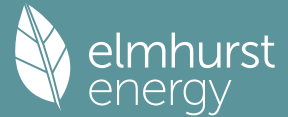


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Plot Reference	Plot 17			Issued on Date	22/12/2025	
Assessment Reference	Plot 17		Plot Type Ref			
Plot Address	Flat 6, 8 Cross Road Manchester, M21 9SB			SAP Version	10.2	
SAP Rating	81 B	DER	5.27	TER	15.66	
Environmental	96 A	% DER < TER				66.35
CO ₂ Emissions (t/year)	0.32	DFEE	36.95	TFEE	46.48	
Compliance Check	See BREL	% DFEE < TFEE				20.50
% DPER < TPER	34.62	DPER	54.40	TPER	83.20	
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	69.9200 (1b)	2.5000 (2b)	174.8000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	174.8000 (5)

2. Ventilation rate

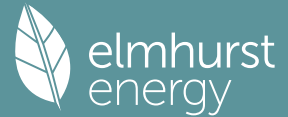
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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	2.9500	(17)
Infiltration rate	0.1475	(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) =	0.1254 (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	0.1599	0.1567	0.1536	0.1379	0.1348	0.1191	0.1191	0.1160	0.1254	0.1348	0.1410	0.1473 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2999	0.2967	0.2936	0.2779	0.2748	0.2591	0.2591	0.2560	0.2654	0.2748	0.2810	0.2873 (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			4.7400	1.3258	6.2841		(27)
Window S/W			13.3200	1.3258	17.6591		(27)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
External Roof	64.6000		64.6000	0.1500	9.6900	9.0000	581.4000 (30)
Total net area of external elements Aum(A, m ²)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.6068		(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000	45.0000	741.6000 (32)
Corridor			25.3000	0.0000	0.0000	45.0000	1138.5000 (32)
Party Floor 1			69.9200			40.0000	2796.8000 (32d)
Party Ceiling			5.3200			30.0000	159.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13384.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							191.4316 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0250	0.2220
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	36.1400	0.0170	0.6144
E16 Corner (normal)	10.7200	0.0420	0.4502
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0750	0.3690
E15 Flat roof with parapet	30.6900	0.1320	4.0511
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.1500	0.9240
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.0400	0.3428
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.3349 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	53.9417 (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	17.2967	17.1159	16.9351	16.0311	15.8503	14.9463	14.9463	14.7655	15.3079	15.8503	16.2119	16.5735	(38)
Heat transfer coeff	71.2384	71.0576	70.8768	69.9728	69.7920	68.8879	68.8879	68.7071	69.2496	69.7920	70.1536	70.5152	(39)
Average = Sum(39)m / 12 =												69.9276	
HLP	1.0189	1.0163	1.0137	1.0008	0.9982	0.9852	0.9852	0.9827	0.9904	0.9982	1.0033	1.0085	(40)
HLP (average)												1.0001	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers	61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102	(42a)
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292	(42b)
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127	(42c)
Average daily hot water use (litres/day)												115.9876	(43)
Daily hot water use	126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521	(44)
Energy conte	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540	(45)
Energy content (annual)												1926.5295	
Distribution loss (46)m = 0.15 x (45)m	29.9756	26.3762	27.7125	23.6585	22.4471	19.6999	19.0724	20.1333	20.6875	23.6968	25.9616	29.5581	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (55)													
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	(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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	(64)
12Total per year (kWh/year)												2244	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	66.4459	58.4673	61.4293	52.4431	49.7577	43.6680	42.2772	44.6288	45.8572	52.5279	57.5481	65.5204	(65)

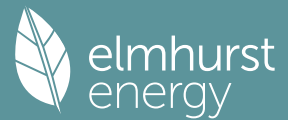
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.4195	110.0716	99.4195	102.7335	99.4195	102.7335	99.4195	99.4195	102.7335	99.4195	102.7335	99.4195	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.1103	199.1557	194.0013	183.0284	169.1771	156.1588	147.4618	145.4164	150.5707	161.5436	175.3949	188.4132	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	(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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	(71)
Water heating gains (Table 5)	89.3090	87.0049	82.5663	72.8376	66.8787	60.6500	56.8242	59.9849	63.6906	70.6020	79.9280	88.0651	(72)
Total internal gains	442.5015	452.8949	432.6498	415.2623	392.1380	376.2050	360.3682	361.4835	373.6575	388.2278	414.7191	432.5606	(73)

6. Solar gains

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

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Northwest	2.9000	11.2829	0.4000	0.0000	0.7700	10.0779 (81)
South	9.9400	46.7521	0.4000	0.0000	0.7700	143.1324 (78)
West	3.3800	19.6403	0.4000	0.0000	0.7700	20.4463 (80)

Solar gains	179.6828	306.4415	421.0002	525.6831	593.3473	591.2791	569.1145	518.1445	457.0982	339.0759	215.2695	153.7474 (83)
Total gains	622.1843	759.3363	853.6500	940.9454	985.4853	967.4841	929.4828	879.6280	830.7557	727.3037	629.9886	586.3080 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	52.1914	52.3242	52.4576	53.1354	53.2730	53.9721	53.9721	54.1141	53.6903	53.2730	52.9984	52.7266
alpha	4.4794	4.4883	4.4972	4.5424	4.5515	4.5981	4.5981	4.6076	4.5794	4.5515	4.5332	4.5151
util living area	0.9731	0.9403	0.8850	0.7738	0.6214	0.4489	0.3248	0.3572	0.5548	0.8190	0.9464	0.9785 (86)
MIT	19.8675	20.1659	20.4717	20.7692	20.9285	20.9872	20.9977	20.9964	20.9670	20.7465	20.2628	19.8128 (87)
Th 2	20.0676	20.0698	20.0719	20.0827	20.0849	20.0957	20.0957	20.0978	20.0913	20.0849	20.0806	20.0762 (88)
util rest of house	0.9671	0.9282	0.8633	0.7369	0.5700	0.3881	0.2587	0.2882	0.4888	0.7793	0.9333	0.9736 (89)
MIT 2	18.7703	19.1411	19.5117	19.8602	20.0262	20.0879	20.0948	20.0963	20.0692	19.8469	19.2751	18.7082 (90)
Living area fraction	19.2353	19.5754	19.9185	20.2454	20.4085	20.4690	20.4774	20.4778	20.4497	20.2281	19.6937	0.4238 (91)
MIT	19.2353	19.5754	19.9185	20.2454	20.4085	20.4690	20.4774	20.4778	20.4497	20.2281	19.6937	19.1763 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2353	19.5754	19.9185	20.2454	20.4085	20.4690	20.4774	20.4778	20.4497	20.2281	19.6937	19.1763 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9604	0.9206	0.8593	0.7438	0.5886	0.4135	0.2867	0.3174	0.5154	0.7860	0.9268	0.9675 (94)
Useful gains	597.5210	699.0626	733.5725	699.9003	580.0770	400.0113	266.4891	279.1899	428.1446	571.6563	583.8657	567.2677 (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	1063.9634	1042.7964	951.0616	793.8709	607.7866	404.3027	267.1054	280.1721	439.7135	671.9675	883.4911	1056.0553 (97)
Space heating kWh	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (98a)
Space heating requirement - total per year (kWh/year)												1482.1286
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1482.1286
Space heating per m2										(98c) / (4) =		21.1975 (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	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (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)	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (64)
Efficiency of water heater (217)m	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106 (216)
Fuel for water heating, kWh/month	65.8483	58.1239	61.4677	53.3682	51.2756	45.7054	44.7434	46.7968	47.6172	53.6946	57.8261	65.0402 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.5841	12.2695	13.5841	13.1459	13.5841	13.1459	13.5841	13.5841	13.1459	13.5841	13.1459	13.5841 (231)
Lighting	18.2957	14.6775	13.2154	9.6822	7.4788	6.1103	6.8224	8.8680	11.5187	15.1132	17.0703	18.8042 (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												1482.1286 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	344.4106	
Water heating fuel used	651.5074	(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)	159.9420	(230a)
Total electricity for the above, kWh/year	159.9420	(231)
Electricity for lighting (calculated in Appendix L)	147.6567	(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	2441.2347	(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	1482.1286	0.1570	232.6798 (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)	651.5074	0.1412	91.9751 (264)
Space and water heating			324.6549 (265)
Pumps, fans and electric keep-hot	159.9420	0.1387	22.1859 (267)
Energy for lighting	147.6567	0.1443	21.3114 (268)
Total CO2, kg/year			368.1523 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.2700 (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	1482.1286	1.5812	2343.4686 (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)	651.5074	1.5220	991.6069 (278)
Space and water heating			3335.0755 (279)
Pumps, fans and electric keep-hot	159.9420	1.5128	241.9603 (281)
Energy for lighting	147.6567	1.5338	226.4808 (282)
Total Primary energy kWh/year			3803.5166 (286)
Dwelling Primary energy Rate (DPER)			54.4000 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.9200 (1b)	x 2.5000 (2b)	= 174.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 174.8000 (5)

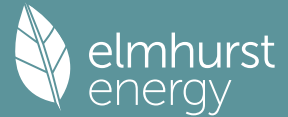
2. Ventilation rate

	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) =	0.1144 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3644	(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) =		0.3098 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)

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Adj infilt rate	0.3949	0.3872	0.3794	0.3407	0.3330	0.2943	0.2943	0.2865	0.3098	0.3330	0.3485	0.3640 (22b)
Effective ac	0.5780	0.5750	0.5720	0.5580	0.5554	0.5433	0.5433	0.5410	0.5480	0.5554	0.5607	0.5662 (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			17.5000	1.1450	20.0382		(27)
EXT Wall	84.5800	17.5000	67.0800	0.1800	12.0744		(29a)
External Roof	64.6000		64.6000	0.1100	7.1060		(30)
Total net area of external elements Aum(A, m2)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		39.2186		(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000		(32)
Corridor			25.3000	0.0000	0.0000		(32)

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

191.4316 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0700	2.2092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0500	0.4440
E3 Sill	1.2500	0.0500	0.0625
E4 Jamb	36.1400	0.0500	1.8070
E16 Corner (normal)	10.7200	0.0900	0.9648
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	2.6800	0.0600	0.1608
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0200	0.0984
E15 Flat roof with parapet	30.6900	0.5600	17.1864
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.2400	1.4784
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.1200	1.0284

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

25.6007 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 64.8193 (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	33.3406	33.1659	32.9947	32.1905	32.0400	31.3395	31.3395	31.2098	31.6093	32.0400	32.3444	32.6626 (38)
Heat transfer coeff	98.1599	97.9852	97.8140	97.0097	96.8593	96.1588	96.1588	96.0291	96.4286	96.8593	97.1637	97.4819 (39)
Average = Sum(39)m / 12 =												97.0090

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.4039	1.4014	1.3989	1.3874	1.3853	1.3753	1.3753	1.3734	1.3791	1.3853	1.3896	1.3942 (40)
HLP (average)												1.3874
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

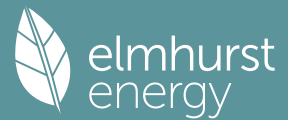
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers	61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102 (42a)	
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292 (42b)	
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127 (42c)	
Average daily hot water use (litres/day)												115.9876 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521 (44)	
Energy content (annual)	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540 (45)	
Distribution loss (46)m = 0.15 x (45)m	29.9756	26.3762	27.7125	23.6585	22.4471	19.6999	19.0724	20.1333	20.6875	23.6968	25.9616	29.5581 (46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
WWHRS	246.4322	217.9273	231.3447	202.8154	196.2422	176.4242	173.7445	180.8168	183.0084	204.5734	218.1690	243.6489 (62)	
PV diverter	-28.2739	-25.0057	-26.1845	-21.6818	-20.2067	-17.2910	-16.2076	-17.2351	-17.8899	-21.0903	-23.8927	-27.7504 (63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
	218.1582	192.9215	205.1601	181.1336	176.0355	159.1332	157.5369	163.5817	165.1184	183.4832	194.2762	215.8985 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2212.4372 (64)	
Electric shower(s)												2212 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000 (64a)	
Heat gains from water heating, kWh/month													
	103.7218	92.1359	98.7052	88.5166	87.0337	79.7415	79.5532	81.9047	81.9307	89.8038	93.6216	102.7964 (65)	

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

Metabolic gains (Table 5), Watts												
(66)m	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.4195	110.0716	99.4195	102.7335	99.4195	102.7335	99.4195	99.4195	102.7335	99.4195	102.7335	99.4195 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	197.1103	199.1557	194.0013	183.0284	169.1771	156.1588	147.4618	145.4164	150.5707	161.5436	175.3949	188.4132 (68)
	(calculated in Appendix L, equation L15 or L15a), also see Table 5											
Pumps, fans	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209 (69)
Losses e.g. evaporation	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)
(negative values) (Table 5)												
Water heating gains (Table 5)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672 (71)
Total internal gains	139.4111	137.1070	132.6683	122.9397	116.9807	110.7521	106.9263	110.0870	113.7927	120.7040	130.0300	138.1672 (72)
	495.6035	505.9969	485.7519	468.3643	445.2400	426.3070	410.4703	411.5855	423.7595	441.3298	467.8212	485.6626 (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					1.7800	10.6334	0.6300	0.7000			0.7700	5.7845 (74)	
South					9.6400	46.7521	0.6300	0.7000			0.7700	137.7367 (78)	
West					3.2700	19.6403	0.6300	0.7000			0.7700	19.6276 (80)	
Northwest					2.8100	11.2829	0.6300	0.7000			0.7700	9.6895 (81)	

Solar gains	172.8382	294.7506	404.8968	505.5139	570.5326	568.5241	547.2206	498.2450	439.5925	326.1281	207.0660	147.8931	(83)
Total gains	668.4418	800.7475	890.6486	973.8783	1015.7726	994.8311	957.6909	909.8305	863.3520	767.4580	674.8872	633.5557	(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	37.8773	37.9448	38.0112	38.3263	38.3859	38.6655	38.6655	38.7177	38.5573	38.3859	38.2656	38.1407
alpha	3.5252	3.5297	3.5341	3.5551	3.5591	3.5777	3.5777	3.5812	3.5705	3.5591	3.5510	3.5427
util living area	0.9745	0.9528	0.9182	0.8469	0.7316	0.5710	0.4282	0.4660	0.6705	0.8727	0.9555	0.9785 (86)
MIT	19.2410	19.5488	19.9297	20.3763	20.7181	20.9152	20.9767	20.9682	20.8452	20.3966	19.7396	19.1841 (87)
Th 2	19.7604	19.7623	19.7641	19.7730	19.7746	19.7823	19.7823	19.7838	19.7794	19.7746	19.7713	19.7678 (88)
util rest of house	0.9681	0.9416	0.8986	0.8105	0.6696	0.4789	0.3158	0.3513	0.5822	0.8340	0.9429	0.9731 (89)
MIT 2	17.7716	18.1568	18.6273	19.1643	19.5409	19.7320	19.7742	19.7716	19.6759	19.2044	18.4080	17.7048 (90)
Living area fraction									FLA = Living area / (4) =			0.4238 (91)
MIT	18.3943	18.7467	19.1792	19.6779	20.0398	20.2334	20.2838	20.2787	20.1714	19.7096	18.9723	18.3317 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3943	18.7467	19.1792	19.6779	20.0398	20.2334	20.2838	20.2787	20.1714	19.7096	18.9723	18.3317 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9587	0.9298	0.8874	0.8073	0.6841	0.5145	0.3632	0.3993	0.6125	0.8316	0.9323	0.9645 (94)
Useful gains	640.8206	744.5713	790.3983	786.2168	694.8728	511.8131	347.8027	363.3344	528.7683	638.2104	629.1639	611.0591 (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	1383.4925	1356.7722	1240.2015	1045.5658	807.7842	541.7011	354.2289	372.4688	585.4569	882.3488	1153.5587	1377.5844 (97)
Space heating kWh	552.5479	411.3990	334.6536	186.7313	84.0061	0.0000	0.0000	0.0000	0.0000	181.6390	377.5643	570.2949 (98a)
Space heating requirement - total per year (kWh/year)												2698.8359
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	552.5479	411.3990	334.6536	186.7313	84.0061	0.0000	0.0000	0.0000	0.0000	181.6390	377.5643	570.2949 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2698.8359
Space heating per m ²										(98c) / (4) =		38.5989 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	552.5479	411.3990	334.6536	186.7313	84.0061	0.0000	0.0000	0.0000	0.0000	181.6390	377.5643	570.2949 (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)	598.6434	445.7194	362.5716	202.3091	91.0142	0.0000	0.0000	0.0000	0.0000	196.7919	409.0620	617.8709 (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	218.1582	192.9215	205.1601	181.1336	176.0355	159.1332	157.5369	163.5817	165.1184	183.4832	194.2762	215.8985 (64)
Efficiency of water heater (217)m	86.0528	85.7139	85.1502	84.1281	82.5012	79.8000	79.8000	79.8000	79.8000	84.0371	85.5231	79.8000 (216)
Fuel for water heating, kWh/month	253.5167	225.0760	240.9392	215.3068	213.3733	199.4150	197.4147	204.9896	206.9153	218.3358	227.1624	250.6590 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.6574	16.5721	14.9214	10.9320	8.4442	6.8990	7.7031	10.0128	13.0056	17.0641	19.2738	21.2315 (232)

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Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-18.7385	-27.7653	-41.9240	-49.5981	-55.6485	-52.7394	-52.0978	-48.1056	-41.4454	-32.8219	-21.0745	-16.0473	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-6.8557	-14.7294	-29.8557	-45.7034	-61.2813	-61.8827	-61.1532	-51.3867	-37.1549	-21.3430	-9.2421	-5.3985	(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												2923.9826	(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												2653.1038	(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)												166.7171	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-863.9928	(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												4965.8108	(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	2923.9826	0.2100	614.0363	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2653.1038	0.2100	557.1518	(264)
Space and water heating			1171.1882	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	166.7171	0.1443	24.0624	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.0062	0.1336	-61.1668	
PV Unit electricity exported	-405.9865	0.1253	-50.8874	
Total			-112.0542	(269)
Total CO2, kg/year			1095.1257	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.6600	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2923.9826	1.1300	3304.1004	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2653.1038	1.1300	2998.0073	(278)
Space and water heating			6302.1077	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	166.7171	1.5338	255.7163	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.0062	1.4935	-684.0414	
PV Unit electricity exported	-405.9865	0.4601	-186.7809	
Total			-870.8223	(283)
Total Primary energy kWh/year			5817.1025	(286)
Target Primary Energy Rate (TPER)			83.2000	(287)

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Plot Reference	Plot 17			Issued on Date	22/12/2025	
Assessment Reference	Plot 17		Plot Type Ref			
Plot Address	Flat 6, 8 Cross Road Manchester, M21 9SB			SAP Version	10.2	
SAP Rating	81 B	DER	5.27	TER	15.66	
Environmental	96 A	% DER < TER			66.35	
CO ₂ Emissions (t/year)	0.32	DFEE	36.95	TFEE	46.48	
Compliance Check	See BREL	% DFEE < TFEE			20.50	
% DPER < TPER	34.62	DPER	54.40	TPER	83.20	
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	69.9200	2.5000	174.8000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		
Dwelling volume			

2. Ventilation rate

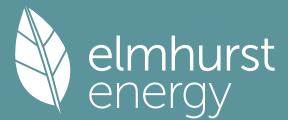
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1144 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.9500 (17)
Infiltration rate	0.2619 (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) = 0.2226 (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	0.2839	0.2783	0.2727	0.2449	0.2393	0.2115	0.2115	0.2059	0.2226	0.2393	0.2505	0.2616 (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	0.5403	0.5387	0.5372	0.5300	0.5286	0.5224	0.5224	0.5212	0.5248	0.5286	0.5314	0.5342 (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			4.7400	1.3258	6.2841		(27)
Window S/W			13.3200	1.3258	17.6591		(27)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
External Roof	64.6000		64.6000	0.1500	9.6900	9.0000	581.4000 (30)
Total net area of external elements Aum(A, m ²)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.6068		(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000	45.0000	741.6000 (32)
Corridor			25.3000	0.0000	0.0000	45.0000	1138.5000 (32)
Party Floor 1			69.9200			40.0000	2796.8000 (32d)
Party Ceiling			5.3200			30.0000	159.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13384.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							191.4316 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				31.5600	0.0370	1.1677	

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P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000										
E2 Other lintels (including other steel lintels)	8.8800	0.0250	0.2220										
E3 Sill	1.2500	0.0220	0.0275										
E4 Jamb	36.1400	0.0170	0.6144										
E16 Corner (normal)	10.7200	0.0420	0.4502										
E18 Party wall between dwellings	2.6800	0.0320	0.0858										
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804										
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0750	0.3690										
E15 Flat roof with parapet	30.6900	0.1320	4.0511										
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.1500	0.9240										
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.0400	0.3428										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.3349	(36)
Point Thermal Bridges												0.0000	
Total fabric heat loss												(33) + (36) + (36a) =	53.9417 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	31.1659	31.0756	30.9872	30.5717	30.4940	30.1321	30.1321	30.0651	30.2715	30.4940	30.6512	30.8156	(38)
Average = Sum(39)m / 12 =	85.1075	85.0173	84.9288	84.5134	84.4356	84.0738	84.0738	84.0068	84.2132	84.4356	84.5929	84.7573	(39)
												84.5130	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2172	1.2159	1.2147	1.2087	1.2076	1.2024	1.2024	1.2015	1.2044	1.2076	1.2099	1.2122	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.2087	
												31	
4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292	(42b)
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127	(42c)
Average daily hot water use (litres/day)													58.9665 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	64.3322	62.5676	60.6411	58.2430	56.1038	53.8806	53.4185	55.3411	57.3130	59.5962	62.0155	64.2419	(44)
Energy content (annual)	101.8865	89.0955	93.2031	79.7318	75.5265	66.2524	64.6050	68.5239	70.6727	80.8714	88.3524	100.5872	(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):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	86.6035	75.7312	79.2226	67.7720	64.1975	56.3146	54.9143	58.2453	60.0718	68.7407	75.0995	85.4992	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	86.6035	75.7312	79.2226	67.7720	64.1975	56.3146	54.9143	58.2453	60.0718	68.7407	75.0995	85.4992	(64)
12Total per year (kWh/year)													832.4121 (64)
Electric shower(s)	49.5293	44.1310	48.1894	45.9865	46.8494	44.6898	46.1795	46.8494	45.9865	48.1894	47.2832	49.5293	(64a)
Heat gains from water heating, kWh/month	34.0332	29.9655	31.8530	28.4396	27.7617	25.2511	25.2734	26.2737	26.5146	29.2325	30.5957	33.7571	(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	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.4195	110.0716	99.4195	102.7335	99.4195	102.7335	99.4195	99.4195	102.7335	99.4195	102.7335	99.4195	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.1103	199.1557	194.0013	183.0284	169.1771	156.1588	147.4618	145.4164	150.5707	161.5436	175.3949	188.4132	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	(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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	(71)
Water heating gains (Table 5)	45.7435	44.5916	42.8132	39.4995	37.3142	35.0710	33.9697	35.3141	36.8258	39.2910	42.4940	45.3725	(72)
Total internal gains	398.9360	410.4815	392.8967	381.9241	362.5735	350.6260	337.5136	336.8127	346.7927	356.9168	377.2851	389.8679	(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)						
Northwest	2.9000	11.2829	0.4000	0.0000	0.7700	10.0779	(81)						
South	9.9400	46.7521	0.4000	0.0000	0.7700	143.1324	(78)						
West	3.3800	19.6403	0.4000	0.0000	0.7700	20.4463	(80)						
Solar gains	179.6828	306.4415	421.0002	525.6831	593.3473	591.2791	569.1145	518.1445	457.0982	339.0759	215.2695	153.7474	(83)
Total gains	578.6188	716.9230	813.8969	907.6072	955.9207	941.9051	906.6282	854.9572	803.8909	695.9927	592.5546	543.6154	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.6862	43.7326	43.7782	43.9934	44.0339	44.2234	44.2234	44.2587	44.1502	44.0339	43.9520	43.8668
alpha	3.9124	3.9155	3.9185	3.9329	3.9356	3.9482	3.9482	3.9506	3.9433	3.9356	3.9301	3.9245
util living area	0.9822	0.9605	0.9230	0.8419	0.7126	0.5426	0.4009	0.4410	0.6531	0.8783	0.9653	0.9858 (86)
MIT	19.4187	19.7388	20.1093	20.5199	20.8066	20.9498	20.9880	20.9826	20.8958	20.5042	19.8787	19.3519 (87)
Th 2	19.9063	19.9073	19.9083	19.9130	19.9139	19.9181	19.9181	19.9188	19.9165	19.9139	19.9121	19.9102 (88)
util rest of house	0.9778	0.9513	0.9053	0.8072	0.6547	0.4612	0.3057	0.3423	0.5724	0.8430	0.9555	0.9822 (89)
MIT 2	18.4928	18.8060	19.1629	19.5450	19.7881	19.8944	19.9146	19.9134	19.8613	19.5429	18.9510	18.4300 (90)
Living area fraction									fLA = Living area / (4) =			0.4238 (91)
MIT	18.8852	19.2013	19.5639	19.9581	20.2197	20.3417	20.3695	20.3665	20.2997	19.9503	19.3441	18.8207 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8852	19.2013	19.5639	19.9581	20.2197	20.3417	20.3695	20.3665	20.2997	19.9503	19.3441	18.8207 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9724	0.9440	0.8988	0.8088	0.6719	0.4940	0.3460	0.3839	0.6024	0.8443	0.9491	0.9775 (94)
Useful gains	562.6510	676.7427	731.5611	734.0502	642.2688	465.2788	313.6487	328.2478	484.2460	587.6395	562.3911	531.3777 (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	1241.3109	1215.8580	1109.5051	934.5608	719.3668	482.7235	316.9165	333.2099	522.0943	789.4975	1035.7674	1239.2106 (97)
Space heating kWh	504.9230	362.2855	281.1903	144.3676	57.3609	0.0000	0.0000	0.0000	0.0000	150.1823	340.8309	526.6277 (98a)
Space heating requirement - total per year (kWh/year)												2367.7683
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	504.9230	362.2855	281.1903	144.3676	57.3609	0.0000	0.0000	0.0000	0.0000	150.1823	340.8309	526.6277 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2367.7683
Space heating per m2												(98c) / (4) = 33.8640 (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	790.2937	622.1461	638.4516	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8967	0.9401	0.9242	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	708.6449	584.8655	590.0320	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1063.5410	1024.2529	965.7874	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	255.5252	326.9043	279.5621	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	63.8813	81.7261	69.8905	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												215.4979 (107)
Energy for space heating												33.8640 (99)
Energy for space cooling												3.0821 (108)
Total												36.9460 (109)
Fabric Energy Efficiency (DFEE)												36.9 (109)

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

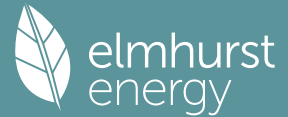
1. Overall dwelling characteristics

Main dwelling		Area (m2)	Storey height (m)	Volume (m3)
Ground floor	69.9200 (1b)	x	2.5000 (2b)	= 174.8000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.8000 (5)

2. Ventilation rate

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

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Number of flueless gas fires

0 * 40 = 0.0000 (7c)

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

Air changes per hour
20.0000 / (5) = 0.1144 (8)
Yes
Blower Door
5.0000 (17)
0.3644 (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) = 0.3098 (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	0.3949	0.3872	0.3794	0.3407	0.3330	0.2943	0.2943	0.2865	0.3098	0.3330	0.3485	0.3640 (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	0.5780	0.5750	0.5720	0.5580	0.5554	0.5433	0.5433	0.5410	0.5480	0.5554	0.5607	0.5662 (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			17.5000	1.1450	20.0382		(27)
EXT Wall	84.5800	17.5000	67.0800	0.1800	12.0744		(29a)
External Roof	64.6000		64.6000	0.1100	7.1060		(30)
Total net area of external elements Aum(A, m2)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 39.2186		(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000		(32)
Corridor			25.3000	0.0000	0.0000		(32)

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

191.4316 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0700	2.2092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0500	0.4440
E3 Sill	1.2500	0.0500	0.0625
E4 Jamb	36.1400	0.0500	1.8070
E16 Corner (normal)	10.7200	0.0900	0.9648
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	2.6800	0.0600	0.1608
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0200	0.0984
E15 Flat roof with parapet	30.6900	0.5600	17.1864
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.2400	1.4784
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.1200	1.0284

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

25.6007 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 64.8193 (37)

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

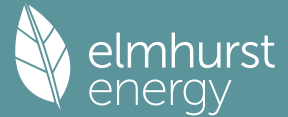
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	33.3406	33.1659	32.9947	32.1905	32.0400	31.3395	31.3395	31.2098	31.6093	32.0400	32.3444	32.6626 (38)
Heat transfer coeff	98.1599	97.9852	97.8140	97.0097	96.8593	96.1588	96.1588	96.0291	96.4286	96.8593	97.1637	97.4819 (39)
Average = Sum(39)m / 12 =												97.0090

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.4039	1.4014	1.3989	1.3874	1.3853	1.3753	1.3753	1.3734	1.3791	1.3853	1.3896	1.3942 (40)
HLP (average)												1.3874
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292	(42b)
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127	(42c)
Average daily hot water use (litres/day)													58.9665 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	64.3322	62.5676	60.6411	58.2430	56.1038	53.8806	53.4185	55.3411	57.3130	59.5962	62.0155	64.2419	(44)
Energy conte	101.8865	89.0955	93.2031	79.7318	75.5265	66.2524	64.6050	68.5239	70.6727	80.8714	88.3524	100.5872	(45)
Energy content (annual)										Total = Sum(45)m =			979.3084
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (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	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
86.6035	75.7312	79.2226	67.7720	64.1975	56.3146	54.9143	58.2453	60.0718	68.7407	75.0995	85.4992	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
86.6035	75.7312	79.2226	67.7720	64.1975	56.3146	54.9143	58.2453	60.0718	68.7407	75.0995	85.4992	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		832.4121	(64)
Electric shower(s)												832	(64)
49.5293	44.1310	48.1894	45.9865	46.8494	44.6898	46.1795	46.8494	45.9865	48.1894	47.2832	49.5293	(64a)	

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Heat gains from water heating, kWh/month
 34.0332 29.9655 31.8530 28.4396 27.7617 25.2511 25.2734 26.2737 26.5146 29.2325 30.5957 33.7571 (65)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 563.3927 (64a)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.4195	110.0716	99.4195	102.7335	99.4195	102.7335	99.4195	99.4195	102.7335	99.4195	102.7335	99.4195	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.1103	199.1557	194.0013	183.0284	169.1771	156.1588	147.4618	145.4164	150.5707	161.5436	175.3949	188.4132	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	(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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	(71)
Water heating gains (Table 5)	45.7435	44.5916	42.8132	39.4995	37.3142	35.0710	33.9697	35.3141	36.8258	39.2910	42.4940	45.3725	(72)
Total internal gains	398.9360	410.4815	392.8967	381.9241	362.5735	350.6260	337.5136	336.8127	346.7927	356.9168	377.2851	389.8679	(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				1.7800	10.6334	0.6300	0.7000	0.7700			5.7845 (74)		
South				9.6400	46.7521	0.6300	0.7000	0.7700			137.7367 (78)		
West				3.2700	19.6403	0.6300	0.7000	0.7700			19.6276 (80)		
Northwest				2.8100	11.2829	0.6300	0.7000	0.7700			9.6895 (81)		
Solar gains	172.8382	294.7506	404.8968	505.5139	570.5326	568.5241	547.2206	498.2450	439.5925	326.1281	207.0660	147.8931	(83)
Total gains	571.7743	705.2321	797.7935	887.4381	933.1060	919.1501	884.7343	835.0577	786.3852	683.0450	584.3512	537.7610	(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	37.8773	37.9448	38.0112	38.3263	38.3859	38.6655	38.6655	38.7177	38.5573	38.3859	38.2656	38.1407	
alpha	3.5252	3.5297	3.5341	3.5551	3.5591	3.5777	3.5777	3.5812	3.5705	3.5591	3.5510	3.5427	
util living area	0.9840	0.9669	0.9382	0.8747	0.7667	0.6069	0.4598	0.5021	0.7119	0.9027	0.9704	0.9869	(86)
MIT	19.0829	19.4043	19.8061	20.2896	20.6686	20.8968	20.9708	20.9597	20.8110	20.3015	19.6007	19.0249	(87)
Th 2	19.7604	19.7623	19.7641	19.7730	19.7746	19.7823	19.7823	19.7838	19.7794	19.7746	19.7713	19.7678	(88)
util rest of house	0.9798	0.9586	0.9224	0.8424	0.7073	0.5126	0.3408	0.3809	0.6246	0.8702	0.9614	0.9835	(89)
MIT 2	18.0557	18.3722	18.7632	19.2241	19.5563	19.7337	19.7742	19.7715	19.6783	19.2486	18.5758	18.0037	(90)
Living area fraction	18.4910	18.8096	19.2052	19.6756	20.0277	20.2266	20.2813	20.2750	20.1583	19.6948	19.0101	18.4365	(91)
MIT	18.4910	18.8096	19.2052	19.6756	20.0277	20.2266	20.2813	20.2750	20.1583	19.6948	19.0101	18.4365	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4910	18.8096	19.2052	19.6756	20.0277	20.2266	20.2813	20.2750	20.1583	19.6948	19.0101	18.4365	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9740	0.9503	0.9137	0.8395	0.7207	0.5487	0.3909	0.4316	0.6539	0.8677	0.9542	0.9784	(94)
Ext temp.	556.9057	670.2023	728.9213	744.9801	672.4473	504.3811	345.8532	360.4148	514.2312	592.6673	557.5976	526.1485	(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	1392.9882	1362.9337	1242.7422	1045.3387	806.6110	541.0444	353.9885	372.1150	584.1930	880.9130	1157.2312	1387.7996	(97)
Space heating requirement - total per year (kWh/year)	622.0454	465.5155	382.2827	216.2582	99.8177	0.0000	0.0000	0.0000	0.0000	214.4548	431.7362	641.0684	(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)	622.0454	465.5155	382.2827	216.2582	99.8177	0.0000	0.0000	0.0000	0.0000	214.4548	431.7362	641.0684	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3073.1790	
Space heating per m ²												43.9528	(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	903.8925	711.5749	729.8208	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8318	0.8915	0.8692	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	751.8382	634.3753	634.3302	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1036.9442	998.6626	942.5283	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	205.2763	271.0297	229.2994	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									f _c = 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	51.3191	67.7574	57.3248	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												176.4014	(107)

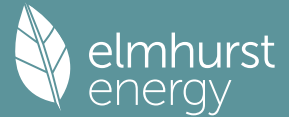
Full SAP Calculation Printout



Energy for space heating
Energy for space cooling
Total
Fabric Energy Efficiency (TFEE)

43.9528 (99)
2.5229 (108)
46.4757 (109)
46.5 (109)

Full SAP Calculation Printout



Plot Reference	Plot 17				Issued on Date	22/12/2025	
Assessment Reference	Plot 17			Plot Type Ref			
Plot Address	Flat 6, 8 Cross Road Manchester, M21 9SB				SAP Version	10.2	
SAP Rating	81 B	DER	5.27	TER	15.66		
Environmental	96 A	% DER < TER				66.35	
CO ₂ Emissions (t/year)	0.32	DFEE	36.95	TFEE	46.48		
Compliance Check	See BREL	% DFEE < TFEE				20.50	
% DPER < TPER	34.62	DPER	54.40	TPER	83.20		
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	69.9200 (1b)	2.5000 (2b)	174.8000 (1b)	- (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200			(4)
Dwelling volume			174.8000 (5)	(3a)+(3b)+(3c)+(3d)+(3e)...(3n)

2. Ventilation rate

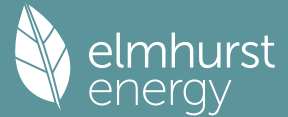
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.9500 (17)
Infiltration rate	0.1475 (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) = 0.1254 (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	0.1599	0.1567	0.1536	0.1379	0.1348	0.1191	0.1191	0.1160	0.1254	0.1348	0.1410	0.1473 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2999	0.2967	0.2936	0.2779	0.2748	0.2591	0.2591	0.2560	0.2654	0.2748	0.2810	0.2873 (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			4.7400	1.3258	6.2841		(27)
Window S/W			13.3200	1.3258	17.6591		(27)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
External Roof	64.6000		64.6000	0.1500	9.6900	9.0000	581.4000 (30)
Total net area of external elements Aum(A, m ²)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 45.6068		(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000	45.0000	741.6000 (32)
Corridor			25.3000	0.0000	0.0000	45.0000	1138.5000 (32)
Party Floor 1			69.9200			40.0000	2796.8000 (32d)
Party Ceiling			5.3200			30.0000	159.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13384.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							191.4316 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0250	0.2220
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	36.1400	0.0170	0.6144
E16 Corner (normal)	10.7200	0.0420	0.4502
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0750	0.3690
E15 Flat roof with parapet	30.6900	0.1320	4.0511
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.1500	0.9240
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.0400	0.3428
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.3349 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	53.9417 (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	17.2967	17.1159	16.9351	16.0311	15.8503	14.9463	14.9463	14.7655	15.3079	15.8503	16.2119	16.5735 (38)
Heat transfer coeff	71.2384	71.0576	70.8768	69.9728	69.7920	68.8879	68.8879	68.7071	69.2496	69.7920	70.1536	70.5152 (39)
Average = Sum(39)m / 12 =												69.9276
HLP	1.0189	1.0163	1.0137	1.0008	0.9982	0.9852	0.9852	0.9827	0.9904	0.9982	1.0033	1.0085 (40)
HLP (average)												1.0001
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers	61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102 (42a)	
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292 (42b)	
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127 (42c)	
Average daily hot water use (litres/day)												115.9876 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521 (44)	
Distribution loss (46)m = 0.15 x (45)m	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540 (45)	
Water storage loss (or HIU loss):	Total = Sum(45)m =											1926.5295	
Store volume	29.9756	26.3762	27.7125	23.6585	22.4471	19.6999	19.0724	20.1333	20.6875	23.6968	25.9616	29.5581 (46)	
a) If manufacturer declared loss factor is known (kWh/day):												201.0000 (47)	
Temperature factor from Table 2b												1.6100 (48)	
Enter (49) or (54) in (55)												0.5400 (49)	
Total storage loss												0.8694 (55)	
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)	
Primary loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
WWHRS	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (62)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
12Total per year (kWh/year)	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (64)	
Electric shower(s)	Total per year (kWh/year) = Sum(64)m =											2243.8605 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	
Heat gains from water heating, kWh/month													
	66.4459	58.4673	61.4293	52.4431	49.7577	43.6680	42.2772	44.6288	45.8572	52.5279	57.5481	65.5204 (65)	

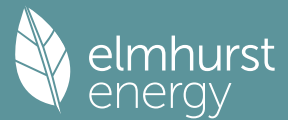
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.4195	110.0716	99.4195	102.7335	99.4195	102.7335	99.4195	99.4195	102.7335	99.4195	102.7335	99.4195 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.1103	199.1557	194.0013	183.0284	169.1771	156.1588	147.4618	145.4164	150.5707	161.5436	175.3949	188.4132 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209 (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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672 (71)
Water heating gains (Table 5)	89.3090	87.0049	82.5663	72.8376	66.8787	60.6500	56.8242	59.9849	63.6906	70.6020	79.9280	88.0651 (72)
Total internal gains	442.5015	452.8949	432.6498	415.2623	392.1380	376.2050	360.3682	361.4835	373.6575	388.2278	414.7191	432.5606 (73)

6. Solar gains

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

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Northwest	2.9000	11.2829	0.4000	0.0000	0.7700	10.0779 (81)
South	9.9400	46.7521	0.4000	0.0000	0.7700	143.1324 (78)
West	3.3800	19.6403	0.4000	0.0000	0.7700	20.4463 (80)

Solar gains	179.6828	306.4415	421.0002	525.6831	593.3473	591.2791	569.1145	518.1445	457.0982	339.0759	215.2695	153.7474 (83)
Total gains	622.1843	759.3363	853.6500	940.9454	985.4853	967.4841	929.4828	879.6280	830.7557	727.3037	629.9886	586.3080 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	52.1914	52.3242	52.4576	53.1354	53.2730	53.9721	53.9721	54.1141	53.6903	53.2730	52.9984	52.7266
alpha	4.4794	4.4883	4.4972	4.5424	4.5515	4.5981	4.5981	4.6076	4.5794	4.5515	4.5332	4.5151
util living area	0.9731	0.9403	0.8850	0.7738	0.6214	0.4489	0.3248	0.3572	0.5548	0.8190	0.9464	0.9785 (86)
MIT	19.8675	20.1659	20.4717	20.7692	20.9285	20.9872	20.9977	20.9964	20.9670	20.7465	20.2628	19.8128 (87)
Th 2	20.0676	20.0698	20.0719	20.0827	20.0849	20.0957	20.0957	20.0978	20.0913	20.0849	20.0806	20.0762 (88)
util rest of house	0.9671	0.9282	0.8633	0.7369	0.5700	0.3881	0.2587	0.2882	0.4888	0.7793	0.9333	0.9736 (89)
MIT 2	18.7703	19.1411	19.5117	19.8602	20.0262	20.0879	20.0948	20.0963	20.0692	19.8469	19.2751	18.7082 (90)
Living area fraction	19.2353	19.5754	19.9185	20.2454	20.4085	20.4690	20.4774	20.4778	20.4497	20.2281	19.6937	19.1763 (92)
MIT	19.2353	19.5754	19.9185	20.2454	20.4085	20.4690	20.4774	20.4778	20.4497	20.2281	19.6937	19.1763 (93)
Temperature adjustment												0.0000
adjusted MIT	19.2353	19.5754	19.9185	20.2454	20.4085	20.4690	20.4774	20.4778	20.4497	20.2281	19.6937	19.1763 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9604	0.9206	0.8593	0.7438	0.5886	0.4135	0.2867	0.3174	0.5154	0.7860	0.9268	0.9675 (94)
Useful gains	597.5210	699.0626	733.5725	699.9003	580.0770	400.0113	266.4891	279.1899	428.1446	571.6563	583.8657	567.2677 (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	1063.9634	1042.7964	951.0616	793.8709	607.7866	404.3027	267.1054	280.1721	439.7135	671.9675	883.4911	1056.0553 (97)
Space heating kWh	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (98a)
Space heating requirement - total per year (kWh/year)												1482.1286
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1482.1286
Space heating per m2										(98c) / (4) =		21.1975 (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	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (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)	347.0331	230.9891	161.8119	67.6588	20.6160	0.0000	0.0000	0.0000	0.0000	74.6315	215.7303	363.6580 (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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (64)
Efficiency of water heater (217)m	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106 (216)
Fuel for water heating, kWh/month	65.8483	58.1239	61.4677	53.3682	51.2756	45.7054	44.7434	46.7968	47.6172	53.6946	57.8261	65.0402 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.5841	12.2695	13.5841	13.1459	13.5841	13.1459	13.5841	13.5841	13.1459	13.5841	13.1459	13.5841 (231)
Lighting	18.2957	14.6775	13.2154	9.6822	7.4788	6.1103	6.8224	8.8680	11.5187	15.1132	17.0703	18.8042 (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												1482.1286 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	344.4106	
Water heating fuel used	651.5074	(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)	159.9420	(230a)
Total electricity for the above, kWh/year	159.9420	(231)
Electricity for lighting (calculated in Appendix L)	147.6567	(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	2441.2347	(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	1482.1286	0.1570	232.6798 (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)	651.5074	0.1412	91.9751 (264)
Space and water heating			324.6549 (265)
Pumps, fans and electric keep-hot	159.9420	0.1387	22.1859 (267)
Energy for lighting	147.6567	0.1443	21.3114 (268)
Total CO2, kg/year			368.1523 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.2700 (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	1482.1286	1.5812	2343.4686 (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)	651.5074	1.5220	991.6069 (278)
Space and water heating			3335.0755 (279)
Pumps, fans and electric keep-hot	159.9420	1.5128	241.9603 (281)
Energy for lighting	147.6567	1.5338	226.4808 (282)
Total Primary energy kWh/year			3803.5166 (286)
Dwelling Primary energy Rate (DPER)			54.4000 (287)

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

CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.9200 (1b)	x 2.5000 (2b)	= 174.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 174.8000 (5)

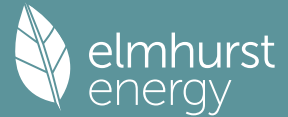
2. Ventilation rate

	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) =	0.1144 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3644	(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) =	0.3098 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)

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Adj infilt rate	0.3949	0.3872	0.3794	0.3407	0.3330	0.2943	0.2943	0.2865	0.3098	0.3330	0.3485	0.3640 (22b)
Effective ac	0.5780	0.5750	0.5720	0.5580	0.5554	0.5433	0.5433	0.5410	0.5480	0.5554	0.5607	0.5662 (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			17.5000	1.1450	20.0382		(27)
EXT Wall	84.5800	17.5000	67.0800	0.1800	12.0744		(29a)
External Roof	64.6000		64.6000	0.1100	7.1060		(30)
Total net area of external elements Aum(A, m2)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		39.2186		(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000		(32)
Corridor			25.3000	0.0000	0.0000		(32)

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

191.4316 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0700	2.2092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0500	0.4440
E3 Sill	1.2500	0.0500	0.0625
E4 Jamb	36.1400	0.0500	1.8070
E16 Corner (normal)	10.7200	0.0900	0.9648
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	2.6800	0.0600	0.1608
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0200	0.0984
E15 Flat roof with parapet	30.6900	0.5600	17.1864
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.2400	1.4784
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.1200	1.0284

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

25.6007 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 64.8193 (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	33.3406	33.1659	32.9947	32.1905	32.0400	31.3395	31.3395	31.2098	31.6093	32.0400	32.3444	32.6626 (38)
Heat transfer coeff	98.1599	97.9852	97.8140	97.0097	96.8593	96.1588	96.1588	96.0291	96.4286	96.8593	97.1637	97.4819 (39)
Average = Sum(39)m / 12 =												97.0090

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.4039	1.4014	1.3989	1.3874	1.3853	1.3753	1.3753	1.3734	1.3791	1.3853	1.3896	1.3942 (40)
HLP (average)												1.3874
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

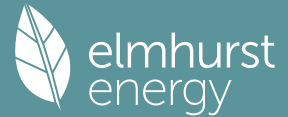
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers	61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102 (42a)	
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292 (42b)	
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127 (42c)	
Average daily hot water use (litres/day)												115.9876 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521 (44)	
Energy content (annual)	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540 (45)	
Distribution loss (46)m = 0.15 x (45)m	29.9756	26.3762	27.7125	23.6585	22.4471	19.6999	19.0724	20.1333	20.6875	23.6968	25.9616	29.5581 (46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
WWHRS	246.4322	217.9273	231.3447	202.8154	196.2422	176.4242	173.7445	180.8168	183.0084	204.5734	218.1690	243.6489 (62)	
PV diverter	-28.2739	-25.0057	-26.1845	-21.6818	-20.2067	-17.2910	-16.2076	-17.2351	-17.8899	-21.0903	-23.8927	-27.7504 (63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
	218.1582	192.9215	205.1601	181.1336	176.0355	159.1332	157.5369	163.5817	165.1184	183.4832	194.2762	215.8985 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2212.4372 (64)	
Electric shower(s)												2212 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000 (64a)	
Heat gains from water heating, kWh/month													
	103.7218	92.1359	98.7052	88.5166	87.0337	79.7415	79.5532	81.9047	81.9307	89.8038	93.6216	102.7964 (65)	

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

Metabolic gains (Table 5), Watts												
(66)m	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
99.4195	110.0716	99.4195	102.7335	99.4195	102.7335	99.4195	99.4195	102.7335	99.4195	102.7335	99.4195	99.4195 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	197.1103 (calculated in Appendix L, equation L15 or L15a), also see Table 5	199.1557	194.0013	183.0284	169.1771	156.1588	147.4618	145.4164	150.5707	161.5436	175.3949	188.4132 (68)
Pumps, fans	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209	34.2209 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672 (71)
Total internal gains	139.4111	137.1070	132.6683	122.9397	116.9807	110.7521	106.9263	110.0870	113.7927	120.7040	130.0300	138.1672 (72)
	495.6035	505.9969	485.7519	468.3643	445.2400	426.3070	410.4703	411.5855	423.7595	441.3298	467.8212	485.6626 (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				1.7800	10.6334	0.6300	0.7000	0.7700	5.7845 (74)			
South				9.6400	46.7521	0.6300	0.7000	0.7700	137.7367 (78)			
West				3.2700	19.6403	0.6300	0.7000	0.7700	19.6276 (80)			
Northwest				2.8100	11.2829	0.6300	0.7000	0.7700	9.6895 (81)			

Solar gains	172.8382	294.7506	404.8968	505.5139	570.5326	568.5241	547.2206	498.2450	439.5925	326.1281	207.0660	147.8931 (83)
Total gains	668.4418	800.7475	890.6486	973.8783	1015.7726	994.8311	957.6909	909.8305	863.3520	767.4580	674.8872	633.5557 (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	37.8773	37.9448	38.0112	38.3263	38.3859	38.6655	38.6655	38.7177	38.5573	38.3859	38.2656	38.1407
alpha	3.5252	3.5297	3.5341	3.5551	3.5591	3.5777	3.5777	3.5812	3.5705	3.5591	3.5510	3.5427
util living area	0.9745	0.9528	0.9182	0.8469	0.7316	0.5710	0.4282	0.4660	0.6705	0.8727	0.9555	0.9785 (86)
MIT	19.2410	19.5488	19.9297	20.3763	20.7181	20.9152	20.9767	20.9682	20.8452	20.3966	19.7396	19.1841 (87)
Th 2	19.7604	19.7623	19.7641	19.7730	19.7746	19.7823	19.7823	19.7838	19.7794	19.7746	19.7713	19.7678 (88)
util rest of house	0.9681	0.9416	0.8986	0.8105	0.6696	0.4789	0.3158	0.3513	0.5822	0.8340	0.9429	0.9731 (89)
MIT 2	17.7716	18.1568	18.6273	19.1643	19.5409	19.7320	19.7742	19.7716	19.6759	19.2044	18.4080	17.7048 (90)
Living area fraction	FLA = Living area / (4) = 0.4238 (91)											
MIT	18.3943	18.7467	19.1792	19.6779	20.0398	20.2334	20.2838	20.2787	20.1714	19.7096	18.9723	18.3317 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.3943	18.7467	19.1792	19.6779	20.0398	20.2334	20.2838	20.2787	20.1714	19.7096	18.9723	18.3317 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9587	0.9298	0.8874	0.8073	0.6841	0.5145	0.3632	0.3993	0.6125	0.8316	0.9323	0.9645 (94)
Ext temp.	640.8206	744.5713	790.3983	786.2168	694.8728	511.8131	347.8027	363.3344	528.7683	638.2104	629.1639	611.0591 (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	1383.4925	1356.7722	1240.2015	1045.5658	807.7842	541.7011	354.2289	372.4688	585.4569	882.3488	1153.5587	1377.5844 (97)
Space heating requirement - total per year (kWh/year)	552.5479	411.3990	334.6536	186.7313	84.0061	0.0000	0.0000	0.0000	0.0000	181.6390	377.5643	570.2949 (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)	552.5479	411.3990	334.6536	186.7313	84.0061	0.0000	0.0000	0.0000	0.0000	181.6390	377.5643	570.2949 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2698.8359 (98c) / (4) = 38.5989 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	552.5479	411.3990	334.6536	186.7313	84.0061	0.0000	0.0000	0.0000	0.0000	181.6390	377.5643	570.2949 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	598.6434	445.7194	362.5716	202.3091	91.0142	0.0000	0.0000	0.0000	0.0000	196.7919	409.0620	617.8709 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (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 requirement	218.1582	192.9215	205.1601	181.1336	176.0355	159.1332	157.5369	163.5817	165.1184	183.4832	194.2762	215.8985 (64)
Efficiency of water heater (217)m	86.0528	85.7139	85.1502	84.1281	82.5012	79.8000	79.8000	79.8000	79.8000	84.0371	85.5231	79.8000 (216)
Fuel for water heating, kWh/month	253.5167	225.0760	240.9392	215.3068	213.3733	199.4150	197.4147	204.9896	206.9153	218.3358	227.1624	250.6590 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.6574	16.5721	14.9214	10.9320	8.4442	6.8990	7.7031	10.0128	13.0056	17.0641	19.2738	21.2315 (232)

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Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-18.7385	-27.7653	-41.9240	-49.5981	-55.6485	-52.7394	-52.0978	-48.1056	-41.4454	-32.8219	-21.0745	-16.0473	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-6.8557	-14.7294	-29.8557	-45.7034	-61.2813	-61.8827	-61.1532	-51.3867	-37.1549	-21.3430	-9.2421	-5.3985	(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												2923.9826	(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												2653.1038	(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)												166.7171	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-863.9928	(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												4965.8108	(238)

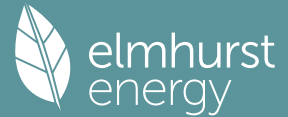
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2923.9826	0.2100	614.0363	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2653.1038	0.2100	557.1518	(264)
Space and water heating			1171.1882	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	166.7171	0.1443	24.0624	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.0062	0.1336	-61.1668	
PV Unit electricity exported	-405.9865	0.1253	-50.8874	
Total			-112.0542	(269)
Total CO2, kg/year			1095.1257	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.6600	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2923.9826	1.1300	3304.1004	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2653.1038	1.1300	2998.0073	(278)
Space and water heating			6302.1077	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	166.7171	1.5338	255.7163	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.0062	1.4935	-684.0414	
PV Unit electricity exported	-405.9865	0.4601	-186.7809	
Total			-870.8223	(283)
Total Primary energy kWh/year			5817.1025	(286)
Target Primary Energy Rate (TPER)			83.2000	(287)

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Plot Reference	Plot 17				Issued on Date	22/12/2025	
Assessment Reference	Plot 17			Plot Type Ref			
Plot Address	Flat 6, 8 Cross Road Manchester, M21 9SB				SAP Version	10.2	
SAP Rating	81 B	DER	5.27	TER	15.66		
Environmental	96 A	% DER < TER				66.35	
CO ₂ Emissions (t/year)	0.32	DFEE	36.95	TFEE	46.48		
Compliance Check	See BREL	% DFEE < TFEE				20.50	
% DPER < TPER	34.62	DPER	54.40	TPER	83.20		
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	69.9200 (1b)	2.5000 (2b)	174.8000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	174.8000 (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	2.9500 (17)
Infiltration rate	0.1475 (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) = 0.1254 (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	0.1599	0.1567	0.1536	0.1379	0.1348	0.1191	0.1191	0.1160	0.1254	0.1348	0.1410	0.1473 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x F _{mv} (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	0.2999	0.2967	0.2936	0.2779	0.2748	0.2591	0.2591	0.2560	0.2654	0.2748	0.2810	0.2873 (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			4.7400	1.3258	6.2841		(27)
Window S/W			13.3200	1.3258	17.6591		(27)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
External Roof	64.6000		64.6000	0.1500	9.6900	9.0000	581.4000 (30)
Total net area of external elements A _{um} (A, m ²)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.6068		(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000	45.0000	741.6000 (32)
Corridor			25.3000	0.0000	0.0000	45.0000	1138.5000 (32)
Party Floor 1			69.9200			40.0000	2796.8000 (32d)
Party Ceiling			5.3200			30.0000	159.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13384.9001 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							191.4316 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0250	0.2220
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	36.1400	0.0170	0.6144
E16 Corner (normal)	10.7200	0.0420	0.4502
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0750	0.3690
E15 Flat roof with parapet	30.6900	0.1320	4.0511
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.1500	0.9240
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.0400	0.3428
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.3349 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	53.9417 (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	17.2967	17.1159	16.9351	16.0311	15.8503	14.9463	14.9463	14.7655	15.3079	15.8503	16.2119	16.5735	(38)
Heat transfer coeff	71.2384	71.0576	70.8768	69.9728	69.7920	68.8879	68.8879	68.7071	69.2496	69.7920	70.1536	70.5152	(39)
Average = Sum(39)m / 12 =												69.9276	
HLP	1.0189	1.0163	1.0137	1.0008	0.9982	0.9852	0.9852	0.9827	0.9904	0.9982	1.0033	1.0085	(40)
HLP (average)												1.0001	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers	61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102	(42a)
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292	(42b)
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127	(42c)
Average daily hot water use (litres/day)												115.9876	(43)
Daily hot water use	126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521	(44)
Energy conte	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540	(45)
Energy content (annual)												1926.5295	
Distribution loss (46)m = 0.15 x (45)m	29.9756	26.3762	27.7125	23.6585	22.4471	19.6999	19.0724	20.1333	20.6875	23.6968	25.9616	29.5581	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (55)													
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	(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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	(64)
Total per year (kWh/year) = Sum(64)m =												2243.8605	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	66.4459	58.4673	61.4293	52.4431	49.7577	43.6680	42.2772	44.6288	45.8572	52.5279	57.5481	65.5204	(65)

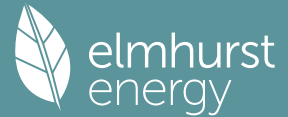
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9023	18.5653	15.0983	11.4304	8.5443	7.2135	7.7944	10.1315	13.5985	17.2664	20.1524	21.4833	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.1944	297.2473	289.5543	273.1768	252.5031	233.0728	220.0922	217.0394	224.7324	241.1099	261.7835	281.2138	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	(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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	(71)
Water heating gains (Table 5)	89.3090	87.0049	82.5663	72.8376	66.8787	60.6500	56.8242	59.9849	63.6906	70.6020	79.9280	88.0651	(72)
Total internal gains	499.9987	498.4103	482.8117	453.0377	423.5190	396.5292	380.3037	382.7487	397.6143	424.5711	457.4568	486.3551	(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)
Northwest	2.9000	11.2829	0.4000	0.0000	0.7700	10.0779 (81)

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South			9.9400		46.7521		0.4000		0.0000		0.7700		143.1324 (78)
West			3.3800		19.6403		0.4000		0.0000		0.7700		20.4463 (80)

Solar gains	179.6828	306.4415	421.0002	525.6831	593.3473	591.2791	569.1145	518.1445	457.0982	339.0759	215.2695	153.7474 (83)
Total gains	679.6814	804.8518	903.8119	978.7208	1016.8663	987.8083	949.4183	900.8932	854.7126	763.6470	672.7263	640.1025 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	52.1914	52.3242	52.4576	53.1354	53.2730	53.9721	53.9721	54.1141	53.6903	53.2730	52.9984	52.7266
alpha	4.4794	4.4883	4.4972	4.5424	4.5515	4.5981	4.5981	4.6076	4.5794	4.5515	4.5332	4.5151
util living area	0.9634	0.9284	0.8664	0.7556	0.6057	0.4402	0.3181	0.3490	0.5412	0.7984	0.9339	0.9705 (86)
MIT	19.9631	20.2304	20.5252	20.7915	20.9354	20.9882	20.9979	20.9968	20.9702	20.7739	20.3252	19.9052 (87)
Th 2	20.0676	20.0698	20.0719	20.0827	20.0849	20.0957	20.0957	20.0978	20.0913	20.0849	20.0806	20.0762 (88)
util rest of house	0.9556	0.9145	0.8426	0.7179	0.5548	0.3804	0.2533	0.2814	0.4761	0.7569	0.9185	0.9640 (89)
MIT 2	18.8892	19.2189	19.5730	19.8832	20.0322	20.0885	20.0948	20.0965	20.0715	19.8749	19.3499	18.8235 (90)
Living area fraction									fLA = Living area / (4) =			0.4238 (91)
MIT	19.3443	19.6476	19.9765	20.2681	20.4149	20.4698	20.4775	20.4780	20.4523	20.2559	19.7632	19.2819 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3443	19.6476	19.9765	20.2681	20.4149	20.4698	20.4775	20.4780	20.4523	20.2559	19.7632	19.2819 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9482	0.9073	0.8399	0.7259	0.5736	0.4053	0.2808	0.3100	0.5024	0.7652	0.9124	0.9572 (94)
Useful gains	644.4445	730.2057	759.1512	710.4288	583.2263	400.3989	266.5504	279.2977	429.4425	584.3205	613.7689	612.6882 (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	1071.7302	1047.9269	955.1719	795.4567	608.2333	404.3560	267.1141	280.1873	439.8940	673.9025	888.3669	1063.5020 (97)
Space heating kWh	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (98a)
Space heating requirement - total per year (kWh/year)												1356.8389
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1356.8389
Space heating per m2										(98c) / (4) =		19.4056 (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	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (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)	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (64)	
Efficiency of water heater (217)m	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106 (216)	
Fuel for water heating, kWh/month	65.8483	58.1239	61.4677	53.3682	51.2756	45.7054	44.7434	46.7968	47.6172	53.6946	57.8261	65.0402 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	13.5841	12.2695	13.5841	13.1459	13.5841	13.1459	13.5841	13.5841	13.1459	13.5841	13.1459	13.5841 (231)	
Lighting	18.2957	14.6775	13.2154	9.6822	7.4788	6.1103	6.8224	8.8680	11.5187	15.1132	17.0703	18.8042 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													1356.8389 (211)
Space heating fuel - main system 2													0.0000 (213)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	344.4106
Water heating fuel used	651.5074 (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)	159.9420 (230a)
Total electricity for the above, kWh/year	159.9420 (231)
Electricity for lighting (calculated in Appendix L)	147.6567 (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	2315.9450 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1356.8389	16.4900	223.7427 (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)	651.5074	16.4900	107.4336 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	159.9420	16.4900	26.3744 (249)
Energy for lighting	147.6567	16.4900	24.3486 (250)
Additional standing charges			0.0000 (251)
Total energy cost			381.8993 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.1963 (257)
SAP value	80.6073
SAP rating (Section 12)	81 (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	1356.8389	0.1571	213.0926 (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)	651.5074	0.1412	91.9751 (264)
Space and water heating			305.0678 (265)
Pumps, fans and electric keep-hot	159.9420	0.1387	22.1859 (267)
Energy for lighting	147.6567	0.1443	21.3114 (268)
Total CO2, kg/year			348.5651 (272)
CO2 emissions per m2			4.9900 (273)
EI value			95.9356
EI rating			96 (274)
EI band			A

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

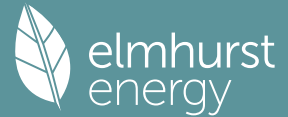
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.9200 (1b)	x 2.5000 (2b)	= 174.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	174.8000 (5)

2. Ventilation rate

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

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.9500 (17)
Infiltration rate 0.1475 (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) = 0.1254 (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	0.1348	0.1316	0.1316	0.1222	0.1254	0.1066	0.1034	0.1034	0.1066	0.1191	0.1191	0.1222	(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	0.2748	0.2716	0.2716	0.2622	0.2654	0.2466	0.2434	0.2434	0.2466	0.2591	0.2591	0.2622	(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			4.7400	1.3258	6.2841			(27)
Window S/W			13.3200	1.3258	17.6591			(27)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002	(29a)
External Roof	64.6000		64.6000	0.1500	9.6900	9.0000	581.4000	(30)
Total net area of external elements Aum(A, m2)			149.1800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 45.6068			(33)
Main dwelling								
Party Wall			16.4800	0.0000	0.0000	45.0000	741.6000	(32)
Corridor			25.3000	0.0000	0.0000	45.0000	1138.5000	(32)
Party Floor 1			69.9200			40.0000	2796.8000	(32d)
Party Ceiling			5.3200			30.0000	159.6000	(32b)
Internal Wall			72.2000			9.0000	649.8000	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13384.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 191.4316 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0250	0.2220
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	36.1400	0.0170	0.6144
E16 Corner (normal)	10.7200	0.0420	0.4502
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0750	0.3690
E15 Flat roof with parapet	30.6900	0.1320	4.0511
E24 Raves (insulation at ceiling level - inverted)	6.1600	0.1500	0.9240
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.0400	0.3428

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.3349 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 53.9417 (37)

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

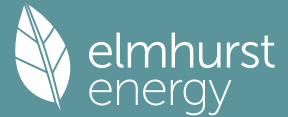
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.8503	15.6695	15.6695	15.1271	15.3079	14.2231	14.0423	14.0423	14.2231	14.9463	14.9463	15.1271	(38)
Heat transfer coeff	69.7920	69.6112	69.6112	69.0687	69.2496	68.1647	67.9839	67.9839	68.1647	68.8879	68.8879	69.0687	(39)
Average = Sum(39)m / 12 =													68.8729

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9982	0.9956	0.9956	0.9878	0.9904	0.9749	0.9723	0.9723	0.9749	0.9852	0.9852	0.9878	(40)
HLP (average)													0.9850
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers													
61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102	61.6102	(42a)
Hot water usage for baths													
26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292	26.6292	(42b)
Hot water usage for other uses													
37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127	37.6127	(42c)
Average daily hot water use (litres/day)													115.9876 (43)
Daily hot water use													
126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521	125.8521	(44)
Energy conte	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540	(45)
Energy content (annual)													Total = Sum(45)m = 1926.5295
Distribution loss (46)m = 0.15 x (45)m													
29.9756	26.3762	27.7125	23.6585	22.4471	19.6999	19.0724	20.1333	20.6875	23.6968	25.9616	29.5581	29.5581	(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													
226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	224.0054	(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)

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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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (64)
Total per year (kWh/year) = Sum(64)m =												2243.8605 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.4459	58.4673	61.4293	52.4431	49.7577	43.6680	42.2772	44.6288	45.8572	52.5279	57.5481	65.5204 (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	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9023	18.5653	15.0983	11.4304	8.5443	7.2135	7.7944	10.1315	13.5985	17.2664	20.1524	21.4833	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.1944	297.2473	289.5543	273.1768	252.5031	233.0728	220.0922	217.0394	224.7324	241.1099	261.7835	281.2138	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	(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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	(71)
Water heating gains (Table 5)	89.3090	87.0049	82.5663	72.8376	66.8787	60.6500	56.8242	59.9849	63.6906	70.6020	79.9280	88.0651	(72)
Total internal gains	499.9987	498.4103	482.8117	453.0377	423.5190	396.5292	380.3037	382.7487	397.6143	424.5711	457.4568	486.3551	(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)				
Northwest					2.9000	9.9768	0.4000	0.0000			0.7700	8.9113 (81)				
South					9.9400	41.2355	0.4000	0.0000			0.7700	126.2434 (78)				
West					3.3800	17.3606	0.4000	0.0000			0.7700	18.0731 (80)				

Solar gains					158.5516	277.3843	398.2029	507.3255	558.7139	570.0628	535.4483	481.1534	444.2889	322.8921	195.2096	138.7567 (83)
Total gains					658.5503	775.7946	881.0146	960.3632	982.2330	966.5920	915.7521	863.9021	841.9033	747.4632	652.6664	625.1118 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	53.2730	53.4114	53.4114	53.8308	53.6903	54.5447	54.6898	54.6898	54.5447	53.9721	53.9721	53.8308	
alpha	4.5515	4.5608	4.5608	4.5887	4.5794	4.6363	4.6460	4.6460	4.6363	4.5981	4.5981	4.5887	
util living area	0.9591	0.9212	0.8484	0.7183	0.5514	0.3713	0.2742	0.3060	0.4988	0.7725	0.9255	0.9668	(86)
MIT	20.0824	20.3307	20.6116	20.8500	20.9623	20.9954	20.9991	20.9985	20.9814	20.8226	20.4170	20.0224	(87)
Th 2	20.0849	20.0870	20.0870	20.0935	20.0913	20.1043	20.1065	20.1065	20.1043	20.0957	20.0957	20.0935	(88)
util rest of house	0.9500	0.9054	0.8212	0.6760	0.4956	0.3096	0.2082	0.2364	0.4322	0.7261	0.9077	0.9594	(89)
MIT 2	19.0522	19.3564	19.6876	19.9560	20.0633	20.1020	20.1062	20.1060	20.0929	19.9372	19.4746	18.9842	(90)
Living area fraction	FLA = Living area / (4) =												0.4238 (91)
MIT	19.4888	19.7693	20.0792	20.3348	20.4442	20.4806	20.4846	20.4842	20.4694	20.3124	19.8740	19.4242	(92)
Temperature adjustment													0.0000
adjusted MIT	19.4888	19.7693	20.0792	20.3348	20.4442	20.4806	20.4846	20.4842	20.4694	20.3124	19.8740	19.4242	(93)

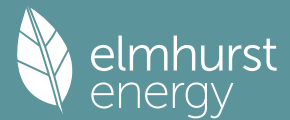
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	620.9612	697.5184	723.2342	660.4243	508.4453	324.4670	216.2980	229.7105	387.0391	551.5222	589.1061	595.4867	(94)
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	997.2412	972.4170	882.6122	720.7217	522.4357	325.8670	216.5015	230.0720	393.2720	620.8459	824.8634	996.2584	(97)
Space heating kWh	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(98a)
Space heating requirement - total per year (kWh/year)													1156.5806
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)													0.0000
Space heating kWh	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													1156.5806
Space heating per m2													(98c) / (4) = 16.5415 (99)

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

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

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(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)	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	(64)
Efficiency of water heater	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	(216)
Fuel for water heating, kWh/month	65.8483	58.1239	61.4677	53.3682	51.2756	45.7054	44.7434	46.7968	47.6172	53.6946	57.8261	65.0402	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.5841	12.2695	13.5841	13.1459	13.5841	13.1459	13.5841	13.5841	13.1459	13.5841	13.1459	13.5841	(231)
Lighting	18.2957	14.6775	13.2154	9.6822	7.4788	6.1103	6.8224	8.8680	11.5187	15.1132	17.0703	18.8042	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1156.5806	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.4106	
Water heating fuel used												651.5074	(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)												159.9420	(230a)
Total electricity for the above, kWh/year												159.9420	(231)
Electricity for lighting (calculated in Appendix L)												147.6567	(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												2115.6867	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1156.5806	28.4300	328.8159	(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)	651.5074	28.4300	185.2235	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	159.9420	28.4300	45.4715	(249)
Energy for lighting	147.6567	28.4300	41.9788	(250)
Additional standing charges			0.0000	(251)
Total energy cost			601.4897	(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	1156.5806	0.1575	182.1622	(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)	651.5074	0.1412	91.9751	(264)
Space and water heating			274.1373	(265)
Pumps, fans and electric keep-hot	159.9420	0.1387	22.1859	(267)
Energy for lighting	147.6567	0.1443	21.3114	(268)
Total CO2, kg/year			317.6347	(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	1156.5806	1.5830	1830.8981	(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)	651.5074	1.5220	991.6069	(278)

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Space and water heating			2822.5051 (279)
Pumps, fans and electric keep-hot	159.9420	1.5128	241.9603 (281)
Energy for lighting	147.6567	1.5338	226.4808 (282)
Total Primary energy kWh/year			3290.9461 (286)

SAP 10 EPC IMPROVEMENTS

Plot 17

Current energy efficiency rating: B 81
Current environmental impact rating: A 96

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

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

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

Potential energy efficiency rating: B 81
Potential environmental impact rating: A 96

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 £601	Potential £601	Saving £0
Electricity			
Space heating	£374	£374	£0
Water heating	£185	£185	£0
Lighting	£42	£42	£0
Total cost of fuels	£601	£601	£0
Total cost of uses	£601	£601	£0
Delivered energy	30 kWh/m²	30 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	5 kg/m²	5 kg/m²	0 kg/m²
Primary energy	47 kWh/m²	47 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.9200 (1b)	x 2.5000 (2b)	= 174.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 174.8000 (5)

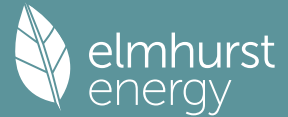
2. Ventilation rate

	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			2.9500 (17)
Infiltration rate			0.1475 (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) =		0.1254 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												

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	0.1599	0.1567	0.1536	0.1379	0.1348	0.1191	0.1191	0.1160	0.1254	0.1348	0.1410	0.1473 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2999	0.2967	0.2936	0.2779	0.2748	0.2591	0.2591	0.2560	0.2654	0.2748	0.2810	0.2873 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			4.7400	1.3258	6.2841			(27)
Window S/W			13.3200	1.3258	17.6591			(27)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002	(29a)
External Roof	64.6000		64.6000	0.1500	9.6900	9.0000	581.4000	(30)
Total net area of external elements Aum(A, m2)			149.1800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		45.6068			(33)
Main dwelling								
Party Wall			16.4800	0.0000	0.0000	45.0000	741.6000	(32)
Corridor			25.3000	0.0000	0.0000	45.0000	1138.5000	(32)
Party Floor 1			69.9200			40.0000	2796.8000	(32d)
Party Ceiling			5.3200			30.0000	159.6000	(32b)
Internal Wall			72.2000			9.0000	649.8000	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 13384.9001 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 191.4316 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	8.8800	0.0250	0.2220
E3 Sill	1.2500	0.0220	0.0275
E4 Jamb	36.1400	0.0170	0.6144
E16 Corner (normal)	10.7200	0.0420	0.4502
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	2.6800	0.0300	0.0804
E9 Balcony between dwellings, wall insulation continuous	4.9200	0.0750	0.3690
E15 Flat roof with parapet	30.6900	0.1320	4.0511
E24 Eaves (insulation at ceiling level - inverted)	6.1600	0.1500	0.9240
P4 Party wall - Roof (insulation at ceiling level)	8.5700	0.0400	0.3428

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.3349 (36)

Point Thermal Bridges 0.0000

Total fabric heat loss (33) + (36) + (36a) = 53.9417 (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	17.2967	17.1159	16.9351	16.0311	15.8503	14.9463	14.9463	14.7655	15.3079	15.8503	16.2119	16.5735 (38)
Heat transfer coeff	71.2384	71.0576	70.8768	69.9728	69.7920	68.8879	68.8879	68.7071	69.2496	69.7920	70.1536	70.5152 (39)
Average = Sum(39)m / 12 =												69.9276

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0189	1.0163	1.0137	1.0008	0.9982	0.9852	0.9852	0.9827	0.9904	0.9982	1.0033	1.0085 (40)
HLP (average)												1.0001
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2442 (42)
Hot water usage for mixer showers												
61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102	(42a)
Hot water usage for baths												
26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292	(42b)
Hot water usage for other uses												
37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127	(42c)
Average daily hot water use (litres/day)												115.9876 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521 (44)
Energy conte	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540 (45)
Energy content (annual)										Total = Sum(45)m =		1926.5295

Distribution loss (46)m = 0.15 x (45)m 29.9756

26.3762 27.7125 23.6585 22.4471 19.6999 19.0724 20.1333 20.6875 23.6968 25.9616 29.5581 (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 226.7887 200.1847 211.7012 183.8056 176.5987 157.4143 154.1010 161.1733 163.9985 184.9299 199.1591 224.0054 (62)

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

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

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

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

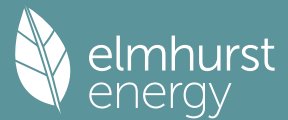
Output from w/h 226.7887 200.1847 211.7012 183.8056 176.5987 157.4143 154.1010 161.1733 163.9985 184.9299 199.1591 224.0054 (64)

Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

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

Heat gains from water heating, kWh/month 66.4459 58.4673 61.4293 52.4431 49.7577 43.6680 42.2772 44.6288 45.8572 52.5279 57.5481 65.5204 (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	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9023	18.5653	15.0983	11.4304	8.5443	7.2135	7.7944	10.1315	13.5985	17.2664	20.1524	21.4833 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.1944	297.2473	289.5543	273.1768	252.5031	233.0728	220.0922	217.0394	224.7324	241.1099	261.7835	281.2138 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093 (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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672 (71)
Water heating gains (Table 5)	89.3090	87.0049	82.5663	72.8376	66.8787	60.6500	56.8242	59.9849	63.6906	70.6020	79.9280	88.0651 (72)
Total internal gains	499.9987	498.4103	482.8117	453.0377	423.5190	396.5292	380.3037	382.7487	397.6143	424.5711	457.4568	486.3551 (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)
Northwest				2.9000	11.2829	0.4000	0.0000			0.7700		10.0779 (81)
South				9.9400	46.7521	0.4000	0.0000			0.7700		143.1324 (78)
West				3.3800	19.6403	0.4000	0.0000			0.7700		20.4463 (80)
Solar gains	179.6828	306.4415	421.0002	525.6831	593.3473	591.2791	569.1145	518.1445	457.0982	339.0759	215.2695	153.7474 (83)
Total gains	679.6814	804.8518	903.8119	978.7208	1016.8663	987.8083	949.4183	900.8932	854.7126	763.6470	672.7263	640.1025 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	52.1914	52.3242	52.4576	53.1354	53.2730	53.9721	53.9721	54.1141	53.6903	53.2730	52.9984	52.7266	
alpha	4.4794	4.4883	4.4972	4.5424	4.5515	4.5981	4.5981	4.6076	4.5794	4.5515	4.5332	4.5151	
util living area	0.9634	0.9284	0.8664	0.7556	0.6057	0.4402	0.3181	0.3490	0.5412	0.7984	0.9339	0.9705 (86)	
MIT	19.9631	20.2304	20.5252	20.7915	20.9354	20.9882	20.9979	20.9968	20.9702	20.7739	20.3252	19.9052 (87)	
Th 2	20.0676	20.0698	20.0719	20.0827	20.0849	20.0957	20.0957	20.0978	20.0913	20.0849	20.0806	20.0762 (88)	
util rest of house	0.9556	0.9145	0.8426	0.7179	0.5548	0.3804	0.2533	0.2814	0.4761	0.7569	0.9185	0.9640 (89)	
MIT 2	18.8892	19.2189	19.5730	19.8832	20.0322	20.0885	20.0948	20.0965	20.0715	19.8749	19.3499	18.8235 (90)	
Living area fraction									fLA = Living area / (4) =			0.4238 (91)	
MIT	19.3443	19.6476	19.9765	20.2681	20.4149	20.4698	20.4775	20.4780	20.4523	20.2559	19.7632	19.2819 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.3443	19.6476	19.9765	20.2681	20.4149	20.4698	20.4775	20.4780	20.4523	20.2559	19.7632	19.2819 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9482	0.9073	0.8399	0.7259	0.5736	0.4053	0.2808	0.3100	0.5024	0.7652	0.9124	0.9572 (94)	
Useful gains	644.4445	730.2057	759.1512	710.4288	583.2263	400.3989	266.5504	279.2977	429.4425	584.3205	613.7689	612.6882 (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	1071.7302	1047.9269	955.1719	795.4567	608.2333	404.3560	267.1141	280.1873	439.8940	673.9025	888.3669	1063.5020 (97)	
Space heating kWh	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (98a)	
Space heating requirement - total per year (kWh/year)												1356.8389	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1356.8389	
Space heating per m2										(98c) / (4) =		19.4056 (99)	

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (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)	317.9005	213.5086	145.8394	61.2201	18.6052	0.0000	0.0000	0.0000	0.0000	66.6490	197.7106	335.4055 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	

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Water heating													
Water heating requirement	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	(64)
Efficiency of water heater												344.4106	(216)
(217)m	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	(217)
Fuel for water heating, kWh/month	65.8483	58.1239	61.4677	53.3682	51.2756	45.7054	44.7434	46.7968	47.6172	53.6946	57.8261	65.0402	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.5841	12.2695	13.5841	13.1459	13.5841	13.1459	13.5841	13.5841	13.1459	13.5841	13.1459	13.5841	(231)
Lighting	18.2957	14.6775	13.2154	9.6822	7.4788	6.1103	6.8224	8.8680	11.5187	15.1132	17.0703	18.8042	(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												1356.8389	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.4106	
Water heating fuel used												651.5074	(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)												159.9420	(230a)
Total electricity for the above, kWh/year												159.9420	(231)
Electricity for lighting (calculated in Appendix L)												147.6567	(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												2315.9450	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1356.8389	16.4900	223.7427	(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)	651.5074	16.4900	107.4336	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	159.9420	16.4900	26.3744	(249)
Energy for lighting	147.6567	16.4900	24.3486	(250)
Additional standing charges			0.0000	(251)
Total energy cost			381.8993	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.1963	(257)
SAP value		80.6073	
SAP rating (Section 12)		81	(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	1356.8389	0.1571	213.0926	(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)	651.5074	0.1412	91.9751	(264)
Space and water heating			305.0678	(265)
Pumps, fans and electric keep-hot	159.9420	0.1387	22.1859	(267)
Energy for lighting	147.6567	0.1443	21.3114	(268)
Total CO2, kg/year			348.5651	(272)
CO2 emissions per m2			4.9900	(273)
EI value			95.9356	
EI rating			96	(274)
EI band			A	

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1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	69.9200 (1b)	x 2.5000 (2b)	= 174.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 174.8000 (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		2.9500	(17)
Infiltration rate		0.1475	(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) =	0.1254	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate	0.1348	0.1316	0.1316	0.1222	0.1254	0.1066	0.1034	0.1034	0.1066	0.1191	0.1191	0.1222
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	0.2748	0.2716	0.2716	0.2622	0.2654	0.2466	0.2434	0.2434	0.2466	0.2591	0.2591	0.2622 (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			4.7400	1.3258	6.2841		(27)
Window S/W			13.3200	1.3258	17.6591		(27)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
External Roof	64.6000		64.6000	0.1500	9.6900	9.0000	581.4000 (30)
Total net area of external elements Aum(A, m ²)			149.1800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	45.6068			(33)
Main dwelling							
Party Wall			16.4800	0.0000	0.0000	45.0000	741.6000 (32)
Corridor			25.3000	0.0000	0.0000	45.0000	1138.5000 (32)
Party Floor 1			69.9200			40.0000	2796.8000 (32d)
Party Ceiling			5.3200			30.0000	159.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	13384.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		191.4316 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	31.5600	0.0370	1.1677
E7 Party floor between dwellings (in blocks of flats)	15.5900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.8800	0.0250	0.2220
E2 Other lintels (including other steel lintels)	1.2500	0.0220	0.0275
E3 Sill	36.1400	0.0170	0.6144
E4 Jamb	10.7200	0.0420	0.4502
E16 Corner (normal)	2.6800	0.0320	0.0858
E18 Party wall between dwellings	2.6800	0.0300	0.0804
E25 Staggered party wall between dwellings	4.9200	0.0750	0.3690
E9 Balcony between dwellings, wall insulation continuous	30.6900	0.1320	4.0511
E15 Flat roof with parapet	6.1600	0.1500	0.9240
E24 Eaves (insulation at ceiling level - inverted)	8.5700	0.0400	0.3428
P4 Party wall - Roof (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.3349 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 53.9417 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	15.8503	15.6695	15.6695	15.1271	15.3079	14.2231	14.0423	14.0423	14.2231	14.9463	14.9463	15.1271 (38)
Heat transfer coeff	69.7920	69.6112	69.6112	69.0687	69.2496	68.1647	67.9839	67.9839	68.1647	68.8879	68.8879	69.0687 (39)
Average = Sum(39)m / 12 =												68.8729

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9982	0.9956	0.9956	0.9878	0.9904	0.9749	0.9723	0.9723	0.9749	0.9852	0.9852	0.9878 (40)
HLP (average)												0.9850
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

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Assumed occupancy												2.2442 (42)
Hot water usage for mixer showers	61.8472	60.9177	59.5634	56.9720	55.0596	52.9270	51.7148	53.0589	54.5323	56.8222	59.4692	61.6102 (42a)
Hot water usage for baths	26.7195	26.3227	25.7639	24.7336	23.9621	23.1066	22.6445	23.1994	23.8036	24.7190	25.7705	26.6292 (42b)
Hot water usage for other uses	37.6127	36.2449	34.8772	33.5095	32.1417	30.7740	30.7740	32.1417	33.5095	34.8772	36.2449	37.6127 (42c)
Average daily hot water use (litres/day)												115.9876 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.1794	123.4854	120.2045	115.2150	111.1634	106.8076	105.1333	108.4000	111.8454	116.4183	121.4846	125.8521 (44)
Energy content (annual)	199.8373	175.8415	184.7498	157.7236	149.6473	131.3323	127.1496	134.2219	137.9165	157.9785	173.0771	197.0540 (45)
Distribution loss (46)m = 0.15 x (45)m	29.9756	26.3762	27.7125	23.6585	22.4471	19.6999	19.0724	20.1333	20.6875	23.6968	25.9616	29.5581 (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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (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	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	66.4459	58.4673	61.4293	52.4431	49.7577	43.6680	42.2772	44.6288	45.8572	52.5279	57.5481	65.5204 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												

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	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509	134.6509 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9023	18.5653	15.0983	11.4304	8.5443	7.2135	7.7944	10.1315	13.5985	17.2664	20.1524	21.4833 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.1944	297.2473	289.5543	273.1768	252.5031	233.0728	220.0922	217.0394	224.7324	241.1099	261.7835	281.2138 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093	50.7093 (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)	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672	-89.7672 (71)
Water heating gains (Table 5)	89.3090	87.0049	82.5663	72.8376	66.8787	60.6500	56.8242	59.9849	63.6906	70.6020	79.9280	88.0651 (72)
Total internal gains	499.9987	498.4103	482.8117	453.0377	423.5190	396.5292	380.3037	382.7487	397.6143	424.5711	457.4568	486.3551 (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)
Northwest					2.9000	9.9768	0.4000	0.0000				0.7700			8.9113 (81)
South					9.9400	41.2355	0.4000	0.0000				0.7700			126.2434 (78)
West					3.3800	17.3606	0.4000	0.0000				0.7700			18.0731 (80)

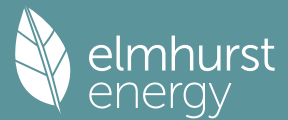
Solar gains	158.5516	277.3843	398.2029	507.3255	558.7139	570.0628	535.4483	481.1534	444.2889	322.8921	195.2096			138.7567 (83)	
Total gains	658.5503	775.7946	881.0146	960.3632	982.2330	966.5920	915.7521	863.9021	841.9033	747.4632	652.6664			625.1118 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	53.2730	53.4114	53.4114	53.8308	53.6903	54.5447	54.6898	54.6898	54.5447	53.9721	53.9721	53.8308
alpha	4.5515	4.5608	4.5608	4.5887	4.5794	4.6363	4.6460	4.6460	4.6363	4.5981	4.5981	4.5887
util living area	0.9591	0.9212	0.8484	0.7183	0.5514	0.3713	0.2742	0.3060	0.4988	0.7725	0.9255	0.9668 (86)
MIT	20.0824	20.3307	20.6116	20.8500	20.9623	20.9954	20.9991	20.9985	20.9814	20.8226	20.4170	20.0224 (87)
Th 2	20.0849	20.0870	20.0870	20.0935	20.0913	20.1043	20.1065	20.1065	20.1043	20.0957	20.0957	20.0935 (88)
util rest of house	0.9500	0.9054	0.8212	0.6760	0.4956	0.3096	0.2082	0.2364	0.4322	0.7261	0.9077	0.9594 (89)
MIT 2	19.0522	19.3564	19.6876	19.9560	20.0633	20.1020	20.1062	20.1060	20.0929	19.9372	19.4746	18.9842 (90)
Living area fraction	19.4888	19.7693	20.0792	20.3348	20.4442	20.4806	20.4846	20.4842	20.4694	20.3124	19.8740	19.4242 (92)
MIT	19.4888	19.7693	20.0792	20.3348	20.4442	20.4806	20.4846	20.4842	20.4694	20.3124	19.8740	19.4242 (93)
Temperature adjustment	19.4888	19.7693	20.0792	20.3348	20.4442	20.4806	20.4846	20.4842	20.4694	20.3124	19.8740	19.4242 (93)
adjusted MIT	19.4888	19.7693	20.0792	20.3348	20.4442	20.4806	20.4846	20.4842	20.4694	20.3124	19.8740	19.4242 (93)

8. Space heating requirement

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9429	0.8991	0.8209	0.6877	0.5176	0.3357	0.2362	0.2659	0.4597	0.7379	0.9026	0.9526	(94)
Useful gains	620.9612	697.5184	723.2342	660.4243	508.4453	324.4670	216.2980	229.7105	387.0391	551.5222	589.1061	595.4867	(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	997.2412	972.4170	882.6122	720.7217	522.4357	325.8670	216.5015	230.0720	393.2720	620.8459	824.8634	996.2584	(97)
Space heating kWh	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(98a)
Space heating requirement - total per year (kWh/year)												1156.5806	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1156.5806	
Space heating per m2										(98c) / (4) =		16.5415	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(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)	279.9524	184.7319	118.5772	43.4141	10.4088	0.0000	0.0000	0.0000	0.0000	51.5768	169.7453	298.1741	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	226.7887	200.1847	211.7012	183.8056	176.5987	157.4143	154.1010	161.1733	163.9985	184.9299	199.1591	224.0054	(64)
Efficiency of water heater (217)m	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	344.4106	(216)
Fuel for water heating, kWh/month	65.8483	58.1239	61.4677	53.3682	51.2756	45.7054	44.7434	46.7968	47.6172	53.6946	57.8261	65.0402	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.5841	12.2695	13.5841	13.1459	13.5841	13.1459	13.5841	13.5841	13.1459	13.5841	13.1459	13.5841	(231)
Lighting	18.2957	14.6775	13.2154	9.6822	7.4788	6.1103	6.8224	8.8680	11.5187	15.1132	17.0703	18.8042	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1156.5806	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.4106	
Water heating fuel used												651.5074	(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)												159.9420	(230a)
Total electricity for the above, kWh/year												159.9420	(231)
Electricity for lighting (calculated in Appendix L)												147.6567	(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												2115.6867	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1156.5806	28.4300	328.8159	(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)	651.5074	28.4300	185.2235	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	159.9420	28.4300	45.4715	(249)
Energy for lighting	147.6567	28.4300	41.9788	(250)

Full SAP Calculation Printout



Additional standing charges
Total energy cost

0.0000 (251)
601.4897 (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	1156.5806	0.1575	182.1622	(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)	651.5074	0.1412	91.9751	(264)
Space and water heating			274.1373	(265)
Pumps, fans and electric keep-hot	159.9420	0.1387	22.1859	(267)
Energy for lighting	147.6567	0.1443	21.3114	(268)
Total CO2, kg/year			317.6347	(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	1156.5806	1.5830	1830.8981	(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)	651.5074	1.5220	991.6069	(278)
Space and water heating			2822.5051	(279)
Pumps, fans and electric keep-hot	159.9420	1.5128	241.9603	(281)
Energy for lighting	147.6567	1.5338	226.4808	(282)
Total Primary energy kWh/year			3290.9461	(286)