

Full SAP Calculation Printout



Plot Reference	Plot 01			Issued on Date	22/12/2025			
Assessment Reference	Plot 01		Plot Type Ref					
Plot Address	Flat 2, 8 Cross Road Manchester, M21 9SB			SAP Version	10.2			
SAP Rating	83 B		DER	4.67		TER	13.86	
Environmental	96 A		% DER < TER				66.31	
CO ₂ Emissions (t/year)	0.28		DFEE	33.08		TFEE	38.42	
Compliance Check	See BREL		% DFEE < TFEE				13.89	
% DPER < TPER	34.35		DPER	48.24		TPER	73.47	
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	2.8700	(17)
Infiltration rate	0.1435	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1327 (21)

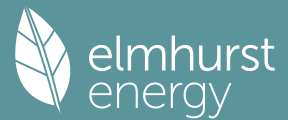
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1692	0.1659	0.1626	0.1460	0.1427	0.1261	0.1261	0.1228	0.1327	0.1427	0.1493	0.1560	(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	0.3092	0.3059	0.3026	0.2860	0.2827	0.2661	0.2661	0.2628	0.2727	0.2827	0.2893	0.2960	(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)
Ground Floor			69.9200	0.1100	7.6912	110.0000	7691.2000	(28a)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002	(29a)
Total net area of external elements Aum(A, m ²)			154.5000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	43.6080		(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 Ceiling			69.9200			30.0000	2097.6000	(32b)
Internal Wall			72.2000			9.0000	649.8000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	19635.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		280.8338 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P1 Party wall - Ground floor	15.5900	0.0510	0.7951
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	5.1500	0.0220	0.1133
E4 Jamb	36.1400	0.0170	0.6144
E5 Ground floor (normal)	31.5600	0.0670	2.1145
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
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.6434 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.2514 (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	17.8382	17.6468	17.4554	16.4983	16.3069	15.3497	15.3497	15.1583	15.7326	16.3069	16.6897	17.0725 (38)
Heat transfer coeff	67.0896	66.8982	66.7068	65.7497	65.5582	64.6011	64.6011	64.4097	64.9840	65.5582	65.9411	66.3239 (39)
Average = Sum(39)m / 12 =												65.7018
HLP	0.9595	0.9568	0.9540	0.9404	0.9376	0.9239	0.9239	0.9212	0.9294	0.9376	0.9431	0.9486 (40)
HLP (average)												0.9397
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)										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 (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)										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)

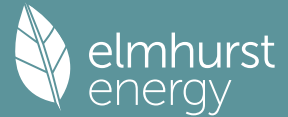
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	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 m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	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)

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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	81.3005	81.5331	81.7671	82.9573	83.1996	84.4322	84.4322	84.6831	83.9348	83.1996	82.7165	82.2390
alpha	6.4200	6.4355	6.4511	6.5305	6.5466	6.6288	6.6288	6.6455	6.5957	6.5466	6.5144	6.4826
util living area	0.9897	0.9664	0.9134	0.7846	0.6082	0.4265	0.3057	0.3367	0.5354	0.8379	0.9711	0.9926 (86)
MIT	20.2720	20.5046	20.7292	20.9171	20.9851	20.9988	20.9999	20.9998	20.9948	20.8951	20.5591	20.2307 (87)
Th 2	20.1172	20.1195	20.1218	20.1333	20.1356	20.1472	20.1472	20.1495	20.1426	20.1356	20.1310	20.1264 (88)
util rest of house	0.9863	0.9566	0.8912	0.7435	0.5555	0.3701	0.2465	0.2745	0.4709	0.7937	0.9609	0.9901 (89)
MIT 2	19.2889	19.5792	19.8479	20.0610	20.1252	20.1466	20.1472	20.1495	20.1398	20.0467	19.6596	19.2440 (90)
Living area fraction										FLA = Living area / (4) =		0.4238 (91)
MIT	19.7055	19.9713	20.2214	20.4238	20.4896	20.5077	20.5085	20.5098	20.5021	20.4062	20.0408	19.6621 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7055	19.9713	20.2214	20.4238	20.4896	20.5077	20.5085	20.5098	20.5021	20.4062	20.0408	19.6621 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9843	0.9547	0.8940	0.7579	0.5774	0.3940	0.2716	0.3009	0.4982	0.8084	0.9596	0.9884 (94)
Useful gains	612.4358	724.9230	763.1652	713.0980	568.9731	381.1612	252.4630	264.6483	413.8555	587.9675	604.5475	579.5089 (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	1033.5492	1008.2459	915.3081	757.6849	576.2318	381.6467	252.4956	264.7116	416.0370	642.8798	853.3300	1025.5101 (97)
Space heating kWh	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (98a)
Space heating requirement - total per year (kWh/year)												1206.2018
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	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1206.2018
Space heating per m2										(98c) / (4) =		17.2512 (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	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (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)	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (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	8.8224	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												1206.2018 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.4106

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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	2165.3078 (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	1206.2018	0.1582	190.8457 (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			282.8209 (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			326.3182 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6700 (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	1206.2018	1.5857	1912.6191 (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			2904.2260 (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			3372.6671 (286)
Dwelling Primary energy Rate (DPER)			48.2400 (287)

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

1. Overall dwelling characteristics

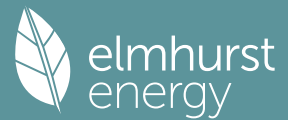
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.9200 (1b)	x 2.5000 (2b)	= 174.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	174.8000 (5)

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	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3371 (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	0.4298	0.4214	0.4129	0.3708	0.3624	0.3202	0.3202	0.3118	0.3371	0.3624	0.3792	0.3961 (22b)
Effective ac	0.5924	0.5888	0.5853	0.5687	0.5657	0.5513	0.5513	0.5486	0.5568	0.5657	0.5719	0.5784 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			17.5000	1.1450	20.0382		(27)
Ground Floor			69.9200	0.1300	9.0896		(28a)
EXT Wall	84.5800	17.5000	67.0800	0.1800	12.0744		(29a)
Total net area of external elements Aum(A, m2)			154.5000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		41.2022		(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

280.8338 (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
P1 Party wall - Ground floor	15.5900	0.0800	1.2472
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	5.1500	0.0500	0.2575
E4 Jamb	36.1400	0.0500	1.8070
E5 Ground floor (normal)	31.5600	0.1600	5.0496
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

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

12.3009 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 53.5031 (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	34.1695	33.9626	33.7599	32.8074	32.6292	31.7997	31.7997	31.6461	32.1192	32.6292	32.9897	33.3666
Average = Sum(39)m / 12 =	87.6726	87.4657	87.2629	86.3105	86.1323	85.3028	85.3028	85.1491	85.6223	86.1323	86.4928	86.8697

86.3096 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2539	1.2509	1.2480	1.2344	1.2319	1.2200	1.2200	1.2178	1.2246	1.2319	1.2370	1.2424
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

1.2344 (40)

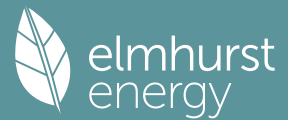
4. Water heating energy requirements (kWh/year)

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)													
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													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
246.4322	217.9273	231.3447	202.8154	196.2422	176.4242	173.7445	180.8168	183.0084	204.5734	218.1690	243.6489	243.6489	(62)
WWHRS	-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)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
218.1582	192.9215	205.1601	181.1336	176.0355	159.1332	157.5369	163.5817	165.1184	183.4832	194.2762	215.8985	215.8985	(64)
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
103.7218	92.1359	98.7052	88.5166	87.0337	79.7415	79.5532	81.9047	81.9307	89.8038	93.6216	102.7964	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													
197.1103	199.1557	194.0013	183.0284	169.1771	156.1588	147.4618	145.4164	150.5707	161.5436	175.3949	188.4132	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	34.2209	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

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	-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)	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)
Total internal gains	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		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	1.7800		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	62.2135	62.3606	62.5055	63.1953	63.3260	63.9419	63.9419	64.0572	63.7032	63.3260	63.0621	62.7885
alpha	5.1476	5.1574	5.1670	5.2130	5.2217	5.2628	5.2628	5.2705	5.2469	5.2217	5.2041	5.1859
util living area	0.9903	0.9758	0.9455	0.8669	0.7261	0.5380	0.3902	0.4276	0.6517	0.8966	0.9776	0.9925 (86)
MIT	19.8984	20.1388	20.4183	20.7243	20.9125	20.9852	20.9977	20.9964	20.9612	20.7138	20.2530	19.8572 (87)
Th 2	19.8771	19.8795	19.8818	19.8926	19.8946	19.9040	19.9040	19.9058	19.9004	19.8946	19.8905	19.8862 (88)
util rest of house	0.9869	0.9678	0.9279	0.8279	0.6595	0.4508	0.2940	0.3275	0.5614	0.8565	0.9688	0.9898 (89)
MIT 2	18.6331	18.9358	19.2798	19.6406	19.8311	19.8971	19.9035	19.9048	19.8792	19.6412	19.0910	18.5876 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.1693	19.4456	19.7622	20.0999	20.2894	20.3582	20.3672	20.3674	20.3377	20.0957	19.5834	19.1257 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1693	19.4456	19.7622	20.0999	20.2894	20.3582	20.3672	20.3674	20.3377	20.0957	19.5834	19.1257 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9841	0.9639	0.9257	0.8359	0.6844	0.4876	0.3348	0.3700	0.5986	0.8647	0.9656	0.9874 (94)
Useful gains	657.8062	771.8243	824.4571	814.0774	695.2190	485.0535	320.6680	336.6682	516.8383	663.6528	651.6961	625.5607 (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	1303.6299	1272.2403	1157.3009	966.6656	739.8212	491.1887	321.3504	337.8169	534.0878	817.8890	1079.7244	1296.5864 (97)
Space heating kWh	480.4929	336.2795	247.6358	109.8636	33.1840	0.0000	0.0000	0.0000	0.0000	114.7517	308.1803	499.2432 (98a)
Space heating requirement - total per year (kWh/year)	2129.6310											
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	480.4929	336.2795	247.6358	109.8636	33.1840	0.0000	0.0000	0.0000	0.0000	114.7517	308.1803	499.2432 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2129.6310											
Space heating per m2	(98c) / (4) = 30.4581 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	480.4929	336.2795	247.6358	109.8636	33.1840	0.0000	0.0000	0.0000	0.0000	114.7517	308.1803	499.2432 (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)	520.5773	364.3332	268.2944	119.0288	35.9523	0.0000	0.0000	0.0000	0.0000	124.3247	333.8899	540.8918 (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	85.7791	85.2932	84.4828	82.9750	81.1038	79.8000	79.8000	79.8000	79.8000	83.0382	85.0895	79.8000 (216)
Fuel for water heating, kWh/month	254.3256	226.1864	242.8424	218.2991	217.0498	199.4150	197.4147	204.9896	206.9153	220.9623	228.3200	251.4071 (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)
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)												

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(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												2307.2925	(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												2668.1271	(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												4364.1439	(238)

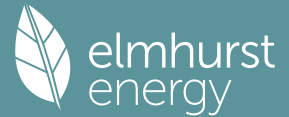
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2307.2925	0.2100	484.5314	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2668.1271	0.2100	560.3067	(264)
Space and water heating			1044.8381	(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			968.7756	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.8600	(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	2307.2925	1.1300	2607.2405	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2668.1271	1.1300	3014.9836	(278)
Space and water heating			5622.2241	(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			5137.2189	(286)
Target Primary Energy Rate (TPER)			73.4700	(287)

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Plot Reference	Plot 01			Issued on Date	22/12/2025
Assessment Reference	Plot 01	Plot Type Ref			
Plot Address	Flat 2, 8 Cross Road Manchester, M21 9SB			SAP Version	10.2
SAP Rating	83 B	DER	4.67	TER	13.86
Environmental	96 A	% DER < TER			66.31
CO ₂ Emissions (t/year)	0.28	DFEE	33.08	TFEE	38.42
Compliance Check	See BREL	% DFEE < TFEE			13.89
% DPER < TPER	34.35	DPER	48.24	TPER	73.47
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

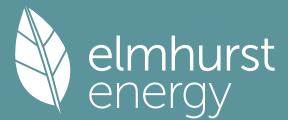
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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	2.8700	(17)
Infiltration rate	0.2579	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2386 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3042	0.2982	0.2923	0.2624	0.2565	0.2266	0.2266	0.2207	0.2386	0.2565	0.2684	0.2803 (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	0.5463	0.5445	0.5427	0.5344	0.5329	0.5257	0.5257	0.5243	0.5285	0.5329	0.5360	0.5393 (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)
Ground Floor			69.9200	0.1100	7.6912	110.0000	7691.2000 (28a)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
Total net area of external elements Aum(A, m ²)			154.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6080		(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 Ceiling			69.9200			30.0000	2097.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	19635.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							280.8338 (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	
P1 Party wall - Ground floor				15.5900	0.0510	0.7951	

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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	5.1500	0.0220	0.1133									
E4 Jamb	36.1400	0.0170	0.6144									
E5 Ground floor (normal)	31.5600	0.0670	2.1145									
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									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												5.6434 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 49.2514 (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	31.5106	31.4070	31.3054	30.8283	30.7391	30.3235	30.3235	30.2466	30.4836	30.7391	30.9196	31.1084 (38)
Average = Sum(39)m / 12 =	80.7620	80.6584	80.5568	80.0797	79.9905	79.5749	79.5749	79.4980	79.7350	79.9905	80.1710	80.3598 (39)
												80.0793
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1551	1.1536	1.1521	1.1453	1.1440	1.1381	1.1381	1.1370	1.1404	1.1440	1.1466	1.1493 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.2442 (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)
	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 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	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)	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)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				563.3927 (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)												

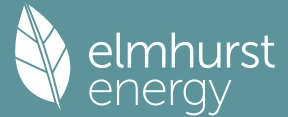
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091	112.2091 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.4195	110.0716	99.4195	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	67.5369	67.6237	67.7089	68.1123	68.1883	68.5444	68.5444	68.6108	68.4068	68.1883	68.0348	67.8749
alpha	5.5025	5.5082	5.5139	5.5408	5.5459	5.5696	5.5696	5.5741	5.5605	5.5459	5.5357	5.5250
util living area	0.9946	0.9827	0.9543	0.8734	0.7249	0.5325	0.3850	0.4256	0.6558	0.9118	0.9856	0.9961 (86)
MIT	19.9207	20.1706	20.4535	20.7536	20.9288	20.9891	20.9985	20.9974	20.9678	20.7241	20.2587	19.8704 (87)
Th 2	19.9561	19.9573	19.9585	19.9640	19.9650	19.9699	19.9699	19.9707	19.9680	19.9650	19.9629	19.9608 (88)
util rest of house	0.9926	0.9768	0.9393	0.8367	0.6613	0.4506	0.2955	0.3315	0.5697	0.8766	0.9797	0.9946 (89)
MIT 2	18.9929	19.2394	19.5121	19.7870	19.9245	19.9658	19.9696	19.9702	19.9541	19.7706	19.3329	18.9467 (90)
Living area fraction									fLA = Living area /	(4) =		0.4238 (91)
MIT	19.3861	19.6340	19.9110	20.1966	20.3501	20.3995	20.4056	20.4055	20.3837	20.1747	19.7252	19.3381 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3861	19.6340	19.9110	20.1966	20.3501	20.3995	20.4056	20.4055	20.3837	20.1747	19.7252	19.3381 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9912	0.9745	0.9385	0.8457	0.6860	0.4852	0.3335	0.3715	0.6055	0.8847	0.9779	0.9935 (94)
Useful gains	573.5299	698.6658	763.8753	767.5811	655.7351	457.0255	302.3800	317.6146	486.7693	615.7355	579.4791	540.0864 (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	1218.3836	1188.4208	1080.3499	904.6312	691.9253	461.4932	302.8293	318.4282	501.0302	765.8852	1012.1791	1216.4971 (97)
Space heating kWh	479.7712	329.1153	235.4571	98.6761	26.9255	0.0000	0.0000	0.0000	0.0000	111.7113	311.5440	503.2495 (98a)
Space heating requirement - total per year (kWh/year)												2096.4500
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	479.7712	329.1153	235.4571	98.6761	26.9255	0.0000	0.0000	0.0000	0.0000	111.7113	311.5440	503.2495 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2096.4500
Space heating per m2										(98c) / (4) =		29.9836 (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	748.0044	588.8545	604.1847	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9536	0.9800	0.9713	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	713.3164	577.0744	586.8316	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	252.1617	332.7008	281.9432	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	63.0404	83.1752	70.4858	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												216.7014 (107)
Energy for space heating												29.9836 (99)
Energy for space cooling												3.0993 (108)
Total												33.0828 (109)
Fabric Energy Efficiency (DFEE)												33.1 (109)

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

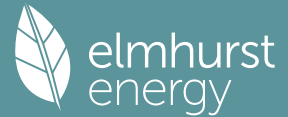
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	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)
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) = 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 1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3371 (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	0.4298	0.4214	0.4129	0.3708	0.3624	0.3202	0.3202	0.3118	0.3371	0.3624	0.3792	0.3961	(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	0.5924	0.5888	0.5853	0.5687	0.5657	0.5513	0.5513	0.5486	0.5568	0.5657	0.5719	0.5784	(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)
Ground Floor			69.9200	0.1300	9.0896			(28a)
EXT Wall	84.5800	17.5000	67.0800	0.1800	12.0744			(29a)
Total net area of external elements Aum (A, m2)			154.5000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 41.2022			(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 280.8338 (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	
P1 Party wall - Ground floor	15.5900	0.0800	1.2472	
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	5.1500	0.0500	0.2575	
E4 Jamb	36.1400	0.0500	1.8070	
E5 Ground floor (normal)	31.5600	0.1600	5.0496	
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	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.3009 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 53.5031 (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	34.1695	33.9626	33.7599	32.8074	32.6292	31.7997	31.7997	31.6461	32.1192	32.6292	32.9897	33.3666	(38)
Heat transfer coeff	87.6726	87.4657	87.2629	86.3105	86.1323	85.3028	85.3028	85.1491	85.6223	86.1323	86.4928	86.8697	(39)
Average = Sum(39)m / 12 =												86.3096	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2539	1.2509	1.2480	1.2344	1.2319	1.2200	1.2200	1.2178	1.2246	1.2319	1.2370	1.2424	(40)
HLP (average)												1.2344	
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 (46)

Water storage loss (or HIU loss): Total storage loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)

If cylinder contains dedicated solar storage 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (57)

Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month 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)

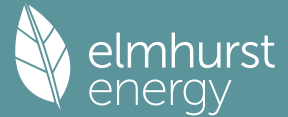
Total per year (kWh/year) = Sum(64)m = 832.4121 (64)

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)

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

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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	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)

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	62.2135	62.3606	62.5055	63.1953	63.3260	63.9419	63.9419	64.0572	63.7032	63.3260	63.0621	62.7885	21.0000 (85)
alpha	5.1476	5.1574	5.1670	5.2130	5.2217	5.2628	5.2628	5.2705	5.2469	5.2217	5.2041	5.1859	
util living area	0.9952	0.9857	0.9638	0.8990	0.7691	0.5778	0.4215	0.4644	0.7012	0.9293	0.9878	0.9964	(86)
MIT	19.7708	20.0203	20.3177	20.6603	20.8851	20.9795	20.9967	20.9946	20.9457	20.6402	20.1393	19.7293	(87)
Th 2	19.8771	19.8795	19.8818	19.8926	19.8946	19.9040	19.9040	19.9040	19.9004	19.8946	19.8905	19.8862	(88)
util rest of house	0.9934	0.9806	0.9511	0.8657	0.7044	0.4862	0.3180	0.3565	0.6094	0.8979	0.9826	0.9951	(89)
MIT 2	18.7817	19.0296	19.3196	19.6439	19.8276	19.8963	19.9034	19.9046	19.8764	19.6365	19.1578	18.7477	(90)
Living area fraction	19.2008	19.4494	19.7426	20.0746	20.2758	20.3553	20.3667	20.3665	20.3295	20.0619	19.5737	19.1637	(91)
MIT	19.2008	19.4494	19.7426	20.0746	20.2758	20.3553	20.3667	20.3665	20.3295	20.0619	19.5737	19.1637	(92)
Temperature adjustment	19.2008	19.4494	19.7426	20.0746	20.2758	20.3553	20.3667	20.3665	20.3295	20.0619	19.5737	19.1637	(93)
adjusted MIT	19.2008	19.4494	19.7426	20.0746	20.2758	20.3553	20.3667	20.3665	20.3295	20.0619	19.5737	19.1637	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9920	0.9782	0.9492	0.8718	0.7281	0.5248	0.3620	0.4024	0.6470	0.9034	0.9807	0.9939	(94)
Useful gains	567.1746	689.8501	757.2520	773.7060	679.3680	482.3440	320.3178	336.0364	508.8293	617.0914	573.0843	534.5048	(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	1306.3944	1272.5744	1155.5847	964.4867	738.6512	490.9460	321.3102	337.7466	533.3856	814.9710	1078.8887	1299.8891	(97)
Space heating kWh	549.9795	391.5907	296.3596	137.3621	44.1067	0.0000	0.0000	0.0000	0.0000	147.2224	364.1792	569.4460	(98a)
Space heating requirement - total per year (kWh/year)												2500.2462	
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	549.9795	391.5907	296.3596	137.3621	44.1067	0.0000	0.0000	0.0000	0.0000	147.2224	364.1792	569.4460	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2500.2462	
Space heating per m ²												35.7587	(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	801.8459	631.2404	647.1334	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9268	0.9651	0.9523	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	743.1324	609.2243	616.2587	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	211.5445	289.7421	242.7446	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	52.8861	72.4355	60.6861	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												186.0078	(107)
Energy for space heating												35.7587	(99)
Energy for space cooling												2.6603	(108)
Total												38.4190	(109)
Fabric Energy Efficiency (TFEE)												38.4	(109)

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Plot Reference	Plot 01			Issued on Date	22/12/2025
Assessment Reference	Plot 01	Plot Type Ref			
Plot Address	Flat 2, 8 Cross Road Manchester, M21 9SB			SAP Version	10.2
SAP Rating	83 B	DER	4.67	TER	13.86
Environmental	96 A	% DER < TER			66.31
CO ₂ Emissions (t/year)	0.28	DFEE	33.08	TFEE	38.42
Compliance Check	See BREL	% DFEE < TFEE			13.89
% DPER < TPER	34.35	DPER	48.24	TPER	73.47
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	2.8700	(17)
Infiltration rate	0.1435	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1327 (21)

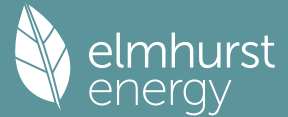
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1692	0.1659	0.1626	0.1460	0.1427	0.1261	0.1261	0.1228	0.1327	0.1427	0.1493	0.1560	(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	0.3092	0.3059	0.3026	0.2860	0.2827	0.2661	0.2661	0.2628	0.2727	0.2827	0.2893	0.2960	(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)
Ground Floor			69.9200	0.1100	7.6912	110.0000	7691.2000	(28a)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002	(29a)
Total net area of external elements Aum(A, m ²)			154.5000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6080			(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 Ceiling			69.9200			30.0000	2097.6000	(32b)
Internal Wall			72.2000			9.0000	649.8000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	19635.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		280.8338 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P1 Party wall - Ground floor	15.5900	0.0510	0.7951
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	5.1500	0.0220	0.1133
E4 Jamb	36.1400	0.0170	0.6144
E5 Ground floor (normal)	31.5600	0.0670	2.1145
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
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.6434 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.2514 (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	17.8382	17.6468	17.4554	16.4983	16.3069	15.3497	15.3497	15.1583	15.7326	16.3069	16.6897	17.0725 (38)
Heat transfer coeff	67.0896	66.8982	66.7068	65.7497	65.5582	64.6011	64.6011	64.4097	64.9840	65.5582	65.9411	66.3239 (39)
Average = Sum(39)m / 12 =												65.7018
HLP	0.9595	0.9568	0.9540	0.9404	0.9376	0.9239	0.9239	0.9212	0.9294	0.9376	0.9431	0.9486 (40)
HLP (average)												0.9397
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)												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 (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)												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)

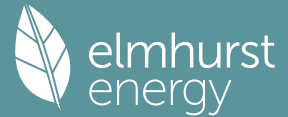
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	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)
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)

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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	81.3005	81.5331	81.7671	82.9573	83.1996	84.4322	84.4322	84.6831	83.9348	83.1996	82.7165	82.2390
alpha	6.4200	6.4355	6.4511	6.5305	6.5466	6.6288	6.6288	6.6455	6.5957	6.5466	6.5144	6.4826
util living area	0.9897	0.9664	0.9134	0.7846	0.6082	0.4265	0.3057	0.3367	0.5354	0.8379	0.9711	0.9926 (86)
MIT	20.2720	20.5046	20.7292	20.9171	20.9851	20.9988	20.9999	20.9998	20.9948	20.8951	20.5591	20.2307 (87)
Th 2	20.1172	20.1195	20.1218	20.1333	20.1356	20.1472	20.1472	20.1495	20.1426	20.1356	20.1310	20.1264 (88)
util rest of house	0.9863	0.9566	0.8912	0.7435	0.5555	0.3701	0.2465	0.2745	0.4709	0.7937	0.9609	0.9901 (89)
MIT 2	19.2889	19.5792	19.8479	20.0610	20.1252	20.1466	20.1472	20.1495	20.1398	20.0467	19.6596	19.2440 (90)
Living area fraction										FLA = Living area / (4) =		0.4238 (91)
MIT	19.7055	19.9713	20.2214	20.4238	20.4896	20.5077	20.5085	20.5098	20.5021	20.4062	20.0408	19.6621 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7055	19.9713	20.2214	20.4238	20.4896	20.5077	20.5085	20.5098	20.5021	20.4062	20.0408	19.6621 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9843	0.9547	0.8940	0.7579	0.5774	0.3940	0.2716	0.3009	0.4982	0.8084	0.9596	0.9884 (94)
Useful gains	612.4358	724.9230	763.1652	713.0980	568.9731	381.1612	252.4630	264.6483	413.8555	587.9675	604.5475	579.5089 (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	1033.5492	1008.2459	915.3081	757.6849	576.2318	381.6467	252.4956	264.7116	416.0370	642.8798	853.3300	1025.5101 (97)
Space heating kWh	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (98a)
Space heating requirement - total per year (kWh/year)												1206.2018
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	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1206.2018
Space heating per m2										(98c) / (4) =		17.2512 (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	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (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)	313.3083	190.3930	113.1943	32.1026	5.4005	0.0000	0.0000	0.0000	0.0000	40.8548	179.1233	331.8249 (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	8.6224	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												1206.2018 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.4106

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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	2165.3078 (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	1206.2018	0.1582	190.8457 (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			282.8209 (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			326.3182 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6700 (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	1206.2018	1.5857	1912.6191 (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			2904.2260 (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			3372.6671 (286)
Dwelling Primary energy Rate (DPER)			48.2400 (287)

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

1. Overall dwelling characteristics

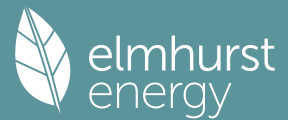
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	69.9200 (1b)	x 2.5000 (2b)	= 174.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	174.8000 (5)

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	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3371 (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	0.4298	0.4214	0.4129	0.3708	0.3624	0.3202	0.3202	0.3118	0.3371	0.3624	0.3792	0.3961 (22b)
Effective ac	0.5924	0.5888	0.5853	0.5687	0.5657	0.5513	0.5513	0.5486	0.5568	0.5657	0.5719	0.5784 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			17.5000	1.1450	20.0382		(27)
Ground Floor			69.9200	0.1300	9.0896		(28a)
EXT Wall	84.5800	17.5000	67.0800	0.1800	12.0744		(29a)
Total net area of external elements Aum(A, m2)			154.5000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	41.2022	(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

280.8338 (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
P1 Party wall - Ground floor	15.5900	0.0800	1.2472
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	5.1500	0.0500	0.2575
E4 Jamb	36.1400	0.0500	1.8070
E5 Ground floor (normal)	31.5600	0.1600	5.0496
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

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

12.3009 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 53.5031 (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	34.1695	33.9626	33.7599	32.8074	32.6292	31.7997	31.7997	31.6461	32.1192	32.6292	32.9897	33.3666
Average = Sum(39)m / 12 =	87.6726	87.4657	87.2629	86.3105	86.1323	85.3028	85.3028	85.1491	85.6223	86.1323	86.4928	86.8697

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2539	1.2509	1.2480	1.2344	1.2319	1.2200	1.2200	1.2178	1.2246	1.2319	1.2370	1.2424
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

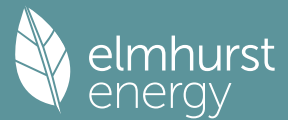
4. Water heating energy requirements (kWh/year)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 content	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)													(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	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	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
246.4322	217.9273	231.3447	202.8154	196.2422	176.4242	173.7445	180.8168	183.0084	204.5734	218.1690	243.6489	243.6489 (62)	
WWHRS	-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)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
218.1582	192.9215	205.1601	181.1336	176.0355	159.1332	157.5369	163.5817	165.1184	183.4832	194.2762	215.8985	215.8985 (64)	
12Total per year (kWh/year)													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	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	102.7964 (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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												

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	-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)	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)
Total internal gains	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	62.2135	62.3606	62.5055	63.1953	63.3260	63.9419	63.9419	64.0572	63.7032	63.3260	63.0621	62.7885
alpha	5.1476	5.1574	5.1670	5.2130	5.2217	5.2628	5.2628	5.2705	5.2469	5.2217	5.2041	5.1859
util living area	0.9903	0.9758	0.9455	0.8669	0.7261	0.5380	0.3902	0.4276	0.6517	0.8966	0.9776	0.9925 (86)
MIT	19.8984	20.1388	20.4183	20.7243	20.9125	20.9852	20.9977	20.9964	20.9612	20.7138	20.2530	19.8572 (87)
Th 2	19.8771	19.8795	19.8818	19.8926	19.8946	19.9040	19.9040	19.9058	19.9004	19.8946	19.8905	19.8862 (88)
util rest of house	0.9869	0.9678	0.9279	0.8279	0.6595	0.4508	0.2940	0.3275	0.5614	0.8565	0.9688	0.9898 (89)
MIT 2	18.6331	18.9358	19.2798	19.6406	19.8311	19.8971	19.9035	19.9048	19.8792	19.6412	19.0910	18.5876 (90)
Living area fraction	19.1693	19.4456	19.7622	20.0999	20.2894	20.3582	20.3672	20.3674	20.3377	20.0957	19.5834	19.1257 (92)
MIT	19.1693	19.4456	19.7622	20.0999	20.2894	20.3582	20.3672	20.3674	20.3377	20.0957	19.5834	19.1257 (93)
Temperature adjustment												0.0000
adjusted MIT	19.1693	19.4456	19.7622	20.0999	20.2894	20.3582	20.3672	20.3674	20.3377	20.0957	19.5834	19.1257 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9841	0.9639	0.9257	0.8359	0.6844	0.4876	0.3348	0.3700	0.5986	0.8647	0.9656	0.9874 (94)
Useful gains	657.8062	771.8243	824.4571	814.0774	695.2190	485.0535	320.6680	336.6682	516.8383	663.6528	651.6961	625.5607 (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	1303.6299	1272.2403	1157.3009	966.6656	739.8212	491.1887	321.3504	337.8169	534.0878	817.8890	1079.7244	1296.5864 (97)
Space heating kWh	480.4929	336.2795	247.6358	109.8636	33.1840	0.0000	0.0000	0.0000	0.0000	114.7517	308.1803	499.2432 (98a)
Space heating requirement - total per year (kWh/year)												2129.6310
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	480.4929	336.2795	247.6358	109.8636	33.1840	0.0000	0.0000	0.0000	0.0000	114.7517	308.1803	499.2432 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2129.6310
Space heating per m2										(98c) / (4) =		30.4581 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	480.4929	336.2795	247.6358	109.8636	33.1840	0.0000	0.0000	0.0000	0.0000	114.7517	308.1803	499.2432 (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)	520.5773	364.3332	268.2944	119.0288	35.9523	0.0000	0.0000	0.0000	0.0000	124.3247	333.8899	540.8918 (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	85.7791	85.2932	84.4828	82.9750	81.1038	79.8000	79.8000	79.8000	79.8000	83.0382	85.0895	79.8000 (216)
Fuel for water heating, kWh/month	254.3256	226.1864	242.8424	218.2991	217.0498	199.4150	197.4147	204.9896	206.9153	220.9623	228.3200	251.4071 (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)
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)												

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(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												2307.2925	(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												2668.1271	(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												4364.1439	(238)

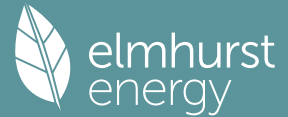
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2307.2925	0.2100	484.5314	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2668.1271	0.2100	560.3067	(264)
Space and water heating			1044.8381	(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			968.7756	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.8600	(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	2307.2925	1.1300	2607.2405	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2668.1271	1.1300	3014.9836	(278)
Space and water heating			5622.2241	(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			5137.2189	(286)
Target Primary Energy Rate (TPER)			73.4700	(287)

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Plot Reference	Plot 01				Issued on Date	22/12/2025	
Assessment Reference	Plot 01			Plot Type Ref			
Plot Address	Flat 2, 8 Cross Road Manchester, M21 9SB				SAP Version	10.2	
SAP Rating	83 B	DER	4.67	TER	13.86		
Environmental	96 A	% DER < TER				66.31	
CO ₂ Emissions (t/year)	0.28	DFEE	33.08	TFEE	38.42		
Compliance Check	See BREL	% DFEE < TFEE				13.89	
% DPER < TPER	34.35	DPER	48.24	TPER	73.47		
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	2.8700	(17)
Infiltration rate	0.1435	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1327 (21)

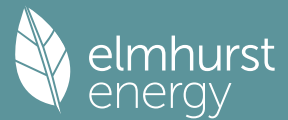
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1692	0.1659	0.1626	0.1460	0.1427	0.1261	0.1261	0.1228	0.1327	0.1427	0.1493	0.1560 (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	0.3092	0.3059	0.3026	0.2860	0.2827	0.2661	0.2661	0.2628	0.2727	0.2827	0.2893	0.2960 (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)
Ground Floor			69.9200	0.1100	7.6912	110.0000	7691.2000 (28a)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
Total net area of external elements Aum(A, m ²)			154.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6080		(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 Ceiling			69.9200			30.0000	2097.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	19635.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		280.8338 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	31.5600	0.0370	1.1677
P1 Party wall - Ground floor	15.5900	0.0510	0.7951
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	5.1500	0.0220	0.1133
E4 Jamb	36.1400	0.0170	0.6144
E5 Ground floor (normal)	31.5600	0.0670	2.1145
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
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.6434 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.2514 (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	17.8382	17.6468	17.4554	16.4983	16.3069	15.3497	15.3497	15.1583	15.7326	16.3069	16.6897	17.0725 (38)
Heat transfer coeff	67.0896	66.8982	66.7068	65.7497	65.5582	64.6011	64.6011	64.4097	64.9840	65.5582	65.9411	66.3239 (39)
Average = Sum(39)m / 12 =												65.7018
HLP	0.9595	0.9568	0.9540	0.9404	0.9376	0.9239	0.9239	0.9212	0.9294	0.9376	0.9431	0.9486 (40)
HLP (average)												0.9397
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)										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 (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)

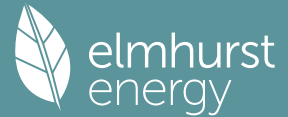
5. Internal gains (see Table 5 and 5a)

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	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)

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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	81.3005	81.5331	81.7671	82.9573	83.1996	84.4322	84.4322	84.6831	83.9348	83.1996	82.7165	82.2390
alpha	6.4200	6.4355	6.4511	6.5305	6.5466	6.6288	6.6288	6.6455	6.5957	6.5466	6.5144	6.4826
util living area	0.9837	0.9562	0.8933	0.7631	0.5910	0.4178	0.2993	0.3287	0.5210	0.8136	0.9607	0.9881 (86)
MIT	20.3483	20.5563	20.7691	20.9295	20.9873	20.9989	20.9999	20.9998	20.9956	20.9124	20.6090	20.3037 (87)
Th 2	20.1172	20.1195	20.1218	20.1333	20.1356	20.1472	20.1472	20.1495	20.1426	20.1356	20.1310	20.1264 (88)
util rest of house	0.9786	0.9441	0.8681	0.7212	0.5392	0.3625	0.2413	0.2680	0.4579	0.7672	0.9476	0.9843 (89)
MIT 2	19.3842	19.6412	19.8919	20.0725	20.1269	20.1467	20.1472	20.1495	20.1402	20.0627	19.7193	19.3359 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7927	20.0290	20.2637	20.4357	20.4915	20.5078	20.5085	20.5098	20.5027	20.4228	20.0963	19.7461 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7927	20.0290	20.2637	20.4357	20.4915	20.5078	20.5085	20.5098	20.5027	20.4228	20.0963	19.7461 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9764	0.9427	0.8725	0.7363	0.5607	0.3859	0.2659	0.2938	0.4846	0.7835	0.9470	0.9823 (94)
Useful gains	663.6076	758.7360	788.5744	720.6229	570.2007	381.2245	252.4676	264.6581	414.2147	598.2799	637.0622	628.7425 (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	1039.4011	1012.1019	918.1299	758.4663	576.3550	381.6532	252.4961	264.7127	416.0732	643.9636	856.9909	1031.0761 (97)
Space heating kWh	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (98a)
Space heating requirement - total per year (kWh/year)	1069.7411											
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	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1069.7411											
Space heating per m2	(98c) / (4) = 15.2995 (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	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (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)	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (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) (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	1069.7411 (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)											

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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	2028.8472 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1069.7411	16.4900	176.4003 (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			334.5569 (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] = 1.0480 (257)
SAP value	83.0113
SAP rating (Section 12)	83 (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	1069.7411	0.1583	169.3884 (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			261.3635 (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			304.8609 (272)	
CO2 emissions per m2			4.3600 (273)	
EI value			96.4452	
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

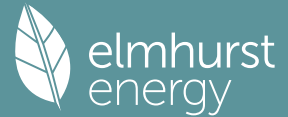
1. Overall dwelling characteristics

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

2. Ventilation rate

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

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Measured/design AP50												2.8700 (17)
Infiltration rate												0.1435 (18)
Number of sides sheltered												1 (19)
Shelter factor												(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.1327 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Adj infilt rate	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Balanced mechanical ventilation with heat recovery	0.1427	0.1394	0.1394	0.1294	0.1327	0.1128	0.1095	0.1095	0.1128	0.1261	0.1261	0.1294 (22b)
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2827	0.2794	0.2794	0.2694	0.2727	0.2528	0.2495	0.2495	0.2528	0.2661	0.2661	0.2694 (25)

3. Heat losses and heat loss parameter

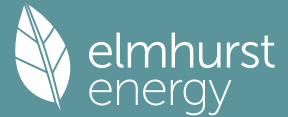
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window N/E			4.7400	1.3258	6.2841		(27)
Window S/W			13.3200	1.3258	17.6591		(27)
Ground Floor			69.9200	0.1100	7.6912	110.0000	7691.2000 (28a)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002 (29a)
Total net area of external elements Aum(A, m2)			154.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	43.6080		(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 Ceiling			69.9200			30.0000	2097.6000 (32b)
Internal Wall			72.2000			9.0000	649.8000 (32c)
Heat capacity Cm = Sum(A x k)							(28) ... (30) + (32) + (32a) ... (32e) = 19635.9001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							280.8338 (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	
P1 Party wall - Ground floor				15.5900	0.0510	0.7951	
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				5.1500	0.0220	0.1133	
E4 Jamb				36.1400	0.0170	0.6144	
E5 Ground floor (normal)				31.5600	0.0670	2.1145	
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	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.6434 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	49.2514 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.3069	16.1154	16.1154	15.5412	15.7326	14.5841	14.3926	14.3926	14.5841	15.3497	15.3497	15.5412 (38)
Average = Sum(39)m / 12 =	65.5582	65.3668	65.3668	64.7926	64.9840	63.8355	63.6440	63.6440	63.8355	64.6011	64.6011	64.7926 (39)
												64.5852
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9376	0.9349	0.9349	0.9267	0.9294	0.9130	0.9102	0.9102	0.9130	0.9239	0.9239	0.9267 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers													
Hot water usage for baths	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 other uses	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)	
Average daily hot water use (litres/day)	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)	
												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):	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)	
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)	
												Total per year (kWh/year) = Sum(64)m = 2243.8605 (64)	

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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	83.1996	83.4432	83.4432	84.1828	83.9348	85.4449	85.7019	85.7019	85.4449	84.4322	84.4322	84.1828	
alpha	6.5466	6.5629	6.5629	6.6122	6.5957	6.6963	6.7135	6.7135	6.6963	6.6288	6.6288	6.6122	
util living area	0.9806	0.9489	0.8717	0.7176	0.5318	0.3498	0.2571	0.2873	0.4759	0.7814	0.9526	0.9857	(86)
MIT	20.4352	20.6271	20.8246	20.9565	20.9942	20.9997	21.0000	20.9999	20.9978	20.9382	20.6741	20.3900	(87)
Th 2	20.1356	20.1380	20.1380	20.1449	20.1426	20.1565	20.1588	20.1588	20.1565	20.1472	20.1472	20.1449	(88)
util rest of house	0.9743	0.9345	0.8420	0.6714	0.4772	0.2943	0.1987	0.2253	0.4131	0.7298	0.9365	0.9810	(89)
MIT 2	19.5085	19.7434	19.9692	20.1096	20.1390	20.1564	20.1588	20.1588	20.1554	20.0986	19.8120	19.4597	(90)
Living area fraction	19.9012	20.1179	20.3317	20.4685	20.5014	20.5138	20.5153	20.5152	20.5124	20.4544	20.1773	19.8539	(91)
MIT	19.9012	20.1179	20.3317	20.4685	20.5014	20.5138	20.5153	20.5152	20.5124	20.4544	20.1773	19.8539	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9012	20.1179	20.3317	20.4685	20.5014	20.5138	20.5153	20.5152	20.5124	20.4544	20.1773	19.8539	(93)

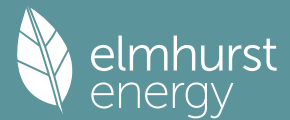
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9723	0.9341	0.8492	0.6894	0.5002	0.3178	0.2235	0.2516	0.4397	0.7492	0.9371	0.9790	(94)
Ext temp.	640.2807	724.6919	748.1148	662.0343	491.3167	307.1911	204.6255	217.3446	370.1776	559.9843	611.6417	611.9894	(95)
Heat loss rate W	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000	(96)
Space heating kWh	963.7865	935.9158	845.3040	684.7580	493.9689	307.2886	204.6323	217.3600	371.0386	591.3867	793.1304	962.4252	(97)
Space heating requirement - total per year (kWh/year)	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98c)
Space heating kWh	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												888.0332	
Space heating per m ²										(98c) / (4) =		12.7007	(99)

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

												0.0000 (201)	
Fraction of space heat from secondary/supplementary system (Table 11)													
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	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242	(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)

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Space heating fuel (main heating system)	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242	(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) (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												888.0332	(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												1847.1393	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	888.0332	28.4300	252.4678	(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			525.1417	(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	888.0332	0.1588	141.0132	(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			232.9884	(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			276.4857	(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	888.0332	1.5877	1409.9705	(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			2401.5775	(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			2870.0185	(286)

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SAP 10 EPC IMPROVEMENTS

Plot 01

Current energy efficiency rating: B 83
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 Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 83
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 £525	Potential £525	£0
Electricity			
Space heating	£298	£298	£0
Water heating	£185	£185	£0
Lighting	£42	£42	£0
Total cost of fuels	£525	£525	£0
Total cost of uses	£525	£525	£0
Delivered energy	26 kWh/m²	26 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	41 kWh/m²	41 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

Main dwelling	Area (m²)	Storey height (m)	Volume (m³)
Ground floor	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)

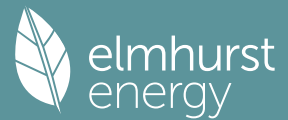
2. Ventilation rate

	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	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	2.8700 (17)
Infiltration rate	0.1435 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1327 (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	0.1692	0.1659	0.1626	0.1460	0.1427	0.1261	0.1261	0.1228	0.1327	0.1427	0.1493	0.1560 (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)

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Effective ac 0.3092 0.3059 0.3026 0.2860 0.2827 0.2661 0.2661 0.2628 0.2727 0.2827 0.2893 0.2960 (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)
Ground Floor			69.9200	0.1100	7.6912	110.0000	7691.2000	(28a)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002	(29a)
Total net area of external elements Aum(A, m2)			154.5000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		43.6080			(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 Ceiling			69.9200			30.0000	2097.6000	(32b)
Internal Wall			72.2000			9.0000	649.8000	(32c)

Heat capacity Cm = Sum(A x k)

(28)...(30) + (32) + (32a)...(32e) = 19635.9001 (34)

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

280.8338 (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
P1 Party wall - Ground floor	15.5900	0.0510	0.7951
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	5.1500	0.0220	0.1133
E4 Jamb	36.1400	0.0170	0.6144
E5 Ground floor (normal)	31.5600	0.0670	2.1145
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

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

5.6434 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 49.2514 (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	17.8382	17.6468	17.4554	16.4983	16.3069	15.3497	15.3497	15.1583	15.7326	16.3069	16.6897	17.0725	(38)
Heat transfer coeff	67.0896	66.8982	66.7068	65.7497	65.5582	64.6011	64.6011	64.4097	64.9840	65.5582	65.9411	66.3239	(39)
Average = Sum(39)m / 12 =													65.7018

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9595	0.9568	0.9540	0.9404	0.9376	0.9239	0.9239	0.9212	0.9294	0.9376	0.9431	0.9486	(40)
HLP (average)													0.9397
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

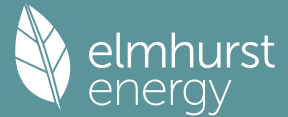
4. Water heating energy requirements (kWh/year)

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)										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		(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month													
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		(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h													
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 =													0.0000 (64a)

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)

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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 (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 (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 (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 (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 (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	81.3005	81.5331	81.7671	82.9573	83.1996	84.4322	84.4322	84.6831	83.9348	83.1996	82.7165	82.2390
alpha	6.4200	6.4355	6.4511	6.5305	6.5466	6.6288	6.6288	6.6455	6.5957	6.5466	6.5144	6.4826
util living area	0.9837	0.9562	0.8933	0.7631	0.5910	0.4178	0.2993	0.3287	0.5210	0.8136	0.9607	0.9881 (86)
MIT	20.3483	20.5563	20.7691	20.9295	20.9873	20.9989	20.9999	20.9998	20.9956	20.9124	20.6090	20.3037 (87)
Th 2	20.1172	20.1195	20.1218	20.1333	20.1356	20.1472	20.1472	20.1495	20.1426	20.1356	20.1310	20.1264 (88)
util rest of house	0.9786	0.9441	0.8681	0.7212	0.5392	0.3625	0.2413	0.2680	0.4579	0.7672	0.9476	0.9843 (89)
MIT 2	19.3842	19.6412	19.8919	20.0725	20.1269	20.1467	20.1472	20.1495	20.1402	20.0627	19.7193	19.3359 (90)
Living area fraction	19.7927	20.0290	20.2637	20.4357	20.4915	20.5078	20.5085	20.5098	20.5027	20.4228	20.0963	19.7461 (92)
MIT	19.7927	20.0290	20.2637	20.4357	20.4915	20.5078	20.5085	20.5098	20.5027	20.4228	20.0963	19.7461 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7927	20.0290	20.2637	20.4357	20.4915	20.5078	20.5085	20.5098	20.5027	20.4228	20.0963	19.7461 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9764	0.9427	0.8725	0.7363	0.5607	0.3859	0.2659	0.2938	0.4846	0.7835	0.9470	0.9823 (94)
Useful gains	663.6076	758.7360	788.5744	720.6229	570.2007	381.2245	252.4676	264.6581	414.2147	598.2799	637.0622	628.7425 (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	1039.4011	1012.1019	918.1299	758.4663	576.3550	381.6532	252.4961	264.7127	416.0732	643.9636	856.9909	1031.0761 (97)
Space heating kWh	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (98a)
Space heating requirement - total per year (kWh/year)												1069.7411
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	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1069.7411
Space heating per m2											(98c) / (4) =	15.2995 (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	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (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)	279.5903	170.2619	96.3893	27.2472	4.5788	0.0000	0.0000	0.0000	0.0000	33.9887	158.3486	299.3362 (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												

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(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	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	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												1069.7411	(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												2028.8472	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1069.7411	16.4900	176.4003 (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			334.5569 (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] =	1.0480 (257)
SAP value		83.0113
SAP rating (Section 12)		83 (258)
SAP band		B

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

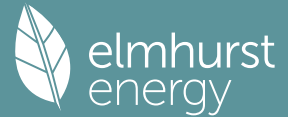
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1069.7411	0.1583	169.3884 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	651.5074	0.1412	91.9751 (264)
Space and water heating			261.3635 (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			304.8609 (272)
CO2 emissions per m2			4.3600 (273)
EI value			96.4452
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 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			

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Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)
Dwelling volume

69.9200

(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 174.8000 (4)
(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		
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											2.8700 (17)		
Infiltration rate											0.1435 (18)		
Number of sides sheltered											1 (19)		
Shelter factor											(20) = 1 - [0.075 x (19)] =	0.9250 (20)	
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.1327 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)	
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	0.1427	0.1394	0.1394	0.1294	0.1327	0.1128	0.1095	0.1095	0.1128	0.1261	0.1261	0.1294 (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	0.2827	0.2794	0.2794	0.2694	0.2727	0.2528	0.2495	0.2495	0.2528	0.2661	0.2661	0.2694 (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)
Ground Floor			69.9200	0.1100	7.6912	110.0000	7691.2000	(28a)
EXT Wall	84.5800	18.0600	66.5200	0.1800	11.9736	110.0000	7317.2002	(29a)
Total net area of external elements Aum(A, m2)			154.5000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6080			(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 Ceiling			69.9200			30.0000	2097.6000	(32b)
Internal Wall			72.2000			9.0000	649.8000	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		19635.9001	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							280.8338	(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		
P1 Party wall - Ground floor				15.5900	0.0510	0.7951		
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				5.1500	0.0220	0.1133		
E4 Jamb				36.1400	0.0170	0.6144		
E5 Ground floor (normal)				31.5600	0.0670	2.1145		
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		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.6434	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		49.2514	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.3069	16.1154	16.1154	15.5412	15.7326	14.5841	14.3926	14.3926	14.5841	15.3497	15.3497	15.5412 (38)
Average = Sum(39)m / 12 =	65.5582	65.3668	65.3668	64.7926	64.9840	63.8355	63.6440	63.6440	63.8355	64.6011	64.6011	64.7926 (39)
												64.5852
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9376	0.9349	0.9349	0.9267	0.9294	0.9130	0.9102	0.9102	0.9130	0.9239	0.9239	0.9267 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2442 (42)
Hot water usage for mixer showers													
Hot water usage for baths	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 other uses	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)
Average daily hot water use (litres/day)	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)
													115.9876 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

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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										Total = Sum(45)m =		1926.5295
Water storage loss (or HIU loss):	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)
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												
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												
WWHRS	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)
Electric shower(s)												
Heat gains from water heating, kWh/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 (64)
Total per year (kWh/year) = Sum(64)m =												2243.8605 (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)

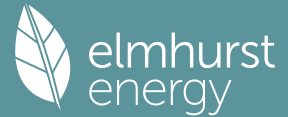
7. Mean internal temperature (heating season)

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)												
tau	83.1996	83.4432	83.4432	84.1828	83.9348	85.4449	85.7019	85.7019	85.4449	84.4322	84.4322	84.1828
alpha	6.5466	6.5629	6.5629	6.6122	6.5957	6.6963	6.7135	6.7135	6.6963	6.6288	6.6288	6.6122
util living area	0.9806	0.9489	0.8717	0.7176	0.5318	0.3498	0.2571	0.2873	0.4759	0.7814	0.9526	0.9857 (86)
MIT	20.4352	20.6271	20.8246	20.9565	20.9942	20.9997	21.0000	20.9999	20.9978	20.9382	20.6741	20.3900 (87)
Th 2	20.1356	20.1380	20.1380	20.1449	20.1426	20.1565	20.1588	20.1588	20.1565	20.1472	20.1472	20.1449 (88)
util rest of house	0.9743	0.9345	0.8420	0.6714	0.4772	0.2943	0.1987	0.2253	0.4131	0.7298	0.9365	0.9810 (89)
MIT 2	19.5085	19.7434	19.9692	20.1096	20.1390	20.1564	20.1588	20.1588	20.1554	20.0986	19.8120	19.4597 (90)
Living area fraction									fLA = Living area / (4) =			0.4238 (91)
MIT	19.9012	20.1179	20.3317	20.4685	20.5014	20.5138	20.5153	20.5152	20.5124	20.4544	20.1773	19.8539 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9012	20.1179	20.3317	20.4685	20.5014	20.5138	20.5153	20.5152	20.5124	20.4544	20.1773	19.8539 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9723	0.9341	0.8492	0.6894	0.5002	0.3178	0.2235	0.2516	0.4397	0.7492	0.9371	0.9790 (94)
Useful gains	640.2807	724.6919	748.1148	662.0343	491.3167	307.1911	204.6255	217.3446	370.1776	559.9843	611.6417	611.9894 (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	963.7865	935.9158	845.3040	684.7580	493.9689	307.2886	204.6323	217.3600	371.0386	591.3867	793.1304	962.4252 (97)
Space heating kWh	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242 (98a)
Space heating requirement - total per year (kWh/year)												888.0332
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)

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Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh												
	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												888.0332
Space heating per m2												(98c) / (4) = 12.7007 (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	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242 (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)	240.6884	141.9425	72.3088	16.3610	1.9732	0.0000	0.0000	0.0000	0.0000	23.3634	130.6718	260.7242 (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) (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												888.0332 (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												1847.1393 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	888.0332	28.4300	252.4678 (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			525.1417 (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	888.0332	0.1588	141.0132 (261)	

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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			232.9884 (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			276.4857 (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	888.0332	1.5877	1409.9705 (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			2401.5775 (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			2870.0185 (286)