	(40)
HLP (average)												0.9888	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

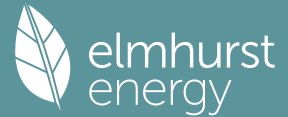
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers													
52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031	52.5031	(42a)
Hot water usage for baths													
22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	22.7111	(42b)
Hot water usage for other uses													
32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	32.0288	(42c)
Average daily hot water use (litres/day)												98.8376	(43)
Daily hot water use													
107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430	107.2430	(44)
Energy conte	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167	(45)
Energy content (annual)										Total = Sum(45)m =		1641.6717	
Distribution loss (46)m = 0.15 x (45)m													
25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875	25.1875	(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	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
216.8835	191.9273	204.0281	179.4949	174.1160	157.0061	154.9444	160.9706	162.6155	181.2140	192.5771	214.5116	214.5116	(62)
WWHRS	-24.0946	-21.3094	-22.3140	-18.4769	-17.2198	-14.7351	-13.8118	-14.6875	-15.2455	-17.9728	-20.3609	-23.6484	(63a)
FV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.7889	170.6179	181.7141	161.0180	156.8963	142.2710	141.1326	146.2831	147.3700	163.2413	172.2162	190.8632	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1966.4125	(64a)
Electric shower(s)												1966	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
93.8969	83.4909	89.6225	80.7625	79.6767	73.2850	73.3021	75.3058	75.1501	82.0368	85.1123	93.1082	93.1082	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
78.8635	87.3132	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
148.0131	149.5490	145.6785	137.4388	127.0376	117.2620	110.7313	109.1954	113.0658	121.3055	131.7067	141.4824	141.4824	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	(71)
Water heating gains (Table 5)													

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Total internal gains	126.2055	124.2424	120.4603	112.1701	107.0923	101.7847	98.5244	101.2175	104.3751	110.2645	118.2116	125.1455 (72)
	404.5661	412.5887	396.4864	382.5853	364.4776	349.0231	336.6032	337.7605	347.4173	361.9176	382.8947	396.9754 (73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d	Gains W
North	1.8400				10.6334		0.6300		0.7000		0.7700	5.9795 (74)
South	5.7300				46.7521		0.6300		0.7000		0.7700	81.8705 (78)
Solar gains	87.8499	145.5098	190.2149	224.2276	243.1727	238.5651	231.1391	217.0032	201.7642	158.2232	104.4208	75.7284 (83)
Total gains	492.4161	558.0984	586.7014	606.8129	607.6502	587.5882	567.7424	554.7637	549.1815	520.1408	487.3155	472.7038 (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	72.7506	72.9782	73.2026	74.2755	74.4798	75.4455	75.4455	75.6271	75.0706	74.4798	74.0677	73.6418
alpha	5.8500	5.8652	5.8802	5.9517	5.9653	6.0297	6.0297	6.0418	6.0047	5.9653	5.9378	5.9095
util living area	0.9821	0.9630	0.9308	0.8526	0.7177	0.5276	0.3788	0.4040	0.6047	0.8528	0.9599	0.9853 (86)
MIT	20.2386	20.4198	20.6117	20.8229	20.9472	20.9930	20.9992	20.9988	20.9843	20.8484	20.5273	20.2106 (87)
Th 2	20.0754	20.0780	20.0806	20.0927	20.0950	20.1055	20.1055	20.1075	20.1014	20.0950	20.0904	20.0856 (88)
util rest of house	0.9768	0.9528	0.9121	0.8168	0.6609	0.4565	0.3022	0.3262	0.5317	0.8106	0.9470	0.9809 (89)
MIT 2	19.2173	19.4434	19.6774	19.9284	20.0551	20.1019	20.1053	20.1071	20.0925	19.9622	19.5889	19.1902 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7639	19.9660	20.1774	20.4071	20.5325	20.5788	20.5837	20.5843	20.5697	20.4365	20.0911	19.7363 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7639	19.9660	20.1774	20.4071	20.5325	20.5788	20.5837	20.5843	20.5697	20.4365	20.0911	19.7363 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9746	0.9513	0.9143	0.8299	0.6891	0.4944	0.3432	0.3679	0.5703	0.8276	0.9470	0.9788 (94)
Useful gains	479.9290	530.9374	536.4204	503.6142	418.7467	290.5327	194.8558	204.0823	313.1918	430.4834	461.4808	462.6990 (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	785.2325	762.6407	690.2299	572.3174	438.0903	292.7499	195.0600	204.3923	318.3715	487.8866	647.9391	779.3619 (97)
Space heating kWh	227.1458	155.7046	114.4342	49.4663	14.3917	0.0000	0.0000	0.0000	0.0000	42.7080	134.2500	235.5972 (98a)
Space heating requirement - total per year (kWh/year)	973.6978											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	227.1458	155.7046	114.4342	49.4663	14.3917	0.0000	0.0000	0.0000	0.0000	42.7080	134.2500	235.5972 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	973.6978											
Space heating per m2	(98c) / (4) = 19.3578 (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	227.1458	155.7046	114.4342	49.4663	14.3917	0.0000	0.0000	0.0000	0.0000	42.7080	134.2500	235.5972 (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)	246.0951	168.6941	123.9807	53.5929	15.5923	0.0000	0.0000	0.0000	0.0000	46.2709	145.4496	255.2516 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.7889	170.6179	181.7141	161.0180	156.8963	142.2710	141.1326	146.2831	147.3700	163.2413	172.2162	190.8632 (64)
Efficiency of water heater	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000 (216)
(217)m	84.4285	83.8552	83.0526	81.7471	80.4854	79.8000	79.8000	79.8000	79.8000	81.5132	83.5075	84.5331 (217)
Fuel for water heating, kWh/month	228.3457	203.4672	218.7940	196.9708	194.9376	178.2845	176.8579	183.3121	184.6741	200.2636	206.2283	225.7851 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	16.3863	13.1457	11.8362	8.6717	6.6983	5.4726	6.1104	7.9425	10.3166	13.5359	15.2888	16.8417 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-13.6309	-20.2773	-30.7412	-36.5291	-41.1420	-39.0690	-38.6181	-35.5985	-30.5608	-24.0636	-15.3659	-11.6660 (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)												

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(233b)m	-4.7814	-10.2931	-20.8967	-32.0302	-42.9765	-43.3895	-42.8539	-35.9756	-25.9837	-14.9022	-6.4436	-3.7620	(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												1054.9272	(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												2397.9212	(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)												132.2467	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-621.5509	(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												3049.5443	(238)

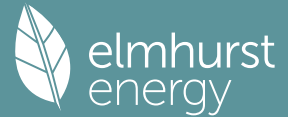
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1054.9272	0.2100	221.5347 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2397.9212	0.2100	503.5634 (264)
Space and water heating			725.0982 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	132.2467	0.1443	19.0873 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-337.2625	0.1335	-45.0088
PV Unit electricity exported	-284.2884	0.1253	-35.6267
Total			-80.6355 (269)
Total CO2, kg/year			675.4792 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.4300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1054.9272	1.1300	1192.0678 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2397.9212	1.1300	2709.6509 (278)
Space and water heating			3901.7187 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	132.2467	1.5338	202.8444 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-337.2625	1.4932	-503.5857
PV Unit electricity exported	-284.2884	0.4600	-130.7670
Total			-634.3527 (283)
Total Primary energy kWh/year			3600.3112 (286)
Target Primary Energy Rate (TPER)			71.5800 (287)

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Plot Reference	Plot 06				Issued on Date	22/12/2025	
Assessment Reference	Plot 06			Plot Type Ref			
Plot Address	Flat 1, 4 Cross Road Manchester, M21 9SX				SAP Version	10.2	
SAP Rating	89 B	DER	3.37	TER	13.43		
Environmental	98 A	% DER < TER				74.91	
CO ₂ Emissions (t/year)	0.15	DFEE	22.45	TFEE	27.42		
Compliance Check	See BREL	% DFEE < TFEE				18.14	
% DPER < TPER	50.50	DPER	35.43	TPER	71.58		
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	50.3000 (1b)	2.5000 (2b)	125.7500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		125.7500 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	125.7500 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1590 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8900 (17)
Infiltration rate	0.3035 (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) = 0.2580 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3290	0.3225	0.3161	0.2838	0.2774	0.2451	0.2451	0.2387	0.2580	0.2774	0.2903	0.3032 (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	0.5541	0.5520	0.5499	0.5403	0.5385	0.5300	0.5300	0.5285	0.5333	0.5385	0.5421	0.5460 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.8400	1.3258	2.4394		(27)
Window S/W			5.7300	1.3258	7.5966		(27)
Ground Floor			50.3000	0.1100	5.5330	110.0000	5533.0000 (28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060	110.0000	2387.0001 (29a)
Total net area of external elements Aum(A, m ²)			79.5700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.4750		(33)
Main dwelling							
Party Wall			53.5200	0.0000	0.0000	45.0000	2408.4000 (32)
Corridor			24.6800	0.0000	0.0000	45.0000	1110.6000 (32)
Party Ceiling			50.3000			30.0000	1509.0000 (32b)
Internal Wall			39.0000			9.0000	351.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13299.0001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							264.3936 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				10.9200	0.0370	0.4040	
P1 Party wall - Ground floor				29.1800	0.0510	1.4882	

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P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000										
E2 Other lintels (including other steel lintels)	3.7400	0.0250	0.0935										
E3 Sill	1.2500	0.0220	0.0275										
E4 Jamb	7.5400	0.0170	0.1282										
E5 Ground floor (normal)	10.9200	0.0670	0.7316										
E16 Corner (normal)	8.0400	0.0420	0.3377										
E18 Party wall between dwellings	2.6800	0.0320	0.0858										
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.5377	(36)
Point Thermal bridges												0.0000	
Total fabric heat loss												(33) + (36) + (36a) =	23.0127 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.9942	22.9070	22.8215	22.4201	22.3450	21.9953	21.9953	21.9306	22.1300	22.3450	22.4969	22.6558	(38)
Average = Sum(39)m / 12 =	46.0068	45.9196	45.8342	45.4327	45.3576	45.0080	45.0080	44.9433	45.1427	45.3576	45.5096	45.6684	(39)
												45.4324	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9146	0.9129	0.9112	0.9032	0.9017	0.8948	0.8948	0.8935	0.8975	0.9017	0.9048	0.9079	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	(42b)
Hot water usage for other uses	32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	(42c)
Average daily hot water use (litres/day)												50.2453	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	86.8166	75.9182	79.4188	67.9398	64.3567	56.4543	55.0501	58.3890	60.2196	68.9098	75.2844	85.7095	(44)
Energy content (annual)												834.4667	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	73.7941	64.5304	67.5060	57.7488	54.7032	47.9862	46.7926	49.6306	51.1867	58.5733	63.9917	72.8530	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	73.7941	64.5304	67.5060	57.7488	54.7032	47.9862	46.7926	49.6306	51.1867	58.5733	63.9917	72.8530	(64)
12Total per year (kWh/year)												709.2967	(64)
Electric shower(s)	42.2080	37.6077	41.0661	39.1889	39.9243	38.0839	39.3533	39.9243	39.1889	41.0661	40.2939	42.2080	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												480.1132	(64a)
Heat gains from water heating, kWh/month	29.0005	25.5345	27.1430	24.2344	23.6569	21.5175	21.5365	22.3887	22.5939	24.9099	26.0714	28.7653	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.8635	87.3132	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	81.4923	78.8635	81.4923	78.8635	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.0131	149.5490	145.6785	137.4388	127.0376	117.2620	110.7313	109.1954	113.0658	121.3055	131.7067	141.4824	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	(71)
Water heating gains (Table 5)	38.9792	37.9978	36.4826	33.6589	31.7968	29.8854	28.9469	30.0924	31.3804	33.4810	36.2103	38.6630	(72)
Total internal gains	314.3399	323.3441	309.5087	301.0741	286.1821	277.1238	267.0257	266.6353	274.4226	282.1341	297.8934	307.4929	(73)

6. Solar gains													
[Jan]													
	Area												
	m2												
	Solar flux												
	Table 6a												
	W/m2												
	Specific data												
	or Table 6b												
	g												
	Specific data												
	or Table 6c												
	FF												
	Access												
	factor												
	Table 6d												
North	1.8400											6.0262	(74)
South	5.7300											82.5099	(78)
Solar gains	88.5361	146.6463	191.7006	225.9789	245.0720	240.4285	232.9445	218.6981	203.3401	159.4590	105.2364	76.3199	(83)
Total gains	402.8759	469.9903	501.2093	527.0530	531.2540	517.5523	499.9702	485.3335	477.7627	441.5931	403.1298	383.8128	(84)

7. Mean internal temperature (heating season)													

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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	80.2960	80.4485	80.5985	81.3107	81.4453	82.0780	82.0780	82.1962	81.8331	81.4453	81.1734	80.8910
alpha	6.3531	6.3632	6.3732	6.4207	6.4297	6.4719	6.4719	6.4797	6.4555	6.4297	6.4116	6.3927
util living area	0.9921	0.9789	0.9535	0.8828	0.7487	0.5509	0.3955	0.4250	0.6370	0.8922	0.9791	0.9940 (86)
MIT	20.2165	20.4062	20.6029	20.8201	20.9488	20.9938	20.9994	20.9990	20.9848	20.8344	20.4935	20.1791 (87)
Th 2	20.1551	20.1565	20.1580	20.1648	20.1660	20.1719	20.1719	20.1730	20.1697	20.1660	20.1635	20.1608 (88)
util rest of house	0.9896	0.9726	0.9400	0.8522	0.6955	0.4822	0.3214	0.3491	0.5666	0.8577	0.9717	0.9921 (89)
MIT 2	19.4520	19.6389	19.8286	20.0313	20.1351	20.1694	20.1718	20.1728	20.1627	20.0485	19.7317	19.4199 (90)
Living area fraction									fLA = Living area /	(4) =		0.5352 (91)
MIT	19.8611	20.0496	20.2430	20.4535	20.5706	20.6106	20.6147	20.6150	20.6026	20.4691	20.1394	19.8262 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8611	20.0496	20.2430	20.4535	20.5706	20.6106	20.6147	20.6150	20.6026	20.4691	20.1394	19.8262 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9885	0.9717	0.9415	0.8635	0.7221	0.5189	0.3611	0.3898	0.6039	0.8712	0.9715	0.9911 (94)
Useful gains	398.2417	456.6752	471.9133	455.0941	383.6235	268.5704	180.5342	189.1735	288.5362	384.7232	391.6386	380.4128 (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	715.9183	695.6628	629.8999	524.9055	402.3479	270.5247	180.6933	189.4338	293.5466	447.6396	593.4163	713.6259 (97)
Space heating kWh	236.3514	160.5996	117.5421	50.2643	13.9310	0.0000	0.0000	0.0000	0.0000	46.8098	145.2799	247.9105 (98a)
Space heating requirement - total per year (kWh/year)												1018.6887
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	236.3514	160.5996	117.5421	50.2643	13.9310	0.0000	0.0000	0.0000	0.0000	46.8098	145.2799	247.9105 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1018.6887
Space heating per m2										(98c) / (4) =		20.2523 (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	423.0753	333.0593	341.5688	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9592	0.9850	0.9803	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	405.8285	328.0520	334.8524	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	573.6952	554.8174	539.2545	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	120.8640	168.7134	152.0752	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area /	(4) =		1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	30.2160	42.1784	38.0188	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												110.4132 (107)
Energy for space heating												20.2523 (99)
Energy for space cooling												2.1951 (108)
Total												22.4474 (109)
Fabric Energy Efficiency (DFEE)												22.4 (109)

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

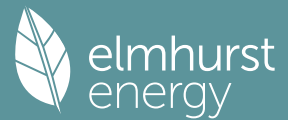
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.3000 (1b)	x 2.5000 (2b)	= 125.7500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.7500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
	Air changes per hour
Infiltration due to chimneys, flues and fans	20.0000 / (5) = 0.1590 (8)
Pressure test	Yes

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Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
5.0000 (17)
0.4090 (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) = 0.3477 (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	0.4433	0.4346	0.4259	0.3825	0.3738	0.3303	0.3303	0.3216	0.3477	0.3738	0.3911	0.4085	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5983	0.5944	0.5907	0.5731	0.5699	0.5546	0.5546	0.5517	0.5604	0.5699	0.5765	0.5835	(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			7.5700	1.1450	8.6679			(27)
Ground Floor			50.3000	0.1300	6.5390			(28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060			(29a)
Total net area of external elements Aum(A, m2)			79.5700					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 19.1129			(33)
Main dwelling								
Party Wall			53.5200	0.0000	0.0000			(32)
Corridor			24.6800	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 264.3936 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	10.9200	0.0700	0.7644	
P1 Party wall - Ground floor	29.1800	0.0800	2.3344	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	3.7400	0.0500	0.1870	
E3 Sill	1.2500	0.0500	0.0625	
E4 Jamb	7.5400	0.0500	0.3770	
E5 Ground floor (normal)	10.9200	0.1600	1.7472	
E16 Corner (normal)	8.0400	0.0900	0.7236	
E18 Party wall between dwellings	2.6800	0.0600	0.1608	
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.8393 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 25.9522 (37)

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

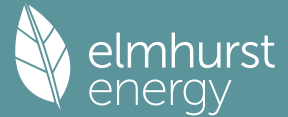
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	24.8262	24.6679	24.5127	23.7838	23.6474	23.0125	23.0125	22.8949	23.2570	23.6474	23.9233	24.2117	(38)
Heat transfer coeff	50.7785	50.6202	50.4650	49.7360	49.5996	48.9647	48.9647	48.8471	49.2093	49.5996	49.8755	50.1640	(39)
Average = Sum(39)m / 12 =												49.7353	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0095	1.0064	1.0033	0.9888	0.9861	0.9735	0.9735	0.9711	0.9783	0.9861	0.9916	0.9973	(40)
HLP (average)												0.9888	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers													(42a)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Hot water usage for baths	22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	(42b)
Hot water usage for other uses	32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	(42c)
Average daily hot water use (litres/day)												50.2453	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
54.8169 53.3138 51.6725 49.6291 47.8064 45.9121 45.5181 47.1560 48.8360 50.7814 52.8429 54.7399													(44)
Energy conte 86.8166 75.9182 79.4188 67.9398 64.3567 56.4543 55.0501 58.3890 60.2196 68.9098 75.2844 85.7095													(45)
Energy content (annual)													
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	73.7941 64.5304 67.5060 57.7488 54.7032 47.9862 46.7926 49.6306 51.1867 58.5733 63.9917 72.8530												(62)
WWHRS	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												(63a)
PV diverter	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												(63b)
Solar input	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												(63c)
FGHRS	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												(63d)
Output from w/h	73.7941 64.5304 67.5060 57.7488 54.7032 47.9862 46.7926 49.6306 51.1867 58.5733 63.9917 72.8530												(64)
Total per year (kWh/year) = Sum(64)m =												709.2967	(64)
Electric shower(s)	42.2080 37.6077 41.0661 39.1889 39.9243 38.0839 39.3533 39.9243 39.1889 41.0661 40.2939 42.2080												(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												480.1132	(64a)
Heat gains from water heating, kWh/month	29.0005 25.5345 27.1430 24.2344 23.6569 21.5175 21.5365 22.3887 22.5939 24.9099 26.0714 28.7653												(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	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.8635	87.3132	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	81.4923	78.8635	81.4923	78.8635	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.0131	149.5490	145.6785	137.4388	127.0376	117.2620	110.7313	109.1954	113.0658	121.3055	131.7067	141.4824	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	(71)
Water heating gains (Table 5)	38.9792	37.9978	36.4826	33.6589	31.7968	29.8854	28.9469	30.0924	31.3804	33.4810	36.2103	38.6630	(72)
Total internal gains	314.3399	323.3441	309.5087	301.0741	286.1821	277.1238	267.0257	266.6353	274.4226	282.1341	297.8934	307.4929	(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)	
South					5.7300	46.7521	0.6300	0.7000	0.7700			81.8705 (78)	
Solar gains	87.8499	145.5098	190.2149	224.2276	243.1727	238.5651	231.1391	217.0032	201.7642	158.2232	104.4208	75.7284 (83)	
Total gains	402.1898	468.8538	499.7236	525.3017	529.3547	515.6890	498.1649	483.6385	476.1868	440.3573	402.3142	383.2213 (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	72.7506	72.9782	73.2026	74.2755	74.4798	75.4455	75.4455	75.6271	75.0706	74.4798	74.0677	73.6418	
alpha	5.8500	5.8652	5.8802	5.9517	5.9653	6.0297	6.0297	6.0418	6.0047	5.9653	5.9378	5.9095	
util living area	0.9933	0.9830	0.9637	0.9074	0.7914	0.5955	0.4309	0.4622	0.6834	0.9147	0.9830	0.9948	(86)
MIT	20.0628	20.2597	20.4767	20.7376	20.9112	20.9868	20.9984	20.9975	20.9704	20.7628	20.3758	20.0335	(87)
Th 2	20.0754	20.0780	20.0806	20.0927	20.0950	20.1055	20.1055	20.1075	20.1014	20.0950	20.0904	20.0856	(88)
util rest of house	0.9911	0.9777	0.9523	0.8798	0.7372	0.5177	0.3442	0.3738	0.6063	0.8835	0.9768	0.9931	(89)
MIT 2	19.2345	19.4301	19.6424	19.8944	20.0401	20.1000	20.1051	20.1068	20.0876	19.9232	19.5560	19.2138	(90)
Living area fraction									fLA = Living area / (4) =			0.5352	(91)
MIT	19.6778	19.8741	20.0889	20.3457	20.5063	20.5746	20.5832	20.5835	20.5600	20.3725	19.9947	19.6525	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6778	19.8741	20.0889	20.3457	20.5063	20.5746	20.5832	20.5835	20.5600	20.3725	19.9947	19.6525	(93)

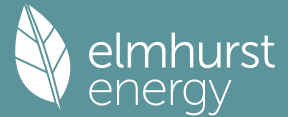
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9899	0.9763	0.9524	0.8882	0.7630	0.5591	0.3907	0.4212	0.6467	0.8941	0.9760	0.9921	(94)
Ext temp.	398.1243	457.7572	475.9443	466.5614	403.8998	288.3177	194.6187	203.7039	307.9721	393.7283	392.6469	380.1826	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	780.8613	757.9919	685.7648	569.2611	436.7896	292.5450	195.0349	204.3532	317.8933	484.7140	643.1308	775.1591	(97)
Space heating requirement - total per year (kWh/year)	284.7563	201.7578	156.1065	73.9437	24.4700	0.0000	0.0000	0.0000	0.0000	67.6934	180.3484	293.8625	(98a)
Solar heating kWh												1282.9385	
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating kWh	284.7563	201.7578	156.1065	73.9437	24.4700	0.0000	0.0000	0.0000	0.0000	67.6934	180.3484	293.8625	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1282.9385	
Space heating per m ²										(98c) / (4) =		25.5057	(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	460.2682	362.3388	371.2381	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9325	0.9715	0.9642	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	429.1981	352.0254	357.9612	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	571.5173	552.7073	537.2735	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	102.4698	149.3073	133.4083	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	25.6174	37.3268	33.3521	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												96.2964	(107)
Energy for space heating												25.5057	(99)
Energy for space cooling												1.9144	(108)
Total												27.4202	(109)
Fabric Energy Efficiency (TFEE)												27.4	(109)

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Plot Reference	Plot 06				Issued on Date	22/12/2025	
Assessment Reference	Plot 06			Plot Type Ref			
Plot Address	Flat 1, 4 Cross Road Manchester, M21 9SX				SAP Version	10.2	
SAP Rating	89 B	DER	3.37	TER	13.43		
Environmental	98 A	% DER < TER				74.91	
CO ₂ Emissions (t/year)	0.15	DFEE	22.45	TFEE	27.42		
Compliance Check	See BREL	% DFEE < TFEE				18.14	
% DPER < TPER	50.50	DPER	35.43	TPER	71.58		
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	50.3000 (1b)	2.5000 (2b)	125.7500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	125.7500 (5)

2. Ventilation rate

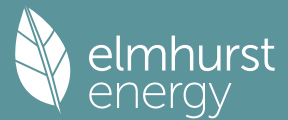
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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	2.8900	(17)
Infiltration rate	0.1445	(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) =	0.1228 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Balanced mechanical ventilation with heat recovery	0.1566	0.1535	0.1505	0.1351	0.1320	0.1167	0.1167	0.1136	0.1228	0.1320	0.1382	0.1443 (22b)
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2966	0.2935	0.2905	0.2751	0.2720	0.2567	0.2567	0.2536	0.2628	0.2720	0.2782	0.2843 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.9400	1.3258	2.4394		(27)
Window S/W			5.7300	1.3258	7.5966		(27)
Ground Floor			50.3000	0.1100	5.5330	110.0000	5533.0000 (28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060	110.0000	2387.0001 (29a)
Total net area of external elements Aum(A, m ²)			79.5700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.4750		(33)
Main dwelling							
Party Wall			53.5200	0.0000	0.0000	45.0000	2408.4000 (32)
Corridor			24.6800	0.0000	0.0000	45.0000	1110.6000 (32)
Party Ceiling			50.3000			30.0000	1509.0000 (32b)
Internal Wall			39.0000			9.0000	351.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13299.0001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							264.3936 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	10.9200	0.0370	0.4040
P1 Party wall - Ground floor	29.1800	0.0510	1.4882
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	3.7400	0.0250	0.0935
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	7.5400	0.0170	0.1282
E5 Ground floor (normal)	10.9200	0.0670	0.7316
E16 Corner (normal)	8.0400	0.0420	0.3377
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5377 (36)
Point Thermal Bridges			0.0000 (36a) =
Total fabric heat loss			23.0127 (37) (33) + (36) + (36a) =

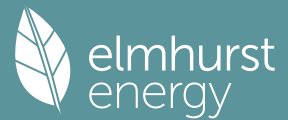
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.3082	12.1808	12.0534	11.4163	11.2889	10.6517	10.6517	10.5243	10.9066	11.2889	11.5437	11.7985	(38)
Heat transfer coeff	35.3209	35.1935	35.0661	34.4289	34.3015	33.6644	33.6644	33.5370	33.9192	34.3015	34.5564	34.8112	(39)
Average = Sum(39)m / 12 =												34.3971	
HLP	0.7022	0.6997	0.6971	0.6845	0.6819	0.6693	0.6693	0.6667	0.6743	0.6819	0.6870	0.6921	(40)
HLP (average)												0.6838	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6989 (42)
Hot water usage for mixer showers	52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031 (42a)
Hot water usage for baths	22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111 (42b)
Hot water usage for other uses	32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288 (42c)
Average daily hot water use (litres/day)												98.8376 (43)
Daily hot water use	107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430 (44)
Energy conte	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167 (45)
Energy content (annual)										Total = Sum(45)m =		1641.6717
Distribution loss (46)m = 0.15 x (45)m	25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875 (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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1959.0027 (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	56.6210	49.8223	52.3465	44.6890	42.4008	37.2115	36.0262	38.0299	39.0766	44.7609	49.0389	55.8323 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.8635	87.3132	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	81.4923	78.8635	81.4923	78.8635 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.0131	149.5490	145.6785	137.4388	127.0376	117.2620	110.7313	109.1954	113.0658	121.3055	131.7067	141.4824 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575 (71)
Water heating gains (Table 5)	76.1034	74.1404	70.3583	62.0681	56.9903	51.6826	48.4223	51.1155	54.2731	60.1624	68.1095	75.0434 (72)
Total internal gains	351.4641	359.4866	343.3844	329.4833	311.3755	298.9210	286.5012	287.6584	297.3152	308.8156	329.7926	343.8733 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
North	1.8400	10.6334	0.4000	0.0000	0.7700	6.0262 (74)						
South	5.7300	46.7521	0.4000	0.0000	0.7700	82.5099 (78)						

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Solar gains	88.5361	146.6463	191.7006	225.9789	245.0720	240.4285	232.9445	218.6981	203.3401	159.4590	105.2364	76.3199 (83)
Total gains	440.0002	506.1329	535.0850	555.4622	556.4475	539.3495	519.4456	506.3566	500.6553	468.2746	435.0290	420.1932 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	104.5887	104.9674	105.3488	107.2983	107.6969	109.7351	109.7351	110.1521	108.9106	107.6969	106.9027	106.1200
alpha	7.9726	7.9978	8.0233	8.1532	8.1798	8.3157	8.3157	8.3435	8.2607	8.1798	8.1268	8.0747
util living area	0.9735	0.9322	0.8652	0.7306	0.5707	0.3994	0.2852	0.3047	0.4670	0.7404	0.9292	0.9795 (86)
MIT	20.6429	20.7903	20.8993	20.9762	20.9968	20.9999	21.0000	21.0000	20.9995	20.9778	20.8312	20.6162 (87)
Th 2	20.3389	20.3411	20.3434	20.3546	20.3568	20.3681	20.3681	20.3703	20.3636	20.3568	20.3523	20.3478 (88)
util rest of house	0.9668	0.9178	0.8413	0.6968	0.5322	0.3600	0.2442	0.2630	0.4241	0.7010	0.9119	0.9741 (89)
MIT 2	19.9385	20.1171	20.2432	20.3337	20.3545	20.3680	20.3681	20.3703	20.3633	20.3386	20.1780	19.9134 (90)
Living area fraction									fLA = Living area / (4) =			0.5352 (91)
MIT	20.3155	20.4774	20.5943	20.6775	20.6982	20.7062	20.7063	20.7073	20.7038	20.6807	20.5276	20.2896 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3155	20.4774	20.5943	20.6775	20.6982	20.7062	20.7063	20.7073	20.7038	20.6807	20.5276	20.2896 (93)

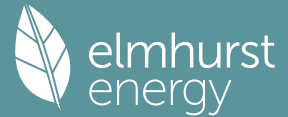
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9665	0.9209	0.8508	0.7140	0.5527	0.3810	0.2661	0.2853	0.4471	0.7212	0.9169	0.9735 (94)
Useful gains	425.2658	466.1197	455.2327	396.5745	307.5405	205.5183	138.2331	144.4510	223.8333	337.7126	398.8704	409.0651 (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	565.6828	548.2222	494.2325	405.4884	308.6534	205.5601	138.2348	144.4539	223.9945	345.7823	464.0091	560.0969 (97)
Space heating kWh	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (98a)
Space heating requirement - total per year (kWh/year)												361.1763
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												361.1763
Space heating per m2										(98c) / (4) =		7.1804 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	104.4702	55.1729	29.0158	6.4179	0.8280	0.0000	0.0000	0.0000	0.0000	6.0039	46.8999	112.3677 (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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	56.4494	49.8511	52.7703	45.9303	44.2095	39.4941	38.7227	40.4473	41.0995	46.2410	49.6744	55.7706 (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	9.7723	8.8266	9.7723	9.4571	9.7723	9.4571	9.7723	9.7723	9.4571	9.7723	9.4571	9.7723 (231)
Lighting	14.6001	11.7127	10.5460	7.7264	5.9681	4.8760	5.4443	7.0767	9.1920	12.0604	13.6222	15.0058 (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												361.1763 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												349.4100
Water heating fuel used												560.6602 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	115.0612 (230a)
Total electricity for the above, kWh/year	115.0612 (231)
Electricity for lighting (calculated in Appendix L)	117.8308 (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	1154.7285 (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	361.1763	0.1593	57.5371 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	560.6602	0.1411	79.1169 (264)
Space and water heating			136.6541 (265)
Pumps, fans and electric keep-hot	115.0612	0.1387	15.9604 (267)
Energy for lighting	117.8308	0.1443	17.0066 (268)
Total CO2, kg/year			169.6211 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3700 (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	361.1763	1.5896	574.1367 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	560.6602	1.5218	853.2118 (278)
Space and water heating			1427.3486 (279)
Pumps, fans and electric keep-hot	115.0612	1.5128	174.0647 (281)
Energy for lighting	117.8308	1.5338	180.7328 (282)
Total Primary energy kWh/year			1782.1461 (286)
Dwelling Primary energy Rate (DPER)			35.4300 (287)

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

1. Overall dwelling characteristics

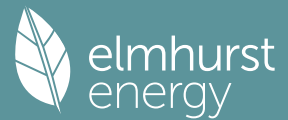
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.3000 (1b)	x 2.5000 (2b)	= 125.7500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.7500 (5)

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) = 0.1590 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4090 (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) = 0.3477 (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	0.4433	0.4346	0.4259	0.3825	0.3738	0.3303	0.3303	0.3216	0.3477	0.3738	0.3911	0.4085 (22b)
Effective ac	0.5983	0.5944	0.5907	0.5731	0.5699	0.5546	0.5546	0.5517	0.5604	0.5699	0.5765	0.5835 (25)

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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			7.5700	1.1450	8.6679			(27)
Ground Floor			50.3000	0.1300	6.5390			(28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060			(29a)
Total net area of external elements Aum(A, m2)			79.5700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.1129			(33)
Main dwelling								
Party Wall			53.5200	0.0000	0.0000			(32)
Corridor			24.6800	0.0000	0.0000			(32)

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

264.3936 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	10.9200	0.0700	0.7644	
P1 Party wall - Ground floor	29.1800	0.0800	2.3344	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	3.7400	0.0500	0.1870	
E3 Sill	1.2500	0.0500	0.0625	
E4 Jamb	7.5400	0.0500	0.3770	
E5 Ground floor (normal)	10.9200	0.1600	1.7472	
E16 Corner (normal)	8.0400	0.0900	0.7236	
E18 Party wall between dwellings	2.6800	0.0600	0.1608	
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824	

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

6.8393 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 25.9522 (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	
24.8262	24.6679	24.5127	23.7838	23.6474	23.0125	23.0125	22.8949	23.2570	23.6474	23.9233	24.2117	24.2117	(38)
Heat transfer coeff	50.7785	50.6202	50.4650	49.7360	49.5996	48.9647	48.9647	48.8471	49.2093	49.5996	49.8755	50.1640	(39)
Average = Sum(39)m / 12 =												49.7353	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0095	1.0064	1.0033	0.9888	0.9861	0.9735	0.9735	0.9711	0.9783	0.9861	0.9916	0.9973	(40)
HLP (average)												0.9888	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

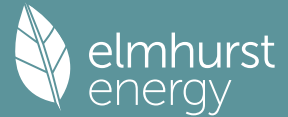
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers													
52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031	52.5031	(42a)
Hot water usage for baths													
22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	22.7111	(42b)
Hot water usage for other uses													
32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	32.0288	(42c)
Average daily hot water use (litres/day)												98.8376	(43)
Daily hot water use													
107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430	107.2430	(44)
Energy conte	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167	(45)
Energy content (annual)										Total = Sum(45)m =		1641.6717	
Distribution loss (46)m = 0.15 x (45)m													
25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875	25.1875	(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	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
216.8835	191.9273	204.0281	179.4949	174.1160	157.0061	154.9444	160.9706	162.6155	181.2140	192.5771	214.5116	214.5116	(62)
WWHRS	-24.0946	-21.3094	-22.3140	-18.4769	-17.2198	-14.7351	-13.8118	-14.6875	-15.2455	-17.9728	-20.3609	-23.6484	(63a)
FV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	192.7889	170.6179	181.7141	161.0180	156.8963	142.2710	141.1326	146.2831	147.3700	163.2413	172.2162	190.8632	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1966.4125	(64a)
Electric shower(s)												1966	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
93.8969	83.4909	89.6225	80.7625	79.6767	73.2850	73.3021	75.3058	75.1501	82.0368	85.1123	93.1082	93.1082	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	84.9468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
78.8635	87.3132	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	81.4923	78.8635	81.4923	78.8635	78.8635	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
148.0131	149.5490	145.6785	137.4388	127.0376	117.2620	110.7313	109.1954	113.0658	121.3055	131.7067	141.4824	141.4824	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	31.4947	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	(71)
Water heating gains (Table 5)													

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Total internal gains	126.2055	124.2424	120.4603	112.1701	107.0923	101.7847	98.5244	101.2175	104.3751	110.2645	118.2116	125.1455 (72)
	404.5661	412.5887	396.4864	382.5853	364.4776	349.0231	336.6032	337.7605	347.4173	361.9176	382.8947	396.9754 (73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d	Gains W
North	1.8400				10.6334		0.6300		0.7000		0.7700	5.9795 (74)
South	5.7300				46.7521		0.6300		0.7000		0.7700	81.8705 (78)
Solar gains	87.8499	145.5098	190.2149	224.2276	243.1727	238.5651	231.1391	217.0032	201.7642	158.2232	104.4208	75.7284 (83)
Total gains	492.4161	558.0984	586.7014	606.8129	607.6502	587.5882	567.7424	554.7637	549.1815	520.1408	487.3155	472.7038 (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	72.7506	72.9782	73.2026	74.2755	74.4798	75.4455	75.4455	75.6271	75.0706	74.4798	74.0677	73.6418
alpha	5.8500	5.8652	5.8802	5.9517	5.9653	6.0297	6.0297	6.0418	6.0047	5.9653	5.9378	5.9095
util living area	0.9821	0.9630	0.9308	0.8526	0.7177	0.5276	0.3788	0.4040	0.6047	0.8528	0.9599	0.9853 (86)
MIT	20.2386	20.4198	20.6117	20.8229	20.9472	20.9930	20.9992	20.9988	20.9843	20.8484	20.5273	20.2106 (87)
Th 2	20.0754	20.0780	20.0806	20.0927	20.0950	20.1055	20.1055	20.1075	20.1014	20.0950	20.0904	20.0856 (88)
util rest of house	0.9768	0.9528	0.9121	0.8168	0.6609	0.4565	0.3022	0.3262	0.5317	0.8106	0.9470	0.9809 (89)
MIT 2	19.2173	19.4434	19.6774	19.9284	20.0551	20.1019	20.1053	20.1071	20.0925	19.9622	19.5889	19.1902 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7639	19.9660	20.1774	20.4071	20.5325	20.5788	20.5837	20.5843	20.5697	20.4365	20.0911	19.7363 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7639	19.9660	20.1774	20.4071	20.5325	20.5788	20.5837	20.5843	20.5697	20.4365	20.0911	19.7363 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9746	0.9513	0.9143	0.8299	0.6891	0.4944	0.3432	0.3679	0.5703	0.8276	0.9470	0.9788 (94)
Useful gains	479.9290	530.9374	536.4204	503.6142	418.7467	290.5327	194.8558	204.0823	313.1918	430.4834	461.4808	462.6990 (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	785.2325	762.6407	690.2299	572.3174	438.0903	292.7499	195.0600	204.3923	318.3715	487.8866	647.9391	779.3619 (97)
Space heating kWh	227.1458	155.7046	114.4342	49.4663	14.3917	0.0000	0.0000	0.0000	0.0000	42.7080	134.2500	235.5972 (98a)
Space heating requirement - total per year (kWh/year)	973.6978											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	227.1458	155.7046	114.4342	49.4663	14.3917	0.0000	0.0000	0.0000	0.0000	42.7080	134.2500	235.5972 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	973.6978											
Space heating per m2	(98c) / (4) = 19.3578 (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	227.1458	155.7046	114.4342	49.4663	14.3917	0.0000	0.0000	0.0000	0.0000	42.7080	134.2500	235.5972 (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)	246.0951	168.6941	123.9807	53.5929	15.5923	0.0000	0.0000	0.0000	0.0000	46.2709	145.4496	255.2516 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	192.7889	170.6179	181.7141	161.0180	156.8963	142.2710	141.1326	146.2831	147.3700	163.2413	172.2162	190.8632 (64)
Efficiency of water heater	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000 (216)
(217)m	84.4285	83.8552	83.0526	81.7471	80.4854	79.8000	79.8000	79.8000	79.8000	81.5132	83.5075	84.5331 (217)
Fuel for water heating, kWh/month	228.3457	203.4672	218.7940	196.9708	194.9376	178.2845	176.8579	183.3121	184.6741	200.2636	206.2283	225.7851 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	16.3863	13.1457	11.8362	8.6717	6.6983	5.4726	6.1104	7.9425	10.3166	13.5359	15.2888	16.8417 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-13.6309	-20.2773	-30.7412	-36.5291	-41.1420	-39.0690	-38.6181	-35.5985	-30.5608	-24.0636	-15.3659	-11.6660 (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)												

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(233b)m	-4.7814	-10.2931	-20.8967	-32.0302	-42.9765	-43.3895	-42.8539	-35.9756	-25.9837	-14.9022	-6.4436	-3.7620	(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												1054.9272	(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												2397.9212	(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)												132.2467	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-621.5509	(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												3049.5443	(238)

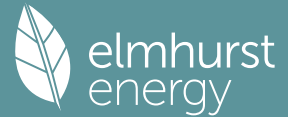
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1054.9272	0.2100	221.5347 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2397.9212	0.2100	503.5634 (264)
Space and water heating			725.0982 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	132.2467	0.1443	19.0873 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-337.2625	0.1335	-45.0088
PV Unit electricity exported	-284.2884	0.1253	-35.6267
Total			-80.6355 (269)
Total CO2, kg/year			675.4792 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.4300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1054.9272	1.1300	1192.0678 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2397.9212	1.1300	2709.6509 (278)
Space and water heating			3901.7187 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	132.2467	1.5338	202.8444 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-337.2625	1.4932	-503.5857
PV Unit electricity exported	-284.2884	0.4600	-130.7670
Total			-634.3527 (283)
Total Primary energy kWh/year			3600.3112 (286)
Target Primary Energy Rate (TPER)			71.5800 (287)

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Plot Reference	Plot 06				Issued on Date	22/12/2025	
Assessment Reference	Plot 06			Plot Type Ref			
Plot Address	Flat 1, 4 Cross Road Manchester, M21 9SX				SAP Version	10.2	
SAP Rating	89 B	DER	3.37	TER	13.43		
Environmental	98 A	% DER < TER				74.91	
CO ₂ Emissions (t/year)	0.15	DFEE	22.45	TFEE	27.42		
Compliance Check	See BREL	% DFEE < TFEE				18.14	
% DPER < TPER	50.50	DPER	35.43	TPER	71.58		
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	50.3000 (1b)	2.5000 (2b)	125.7500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	125.7500 (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	2.8900	(17)
Infiltration rate	0.1445	(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) =	0.1228 (21)

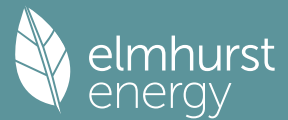
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1566	0.1535	0.1505	0.1351	0.1320	0.1167	0.1167	0.1136	0.1228	0.1320	0.1382	0.1443 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2966	0.2935	0.2905	0.2751	0.2720	0.2567	0.2567	0.2536	0.2628	0.2720	0.2782	0.2843 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.8400	1.3258	2.4394		(27)
Window S/W			5.7300	1.3258	7.5966		(27)
Ground Floor			50.3000	0.1100	5.5330	110.0000	5533.0000 (28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060	110.0000	2387.0001 (29a)
Total net area of external elements Aum(A, m ²)			79.5700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.4750		(33)
Main dwelling							
Party Wall			53.5200	0.0000	0.0000	45.0000	2408.4000 (32)
Corridor			24.6800	0.0000	0.0000	45.0000	1110.6000 (32)
Party Ceiling			50.3000			30.0000	1509.0000 (32b)
Internal Wall			39.0000			9.0000	351.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	13299.0001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		264.3936 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	10.9200	0.0370	0.4040
P1 Party wall - Ground floor	29.1800	0.0510	1.4882
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	3.7400	0.0250	0.0935
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	7.5400	0.0170	0.1282
E5 Ground floor (normal)	10.9200	0.0670	0.7316
E16 Corner (normal)	8.0400	0.0420	0.3377
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5377 (36)
Point Thermal Bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	23.0127 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.3082	12.1808	12.0534	11.4163	11.2889	10.6517	10.6517	10.5243	10.9066	11.2889	11.5437	11.7985	(38)
Heat transfer coeff	35.3209	35.1935	35.0661	34.4289	34.3015	33.6644	33.6644	33.5370	33.9192	34.3015	34.5564	34.8112	(39)
Average = Sum(39)m / 12 =												34.3971	
HLP	0.7022	0.6997	0.6971	0.6845	0.6819	0.6693	0.6693	0.6667	0.6743	0.6819	0.6870	0.6921	(40)
HLP (average)												0.6838	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers	52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031	(42a)
Hot water usage for baths	22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	(42b)
Hot water usage for other uses	32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	(42c)
Average daily hot water use (litres/day)												98.8376	(43)
Daily hot water use	107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430	(44)
Energy conte	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167	(45)
Energy content (annual)										Total = Sum(45)m =		1641.6717	
Distribution loss (46)m = 0.15 x (45)m	25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875	(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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(64)
										Total per year (kWh/year) = Sum(64)m =		1959.0027	(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	56.6210	49.8223	52.3465	44.6890	42.4008	37.2115	36.0262	38.0299	39.0766	44.7609	49.0389	55.8323	(65)

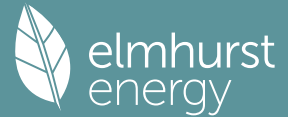
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.6802	14.8152	12.0485	9.1215	6.8184	5.7564	6.2200	8.0850	10.8517	13.7787	16.0817	17.1438	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.9150	223.2075	217.4307	205.1326	189.6084	175.0179	165.2705	162.9781	168.7549	181.0530	196.5772	211.1677	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	(71)
Water heating gains (Table 5)	76.1034	74.1404	70.3583	62.0681	56.9903	51.6826	48.4223	51.1155	54.2731	60.1624	68.1095	75.0434	(72)
Total internal gains	394.5699	393.0343	380.7087	357.1934	334.2884	313.3282	300.7841	303.0499	314.7509	335.8654	361.6397	384.2261	(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)	
South				5.7300	46.7521	0.4000	0.0000			0.7700	82.5099 (78)	
Solar gains	88.5361	146.6463	191.7006	225.9789	245.0720	240.4285	232.9445	218.6981	203.3401	159.4590	105.2364	76.3199 (83)

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Total gains 483.1060 539.6806 572.4093 583.1723 579.3604 553.7567 533.7286 521.7480 518.0910 495.3244 466.8762 460.5460 (84)

7. Mean internal temperature (heating season)

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

21.0000 (85)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	104.5887	104.9674	105.3488	107.2983	107.6969	109.7351	109.7351	110.1521	108.9106	107.6969	106.9027	106.1200
alpha	7.9726	7.9978	8.0233	8.1532	8.1798	8.3157	8.3157	8.3435	8.2607	8.1798	8.1268	8.0747
util living area	0.9558	0.9092	0.8299	0.7006	0.5487	0.3890	0.2775	0.2957	0.4514	0.7057	0.9027	0.9651 (86)
MIT	20.7168	20.8321	20.9260	20.9822	20.9976	20.9999	21.0000	21.0000	20.9996	20.9841	20.8694	20.6891 (87)
Th 2	20.3389	20.3411	20.3434	20.3546	20.3568	20.3681	20.3681	20.3703	20.3636	20.3568	20.3523	20.3478 (88)
util rest of house	0.9456	0.8919	0.8037	0.6670	0.5115	0.3506	0.2377	0.2552	0.4099	0.6665	0.8816	0.9568 (89)
MIT 2	20.0277	20.1649	20.2712	20.3392	20.3551	20.3680	20.3681	20.3703	20.3633	20.3439	20.2205	20.0025 (90)
Living area fraction	fLA = Living area / (4) = 0.5352 (91)											
MIT	20.3965	20.5220	20.6217	20.6833	20.6989	20.7062	20.7063	20.7073	20.7039	20.6866	20.5678	20.3700 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.3965	20.5220	20.6217	20.6833	20.6989	20.7062	20.7063	20.7073	20.7039	20.6866	20.5678	20.3700 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9466	0.8969	0.8151	0.6843	0.5313	0.3711	0.2590	0.2769	0.4321	0.6869	0.8890	0.9571 (94)
Useful gains	457.2997	484.0564	466.5615	399.0411	307.8382	205.5267	138.2335	144.4517	223.8729	340.2286	415.0601	440.7829 (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	568.5427	549.7920	495.1909	405.6866	308.6770	205.5608	138.2348	144.4540	223.9977	345.9840	465.3975	562.8971 (97)
Space heating kWh	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (98a)
Space heating requirement - total per year (kWh/year)	285.0260											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	285.0260											
Space heating per m2	(98c) / (4) = 5.6665 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	56.4494	49.8511	52.7703	45.9303	44.2095	39.4941	38.7227	40.4473	41.0995	46.2410	49.6744	55.7706 (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	9.7723	8.8266	9.7723	9.4571	9.7723	9.4571	9.7723	9.7723	9.4571	9.7723	9.4571	9.7723 (231)
Lighting	14.6001	11.7127	10.5460	7.7264	5.9681	4.8760	5.4443	7.0767	9.1920	12.0604	13.6222	15.0058 (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	285.0260 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	349.4100											
Water heating fuel used	560.6602 (219)											
Space cooling fuel	0.0000 (221)											

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Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	115.0612 (230a)
Total electricity for the above, kWh/year	115.0612 (231)
Electricity for lighting (calculated in Appendix L)	117.8308 (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	1078.5782 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	285.0260	16.4900	47.0008 (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)	560.6602	16.4900	92.4529 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	115.0612	16.4900	18.9736 (249)
Energy for lighting	117.8308	16.4900	19.4303 (250)
Additional standing charges			0.0000 (251)
Total energy cost			177.8575 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.6719 (257)
SAP value		89.1091
SAP rating (Section 12)		89 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	285.0260	0.1595	45.4481 (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)	560.6602	0.1411	79.1169 (264)
Space and water heating			124.5651 (265)
Pumps, fans and electric keep-hot	115.0612	0.1387	15.9604 (267)
Energy for lighting	117.8308	0.1443	17.0066 (268)
Total CO2, kg/year			157.5321 (272)
CO2 emissions per m2			3.1300 (273)
EI value			97.7850
EI rating			98 (274)
EI band			A

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

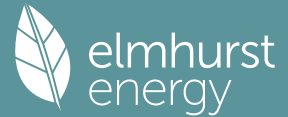
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.3000 (1b)	x 2.5000 (2b)	= 125.7500 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 125.7500 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8900 (17)
Infiltration rate	0.1445 (18)

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Number of sides sheltered

2 (19)

Shelter factor

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

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.1228 \quad (21)$$

	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	0.1320	0.1290	0.1290	0.1198	0.1228	0.1044	0.1013	0.1013	0.1044	0.1167	0.1167	0.1198	(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	0.2720	0.2690	0.2690	0.2598	0.2628	0.2444	0.2413	0.2413	0.2444	0.2567	0.2567	0.2598	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			1.8400	1.3258	2.4394			(27)
Window S/W			5.7300	1.3258	7.5966			(27)
Ground Floor			50.3000	0.1100	5.5330	110.0000	5533.0000	(28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060	110.0000	2387.0001	(29a)
Total net area of external elements Aum(A, m2)			79.5700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	19.4750			(33)
Main dwelling								
Party Wall			53.5200	0.0000	0.0000	45.0000	2408.4000	(32)
Corridor			24.6800	0.0000	0.0000	45.0000	1110.6000	(32)
Party Ceiling			50.3000			30.0000	1509.0000	(32b)
Internal Wall			39.0000			9.0000	351.0000	(32c)

Heat capacity Cm = Sum(A x k)

$$(28) \dots (30) + (32) + (32a) \dots (32e) = 13299.0001 \quad (34)$$

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

$$264.3936 \quad (35)$$

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	10.9200	0.0370	0.4040	
P1 Party wall - Ground floor	29.1800	0.0510	1.4882	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.1800	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	3.7400	0.0250	0.0935	
E3 Sill	1.2500	0.0220	0.0275	
E4 Jamb	7.5400	0.0170	0.1282	
E5 Ground floor (normal)	10.9200	0.0670	0.7316	
E16 Corner (normal)	8.0400	0.0420	0.3377	
E18 Party wall between dwellings	2.6800	0.0320	0.0858	
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412	

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

$$3.5377 \quad (36)$$

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 23.0127 \quad (37)$$

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

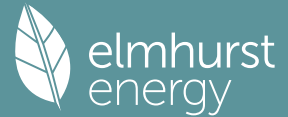
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	11.2889	11.1614	11.1614	10.7792	10.9066	10.1420	10.0146	10.0146	10.1420	10.6517	10.6517	10.7792	(38)
Heat transfer coeff	34.3015	34.1741	34.1741	33.7918	33.9192	33.1547	33.0273	33.0273	33.1547	33.6644	33.6644	33.7918	(39)
Average = Sum(39)m / 12 =													33.6538

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6819	0.6794	0.6794	0.6718	0.6743	0.6591	0.6566	0.6566	0.6591	0.6693	0.6693	0.6718	(40)
HLP (average)													0.6691
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers													
52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031	52.5031	(42a)
Hot water usage for baths													
22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	22.7111	(42b)
Hot water usage for other uses													
32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	32.0288	(42c)
Average daily hot water use (litres/day)													98.8376 (43)
Daily hot water use													
107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430	107.2430	(44)
Energy conte	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167	(45)
Energy content (annual)										Total = Sum(45)m =	1641.6717		
Distribution loss (46)m = 0.15 x (45)m													
25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875	25.1875	(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													
197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	194.8681	(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													
197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	194.8681	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total per year (kWh/year) = Sum(64)m =													1959.0027 (64)

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Heat gains from water heating, kWh/month	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)										
56.6210 49.8223 52.3465 44.6890 42.4008 37.2115 36.0262 38.0299 39.0766 44.7609 49.0389	55.8323 (65)										

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.6802	14.8152	12.0485	9.1215	6.8184	5.7564	6.2200	8.0850	10.8517	13.7787	16.0817	17.1438 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.9150	223.2075	217.4307	205.1326	189.6084	175.0179	165.2705	162.9781	168.7549	181.0530	196.5772	211.1677 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575 (71)
Water heating gains (Table 5)	76.1034	74.1404	70.3583	62.0681	56.9903	51.6826	48.4223	51.1155	54.2731	60.1624	68.1095	75.0434 (72)
Total internal gains	394.5699	393.0343	380.7087	357.1934	334.2884	313.3282	300.7841	303.0499	314.7509	335.8654	361.6397	384.2261 (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)
South					5.7300	41.2355	0.4000		0.0000		0.7700		72.7741 (78)
Solar gains	78.0980	132.6870	181.2315	217.9821	230.6766	231.7245	219.0857	202.9931	197.5428	151.7809	95.3961	68.8570 (83)	
Total gains	472.6679	525.7213	561.9402	575.1755	564.9650	545.0527	519.8699	506.0430	512.2937	487.6463	457.0358	453.0832 (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	107.6969	108.0985	108.0985	109.3213	108.9106	111.4221	111.8520	111.8520	111.4221	109.7351	109.7351	109.3213
alpha	8.1798	8.2066	8.2066	8.2881	8.2607	8.4281	8.4568	8.4568	8.4281	8.3157	8.3157	8.2881
util living area	0.9416	0.8860	0.7906	0.6454	0.4857	0.3224	0.2351	0.2545	0.4076	0.6616	0.8760	0.9536 (86)
MIT	20.7850	20.8808	20.9545	20.9914	20.9992	21.0000	21.0000	21.0000	20.9999	20.9912	20.9096	20.7585 (87)
Th 2	20.3568	20.3591	20.3591	20.3658	20.3636	20.3771	20.3793	20.3793	20.3771	20.3681	20.3681	20.3658 (88)
util rest of house	0.9285	0.8653	0.7615	0.6106	0.4478	0.2845	0.1956	0.2140	0.3674	0.6212	0.8509	0.9427 (89)
MIT 2	20.1260	20.2375	20.3164	20.3588	20.3630	20.3771	20.3793	20.3793	20.3770	20.3613	20.2801	20.1029 (90)
Living area fraction									fLA = Living area / (4) =			0.5352 (91)
MIT	20.4787	20.5818	20.6579	20.6974	20.7035	20.7104	20.7115	20.7115	20.7103	20.6985	20.6170	20.4537 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4787	20.5818	20.6579	20.6974	20.7035	20.7104	20.7115	20.7115	20.7103	20.6985	20.6170	20.4537 (93)

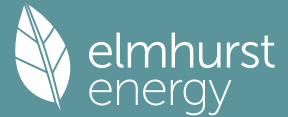
8. Space heating requirement

Utilisation	0.9312	0.8728	0.7753	0.6289	0.4680	0.3048	0.2167	0.2357	0.3889	0.6425	0.8613	0.9443 (94)
Useful gains	440.1311	458.8312	435.6889	361.7501	264.4204	166.1145	112.6724	119.2776	199.2285	313.2944	393.6225	427.8465 (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	524.0819	505.1547	453.0773	364.8638	264.6886	166.1196	112.6726	119.2780	199.2711	316.3934	428.1104	522.2104 (97)
Space heating kWh	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067 (98a)
Space heating requirement - total per year (kWh/year)	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067 (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)	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067 (98c)
Space heating per m ²	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067 (98c)
										(98c) / (4) =		4.1016 (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	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067 (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)	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067 (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)

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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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(64)
Efficiency of water heater												349.4100	(216)
(217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(217)
Fuel for water heating, kWh/month	56.4494	49.8511	52.7703	45.9303	44.2095	39.4941	38.7227	40.4473	41.0995	46.2410	49.6744	55.7706	(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	9.7723	8.8266	9.7723	9.4571	9.7723	9.4571	9.7723	9.7723	9.4571	9.7723	9.4571	9.7723	(231)
Lighting	14.6001	11.7127	10.5460	7.7264	5.9681	4.8760	5.4443	7.0767	9.1920	12.0604	13.6222	15.0058	(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												206.3107	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												560.6602	(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)												115.0612	(230a)
Total electricity for the above, kWh/year												115.0612	(231)
Electricity for lighting (calculated in Appendix L)												117.8308	(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												999.8630	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	206.3107	28.4300	58.6541 (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)	560.6602	28.4300	159.3957 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	115.0612	28.4300	32.7119 (249)
Energy for lighting	117.8308	28.4300	33.4993 (250)
Additional standing charges			0.0000 (251)
Total energy cost			284.2610 (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	206.3107	0.1599	32.9946 (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)	560.6602	0.1411	79.1169 (264)
Space and water heating			112.1116 (265)
Pumps, fans and electric keep-hot	115.0612	0.1387	15.9604 (267)
Energy for lighting	117.8308	0.1443	17.0066 (268)
Total CO2, kg/year			145.0786 (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	206.3107	1.5919	328.4273 (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)	560.6602	1.5218	853.2118 (278)
Space and water heating			1181.6391 (279)
Pumps, fans and electric keep-hot	115.0612	1.5128	174.0647 (281)
Energy for lighting	117.8308	1.5338	180.7328 (282)
Total Primary energy kWh/year			1536.4366 (286)

SAP 10 EPC IMPROVEMENTS

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Plot 06

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

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

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

Recommended measures
(none)

Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0	0.00 kg/m²

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

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

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

	Current	Potential	Saving
Electricity	£284	£284	£0
Space heating	£91	£91	£0
Water heating	£159	£159	£0
Lighting	£33	£33	£0
Total cost of fuels	£284	£284	£0
Total cost of uses	£283	£283	£0
Delivered energy	20 kWh/m²	20 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	31 kWh/m²	31 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.3000 (1b)	x 2.5000 (2b)	= 125.7500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 125.7500 (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	2.8900	(17)
Infiltration rate	0.1445	(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) =	0.1228 (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	0.1566	0.1535	0.1505	0.1351	0.1320	0.1167	0.1167	0.1136	0.1228	0.1320	0.1382	0.1443 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2966	0.2935	0.2905	0.2751	0.2720	0.2567	0.2567	0.2536	0.2628	0.2720	0.2782	0.2843 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			1.8400	1.3258	2.4394			(27)
Window S/W			5.7300	1.3258	7.5966			(27)
Ground Floor			50.3000	0.1100	5.5330	110.0000	5533.0000	(28a)
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060	110.0000	2387.0001	(29a)
Total net area of external elements Aum(A, m2)			79.5700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.4750			(33)
Main dwelling								
Party Wall			53.5200	0.0000	0.0000	45.0000	2408.4000	(32)
Corridor			24.6800	0.0000	0.0000	45.0000	1110.6000	(32)
Party Ceiling			50.3000			30.0000	1509.0000	(32b)
Internal Wall			39.0000			9.0000	351.0000	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13299.0001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 264.3936 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	10.9200	0.0370	0.4040	
E7 Party floor between dwellings (in blocks of flats)	29.1800	0.0510	1.4882	
P1 Party wall - Ground floor	29.1800	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	3.7400	0.0250	0.0935	
E2 Other lintels (including other steel lintels)	1.2500	0.0220	0.0275	
E3 Sill	7.5400	0.0170	0.1282	
E4 Jamb	10.9200	0.0670	0.7316	
E5 Ground floor (normal)	8.0400	0.0420	0.3377	
E16 Corner (normal)	2.6800	0.0320	0.0858	
E18 Party wall between dwellings	8.0400	0.0300	0.2412	
E25 Staggered party wall between dwellings				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				3.5377 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 23.0127 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.3082	12.1808	12.0534	11.4163	11.2889	10.6517	10.6517	10.5243	10.9066	11.2889	11.5437	11.7985	(38)
Heat transfer coeff	35.3209	35.1935	35.0661	34.4289	34.3015	33.6644	33.6644	33.5370	33.9192	34.3015	34.5564	34.8112	(39)
Average = Sum(39)m / 12 =													34.3971
HLP	0.7022	0.6997	0.6971	0.6845	0.6819	0.6693	0.6693	0.6667	0.6743	0.6819	0.6870	0.6921	(40)
HLP (average)													0.6838
Days in mont	31	28	31	30	31	30	31	31	30	31	30		31

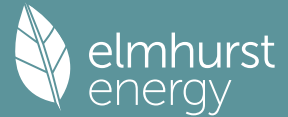
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6989 (42)
Hot water usage for mixer showers	52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031	(42a)
Hot water usage for baths	22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111	(42b)
Hot water usage for other uses	32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288	(42c)
Average daily hot water use (litres/day)													98.8376 (43)
Daily hot water use	107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430	(44)
Energy conte	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167	(45)
Energy content (annual)													Total = Sum(45)m = 1641.6717
Distribution loss (46)m = 0.15 x (45)m	25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875	(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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(64)
													Total per year (kWh/year) = Sum(64)m = 1959.0027 (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	56.6210	49.8223	52.3465	44.6890	42.4008	37.2115	36.0262	38.0299	39.0766	44.7609	49.0389	55.8323	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.6802	14.8152	12.0485	9.1215	6.8184	5.7564	6.2200	8.0850	10.8517	13.7787	16.0817	17.1438	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.9150	223.2075	217.4307	205.1326	189.6084	175.0179	165.2705	162.9781	168.7549	181.0530	196.5772	211.1677	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	(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)													

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	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575 (71)
Water heating gains (Table 5)	76.1034	74.1404	70.3583	62.0681	56.9903	51.6826	48.4223	51.1155	54.2731	60.1624	68.1095	75.0434 (72)
Total internal gains	394.5699	393.0343	380.7087	357.1934	334.2884	313.3282	300.7841	303.0499	314.7509	335.8654	361.6397	384.2261 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		FF Access factor Table 6d		Gains W	
North	1.8400		10.6334		0.4000		0.0000		0.7700		6.0262 (74)	
South	5.7300		46.7521		0.4000		0.0000		0.7700		82.5099 (78)	
Solar gains	88.5361	146.6463	191.7006	225.9789	245.0720	240.4285	232.9445	218.6981	203.3401	159.4590	105.2364	76.3199 (83)
Total gains	483.1060	539.6806	572.4093	583.1723	579.3604	553.7567	533.7286	521.7480	518.0910	495.3244	466.8762	460.5460 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	104.5887	104.9674	105.3488	107.2983	107.6969	109.7351	109.7351	110.1521	108.9106	107.6969	106.9027	106.1200
alpha	7.9726	7.9978	8.0233	8.1532	8.1798	8.3157	8.3157	8.3435	8.2607	8.1798	8.1268	8.0747
util living area	0.9558	0.9092	0.8299	0.7006	0.5487	0.3890	0.2775	0.2957	0.4514	0.7057	0.9027	0.9651 (86)
MIT	20.7168	20.8321	20.9260	20.9822	20.9976	20.9999	21.0000	21.0000	20.9996	20.9841	20.8694	20.6891 (87)
Th 2	20.3389	20.3411	20.3434	20.3546	20.3568	20.3681	20.3681	20.3703	20.3636	20.3568	20.3523	20.3478 (88)
util rest of house	0.9456	0.8919	0.8037	0.6670	0.5115	0.3506	0.2377	0.2552	0.4099	0.6665	0.8816	0.9568 (89)
MIT 2	20.0277	20.1649	20.2712	20.3392	20.3551	20.3680	20.3681	20.3703	20.3633	20.3439	20.2205	20.0025 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.3965	20.5220	20.6217	20.6833	20.6989	20.7062	20.7063	20.7073	20.7039	20.6866	20.5678	20.3700 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3965	20.5220	20.6217	20.6833	20.6989	20.7062	20.7063	20.7073	20.7039	20.6866	20.5678	20.3700 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9466	0.8969	0.8151	0.6843	0.5313	0.3711	0.2590	0.2769	0.4321	0.6869	0.8890	0.9571 (94)
Useful gains	457.2997	484.0564	466.5615	399.0411	307.8382	205.5267	138.2335	144.4517	223.8729	340.2286	415.0601	440.7829 (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	568.5427	549.7920	495.1909	405.6866	308.6770	205.5608	138.2348	144.4540	223.9977	345.9840	465.3975	562.8971 (97)
Space heating kWh	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (98a)
Space heating requirement - total per year (kWh/year)												285.0260
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												285.0260
Space heating per m2												(98c) / (4) = 5.6665 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	82.7648	44.1743	21.3003	4.7847	0.6240	0.0000	0.0000	0.0000	0.0000	4.2821	36.2429	90.8529 (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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (64)	
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)	
Fuel for water heating, kWh/month	56.4494	49.8511	52.7703	45.9303	44.2095	39.4941	38.7227	40.4473	41.0995	46.2410	49.6744	55.7706 (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	9.7723	8.8266	9.7723	9.4571	9.7723	9.4571	9.7723	9.7723	9.4571	9.7723	9.4571	9.7723 (231)	
Lighting	14.6001	11.7127	10.5460	7.7264	5.9681	4.8760	5.4443	7.0767	9.1920	12.0604	13.6222	15.0058 (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)													

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(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												285.0260	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												560.6602	(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)												115.0612	(230a)
Total electricity for the above, kWh/year												115.0612	(231)
Electricity for lighting (calculated in Appendix L)												117.8308	(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												1078.5782	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price £/kWh	Fuel cost £/year	
Space heating - main system 1	285.0260	16.4900	47.0008	(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)	560.6602	16.4900	92.4529	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	115.0612	16.4900	18.9736	(249)
Energy for lighting	117.8308	16.4900	19.4303	(250)
Additional standing charges			0.0000	(251)
Total energy cost			177.8575	(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] =	0.6719 (257)
SAP value		89.1091
SAP rating (Section 12)		89 (258)
SAP band		B

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

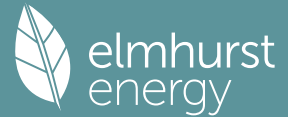
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	285.0260	0.1595	45.4481	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	560.6602	0.1411	79.1169	(264)
Space and water heating			124.5651	(265)
Pumps, fans and electric keep-hot	115.0612	0.1387	15.9604	(267)
Energy for lighting	117.8308	0.1443	17.0066	(268)
Total CO2, kg/year			157.5321	(272)
CO2 emissions per m2			3.1300	(273)
EI value			97.7850	
EI rating			98	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	50.3000 (1b)	x 2.5000 (2b)	= 125.7500 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.3000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.7500 (5)	

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2. Ventilation rate

											m3 per hour	
Number of open chimneys											0 * 80 =	0.0000 (6a)
Number of open flues											0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire											0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler											0 * 20 =	0.0000 (6d)
Number of flues attached to other heater											0 * 35 =	0.0000 (6e)
Number of blocked chimneys											0 * 20 =	0.0000 (6f)
Number of intermittent extract fans											0 * 10 =	0.0000 (7a)
Number of passive vents											0 * 10 =	0.0000 (7b)
Number of flueless gas fires											0 * 40 =	0.0000 (7c)
											Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) =	0.0000 (8)
Pressure test											Yes	
Pressure Test Method											Blower Door	
Measured/design AP50											2.8900 (17)	
Infiltration rate											0.1445 (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) =	0.1228 (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	0.1320	0.1290	0.1290	0.1198	0.1228	0.1044	0.1013	0.1013	0.1044	0.1167	0.1167	0.1198 (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	0.2720	0.2690	0.2690	0.2598	0.2628	0.2444	0.2413	0.2413	0.2444	0.2567	0.2567	0.2598 (25)

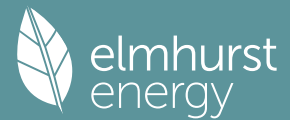
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Window N/E			1.8400	1.3258	2.4394			(27)				
Window S/W			5.7300	1.3258	7.5966			(27)				
Ground Floor			50.3000	0.1100	5.5330	110.0000	5533.0000	(28a)				
EXT Wall	29.2700	7.5700	21.7000	0.1800	3.9060	110.0000	2387.0001	(29a)				
Total net area of external elements Aum(A, m2)			79.5700					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.4750			(33)				
Main dwelling												
Party Wall			53.5200	0.0000	0.0000	45.0000	2408.4000	(32)				
Corridor			24.6800	0.0000	0.0000	45.0000	1110.6000	(32)				
Party Ceiling			50.3000			30.0000	1509.0000	(32b)				
Internal Wall			39.0000			9.0000	351.0000	(32c)				
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13299.0001	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							264.3936	(35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E7 Party floor between dwellings (in blocks of flats)				10.9200	0.0370	0.4040						
P1 Party wall - Ground floor				29.1800	0.0510	1.4882						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				29.1800	0.0000	0.0000						
E2 Other lintels (including other steel lintels)				3.7400	0.0250	0.0935						
E3 Sill				1.2500	0.0220	0.0275						
E4 Jamb				7.5400	0.0170	0.1282						
E5 Ground floor (normal)				10.9200	0.0670	0.7316						
E16 Corner (normal)				8.0400	0.0420	0.3377						
E18 Party wall between dwellings				2.6800	0.0320	0.0858						
E25 Staggered party wall between dwellings				8.0400	0.0300	0.2412						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5377	(36)				
Point Thermal bridges							(36a) =	0.0000				
Total fabric heat loss							(33) + (36) + (36a) =	23.0127 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	11.2889	11.1614	11.1614	10.7792	10.9066	10.1420	10.0146	10.0146	10.1420	10.6517	10.6517	10.7792 (38)
Average = Sum(39)m / 12 =	34.3015	34.1741	34.1741	33.7918	33.9192	33.1547	33.0273	33.0273	33.1547	33.6644	33.6644	33.7918 (39)
												33.6538
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6819	0.6794	0.6794	0.6718	0.6743	0.6591	0.6566	0.6566	0.6591	0.6693	0.6693	0.6718 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6989 (42)											
Hot water usage for mixer showers	52.7051	51.9130	50.7588	48.5505	46.9208	45.1034	44.0704	45.2159	46.4715	48.4228	50.6786	52.5031 (42a)
Hot water usage for baths	22.7881	22.4497	21.9731	21.0944	20.4364	19.7068	19.3127	19.7859	20.3012	21.0819	21.9788	22.7111 (42b)
Hot water usage for other uses	32.0288	30.8641	29.6994	28.5348	27.3701	26.2054	26.2054	27.3701	28.5348	29.6994	30.8641	32.0288 (42c)
Average daily hot water use (litres/day)												98.8376 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	107.5220	105.2268	102.4314	98.1796	94.7273	91.0156	89.5885	92.3719	95.3074	99.2042	103.5214	107.2430 (44)
Energy content (annual)	170.2886	149.8416	157.4332	134.4030	127.5211	111.9143	108.3495	114.3757	117.5236	134.6191	147.4853	167.9167 (45)
Distribution loss (46)m = 0.15 x (45)m	25.5433	22.4762	23.6150	20.1605	19.1282	16.7871	16.2524	17.1563	17.6285	20.1929	22.1228	25.1875 (46)
Water storage loss (or HIU loss):												

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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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681 (64)
	Total per year (kWh/year) = Sum(64)m =											1959.0027 (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	56.6210	49.8223	52.3465	44.6890	42.4008	37.2115	36.0262	38.0299	39.0766	44.7609	49.0389	55.8323 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	101.9362	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.6802	14.8152	12.0485	9.1215	6.8184	5.7564	6.2200	8.0850	10.8517	13.7787	16.0817	17.1438	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.9150	223.2075	217.4307	205.1326	189.6084	175.0179	165.2705	162.9781	168.7549	181.0530	196.5772	211.1677	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	46.8926	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	-67.9575	(71)
Water heating gains (Table 5)	76.1034	74.1404	70.3583	62.0681	56.9903	51.6826	48.4223	51.1155	54.2731	60.1624	68.1095	75.0434	(72)
Total internal gains	394.5699	393.0343	380.7087	357.1934	334.2884	313.3282	300.7841	303.0499	314.7509	335.8654	361.6397	384.2261	(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)
South				5.7300	41.2355	0.4000	0.0000			0.7700			72.7741 (78)
Solar gains	78.0980	132.6870	181.2315	217.9821	230.6766	231.7245	219.0857	202.9931	197.5428	151.7809	95.3961	68.8570 (83)	
Total gains	472.6679	525.7213	561.9402	575.1755	564.9650	545.0527	519.8699	506.0430	512.2937	487.6463	457.0358	453.0832 (84)	

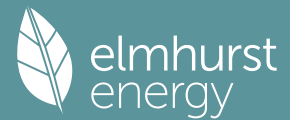
7. Mean internal temperature (heating season)

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	107.6969	108.0985	108.0985	109.3213	108.9106	111.4221	111.8520	111.8520	111.4221	109.7351	109.7351	109.3213
alpha	8.1798	8.2066	8.2066	8.2881	8.2607	8.4281	8.4568	8.4568	8.4281	8.3157	8.3157	8.2881
util living area	0.9416	0.8860	0.7906	0.6454	0.4857	0.3224	0.2351	0.2545	0.4076	0.6616	0.8760	0.9536 (86)
MIT	20.7850	20.8808	20.9545	20.9914	20.9992	21.0000	21.0000	21.0000	20.9999	20.9912	20.9096	20.7585 (87)
Th 2	20.3568	20.3591	20.3591	20.3658	20.3636	20.3771	20.3793	20.3793	20.3771	20.3681	20.3681	20.3658 (88)
util rest of house	0.9285	0.8653	0.7615	0.6106	0.4478	0.2845	0.1956	0.2140	0.3674	0.6212	0.8509	0.9427 (89)
MIT 2	20.1260	20.2375	20.3164	20.3588	20.3630	20.3771	20.3793	20.3793	20.3770	20.3613	20.2801	20.1029 (90)
Living area fraction	fLA = Living area / (4) = 0.5352 (91)											
MIT	20.4787	20.5818	20.6579	20.6974	20.7035	20.7104	20.7115	20.7115	20.7103	20.6985	20.6170	20.4537 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.4787	20.5818	20.6579	20.6974	20.7035	20.7104	20.7115	20.7115	20.7103	20.6985	20.6170	20.4537 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9312	0.8728	0.7753	0.6289	0.4680	0.3048	0.2167	0.2357	0.3889	0.6425	0.8613	0.9443	(94)
Ext temp.	440.1311	458.8312	435.6889	361.7501	264.4204	166.1145	112.6724	119.2776	199.2285	313.2944	393.6225	427.8465	(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	524.0819	505.1547	453.0773	364.8638	264.6886	166.1196	112.6726	119.2780	199.2711	316.3934	428.1104	522.2104	(97)
Space heating requirement - total per year (kWh/year)	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067	(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)	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												206.3107	(98c)
Space heating per m ²												4.1016	(99)

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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	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067	(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)	62.4594	31.1294	12.9369	2.2418	0.1996	0.0000	0.0000	0.0000	0.0000	2.3056	24.8313	70.2067	(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	197.2400	174.1848	184.3846	160.4850	154.4725	137.9963	135.3009	141.3271	143.6056	161.5705	173.5673	194.8681	(64)	
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)	
Fuel for water heating, kWh/month	56.4494	49.8511	52.7703	45.9303	44.2095	39.4941	38.7227	40.4473	41.0995	46.2410	49.6744	55.7706	(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	9.7723	8.8266	9.7723	9.4571	9.7723	9.4571	9.7723	9.7723	9.4571	9.7723	9.4571	9.7723	(231)	
Lighting	14.6001	11.7127	10.5460	7.7264	5.9681	4.8760	5.4443	7.0767	9.1920	12.0604	13.6222	15.0058	(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													206.3107	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													349.4100	
Water heating fuel used													560.6602	(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)													115.0612	(230a)
Total electricity for the above, kWh/year													115.0612	(231)
Electricity for lighting (calculated in Appendix L)													117.8308	(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													999.8630	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	206.3107	28.4300	58.6541	(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)	560.6602	28.4300	159.3957	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	115.0612	28.4300	32.7119	(249)
Energy for lighting	117.8308	28.4300	33.4993	(250)
Additional standing charges			0.0000	(251)
Total energy cost			284.2610	(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	206.3107	0.1599	32.9946	(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)	560.6602	0.1411	79.1169	(264)
Space and water heating			112.1116	(265)
Pumps, fans and electric keep-hot	115.0612	0.1387	15.9604	(267)
Energy for lighting	117.8308	0.1443	17.0066	(268)
Total CO2, kg/year			145.0786	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	206.3107	1.5919	328.4273 (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)	560.6602	1.5218	853.2118 (278)
Space and water heating			1181.6391 (279)
Pumps, fans and electric keep-hot	115.0612	1.5128	174.0647 (281)
Energy for lighting	117.8308	1.5338	180.7328 (282)
Total Primary energy kWh/year			1536.4366 (286)