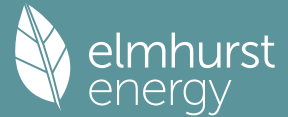


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Plot Reference	Plot 25				Issued on Date	22/12/2025	
Assessment Reference	Plot 25			Plot Type Ref			
Plot Address	Flat 11, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	76 C	DER	7.12	TER	15.76		
Environmental	95 A	% DER < TER				54.82	
CO ₂ Emissions (t/year)	0.35	DFEE	48.81	TFEE	40.38		
Compliance Check	See BREL	% DFEE < TFEE				-20.87	
% DPER < TPER	12.08	DPER	73.79	TPER	83.93		
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	55.1900 (1b)	3.3500 (2b)	184.8865 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		184.8865 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	184.8865 (5)

2. Ventilation rate

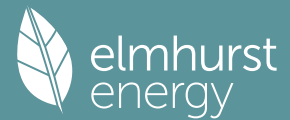
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.9000 (17)
Infiltration rate	0.1450 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1232 (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	0.1571	0.1541	0.1510	0.1356	0.1325	0.1171	0.1171	0.1140	0.1232	0.1325	0.1387	0.1448 (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	0.2971	0.2941	0.2910	0.2756	0.2725	0.2571	0.2571	0.2540	0.2632	0.2725	0.2787	0.2848 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	51.9900		51.9900	0.1200	6.2388	9.0000	467.9100 (30)
Flat Ceiling	10.2100		10.2100	0.1200	1.2252	9.0000	91.8900 (30)
Total net area of external elements Aum (A, m ²)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.9145		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000	20.0000	508.0000 (32)
Corridor			31.8900	0.0000	0.0000	20.0000	637.8000 (32)
Party Floor 1			55.1900			40.0000	2207.6000 (32d)
Internal Walls			88.9400			9.0000	800.4600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5083.4000 (34)

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

92.1073 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	9.0700	0.1690	1.5328
E2 Other lintels (including other steel lintels)	7.1400	0.0070	0.0500
E3 Sill	11.7800	0.0370	0.4359
E4 Jamb	16.6400	0.0370	0.6157
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0890	0.4503
E16 Corner (normal)	5.0600	0.0310	0.1569
E18 Party wall between dwellings	5.5400	0.1320	0.7313
E11 Eaves (insulation at rafter level)	9.9900	0.0320	0.3197
E13 Gable (insulation at rafter level)	10.0900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072
E25 Staggered party wall between dwellings	21.2800	0.0260	0.5533
R6 Flat ceiling	1.9200	0.2500	0.4800
E12 Gable (insulation at ceiling level)	17.8500	0.1710	3.0524
P5 Party wall - Roof (insulation at rafter level)			

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

8.9853 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 48.8998 (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	18.1295	17.9415	17.7535	16.8135	16.6255	15.6856	15.6856	15.4976	16.0616	16.6255	17.0015	17.3775 (38)
Heat transfer coeff	67.0293	66.8413	66.6533	65.7133	65.5254	64.5854	64.5854	64.3974	64.9614	65.5254	65.9013	66.2773 (39)
Average = Sum(39)m / 12 =												65.6663

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2145	1.2111	1.2077	1.1907	1.1873	1.1702	1.1702	1.1668	1.1770	1.1873	1.1941	1.2009 (40)
HLP (average)												1.1898
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8429 (42)
Hot water usage for mixer showers	55.1193	54.2910	53.0839	50.7745	49.0701	47.1695	46.0891	47.2871	48.6002	50.6409	53.0000	54.9081 (42a)
Hot water usage for baths	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458 (42b)
Hot water usage for other uses	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034 (42c)
Average daily hot water use (litres/day)												103.3666 (43)
Daily hot water use	112.4490	110.0485	107.1249	102.6783	99.0677	95.1859	93.6935	96.6046	99.6748	103.7501	108.2652	112.1573 (44)
Energy conte	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112 (45)
Energy content (annual)										Total = Sum(45)m =		1716.8969
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417 (46)
Water storage loss (or HIU loss):												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8694 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2034.2279 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	59.2155	52.1053	54.7451	46.7367	44.3436	38.9165	37.6770	39.7725	40.8672	46.8120	51.2860	58.3907 (65)

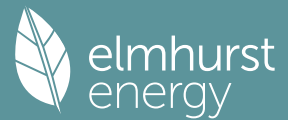
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.0422	89.7252	81.0422	83.7436	81.0422	83.7436	81.0422	81.0422	83.7436	81.0422	83.7436	81.0422 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.6751	162.3425	158.1409	149.1963	137.9053	127.2934	120.2040	118.5367	122.7382	131.6828	142.9738	153.5857 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146 (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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)	79.5908	77.5376	73.5821	64.9121	59.6016	54.0507	50.6411	53.4577	56.7600	62.9193	71.2305	78.4822 (72)
Total internal gains	371.9519	380.2492	363.4091	348.4958	329.1930	315.7316	302.5311	303.6804	313.8857	326.2882	348.5918	363.7539 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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North	1.3700		10.6334		0.4000		0.0000		0.7700		4.4869 (74)	
South	19.6100		46.7521		0.3500		0.7000		0.7700		155.6602 (78)	
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)
Total gains	532.0990	643.7552	702.7168	738.9233	743.1814	717.5493	693.6656	677.9246	670.6305	611.4626	538.6374	501.9992 (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	21.0662	21.1255	21.1851	21.4881	21.5498	21.8634	21.8634	21.9272	21.7369	21.5498	21.4268	21.3053
alpha	2.4044	2.4084	2.4123	2.4325	2.4367	2.4576	2.4576	2.4618	2.4491	2.4367	2.4285	2.4204
util living area	0.9047	0.8590	0.8092	0.7342	0.6359	0.5021	0.3814	0.4030	0.5583	0.7464	0.8646	0.9145 (86)
MIT	18.5818	19.0146	19.4884	20.0343	20.4765	20.7957	20.9245	20.9112	20.7165	20.1385	19.2808	18.5078 (87)
Th 2	19.9084	19.9111	19.9138	19.9275	19.9302	19.9439	19.9439	19.9466	19.9384	19.9302	19.9247	19.9193 (88)
util rest of house	0.8925	0.8421	0.7864	0.7017	0.5892	0.4361	0.2989	0.3212	0.4948	0.7090	0.8456	0.9036 (89)
MIT 2	17.1299	17.6652	18.2490	18.9164	19.4322	19.7847	19.9014	19.8940	19.7046	19.0567	18.0156	17.0445 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.9089	18.3892	18.9140	19.5162	19.9924	20.3271	20.4503	20.4397	20.2475	19.6371	18.6944	17.8296 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.9089	18.3892	18.9140	19.5162	19.9924	20.3271	20.4503	20.4397	20.2475	19.6371	18.6944	17.8296 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8643	0.8139	0.7622	0.6880	0.5921	0.4610	0.3395	0.3605	0.5142	0.6976	0.8193	0.8762 (94)
Useful gains	459.9132	523.9599	535.5993	508.3978	440.0240	330.7630	235.4700	244.4058	344.8449	426.5336	441.2872	439.8641 (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	912.1944	901.6359	827.4316	697.6233	543.3651	369.8873	248.6715	260.1463	399.3488	592.1606	764.0842	903.3310 (97)
Space heating kWh	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (98a)
Space heating requirement - total per year (kWh/year)												1721.0066
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	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1721.0066
Space heating per m2	(98c) / (4) =											31.1833 (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	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (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)	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (64)
Efficiency of water heater (217)m	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073 (216)
Fuel for water heating, kWh/month	58.8516	51.9653	54.9926	47.8301	46.0139	41.0796	40.2591	42.0680	42.7635	48.1446	51.7571	58.1396 (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	16.0921	14.5348	16.0921	15.5730	16.0921	15.5730	16.0921	16.0921	15.5730	16.0921	15.5730	16.0921 (231)
Lighting	15.3831	12.3409	11.1116	8.1408	6.2882	5.1375	5.7363	7.4563	9.6850	12.7072	14.3527	15.8106 (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												1721.0066 (211)
Space heating fuel - main system 1												

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	348.4073	
Water heating fuel used	583.8650	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	189.4717	(230a)
Total electricity for the above, kWh/year	189.4717	(231)
Electricity for lighting (calculated in Appendix L)	124.1501	(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	2618.4933	(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	1721.0066	0.1548	266.3671 (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)	583.8650	0.1411	82.4015 (264)
Space and water heating			348.7685 (265)
Pumps, fans and electric keep-hot	189.4717	0.1387	26.2821 (267)
Energy for lighting	124.1501	0.1443	17.9187 (268)
Total CO2, kg/year			392.9693 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.1200 (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	1721.0066	1.5730	2707.1220 (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)	583.8650	1.5219	888.5624 (278)
Space and water heating			3595.6845 (279)
Pumps, fans and electric keep-hot	189.4717	1.5128	286.6328 (281)
Energy for lighting	124.1501	1.5338	190.4256 (282)
Total Primary energy kWh/year			4072.7429 (286)
Dwelling Primary energy Rate (DPER)			73.7900 (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	55.1900 (1b)	x 3.3500 (2b)	= 184.8865 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 184.8865 (5)

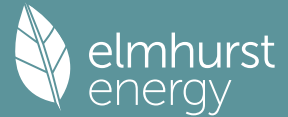
2. Ventilation rate

	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) = 0.1082 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3582	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3044 (21)

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

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Adj infilt rate	0.3882	0.3806	0.3729	0.3349	0.3273	0.2892	0.2892	0.2816	0.3044	0.3273	0.3425	0.3577 (22b)
Effective ac	0.5753	0.5724	0.5695	0.5561	0.5536	0.5418	0.5418	0.5397	0.5463	0.5536	0.5587	0.5640 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type			11.6700	1.1450	13.3626		(27)
EXT Wall	49.5100	13.7900	35.7200	0.1800	6.4296		(29a)
Warm Sloping Roof	51.9900		51.9900	0.1100	5.7189		(30)
Flat Ceiling	10.2100		10.2100	0.1100	1.1231		(30)
Total net area of external elements Aum(A, m2)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	28.7542		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000		(32)
Corridor			31.8900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							92.1073 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	9.0700	0.0500	0.4535
E2 Other lintels (including other steel lintels)	7.1400	0.0500	0.3570
E3 Sill	11.7800	0.0500	0.5890
E4 Jamb	16.6400	0.0700	1.1648
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0900	0.4554
E16 Corner (normal)	5.0600	0.0600	0.3036
E18 Party wall between dwellings	5.5400	0.0400	0.2216
E11 Eaves (insulation at rafter level)	9.9900	0.0800	0.7992
E13 Gable (insulation at rafter level)	10.0900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.0600	0.3036
E25 Staggered party wall between dwellings	21.2800	0.0600	1.2768
R6 Flat ceiling	1.9200	0.0600	0.1152
E12 Gable (insulation at ceiling level)	17.8500	0.0800	1.4280
P5 Party wall - Roof (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4677 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	36.2219 (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	35.1029	34.9244	34.7494	33.9277	33.7739	33.0582	33.0582	32.9256	33.3339	33.7739	34.0849	34.4101 (38)
Heat transfer coeff	71.3248	71.1463	70.9713	70.1495	69.9958	69.2801	69.2801	69.1475	69.5558	69.9958	70.3068	70.6320 (39)
Average = Sum(39)m / 12 =												70.1488
HLP	1.2923	1.2891	1.2859	1.2711	1.2683	1.2553	1.2553	1.2529	1.2603	1.2683	1.2739	1.2798 (40)
HLP (average)												1.2710
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

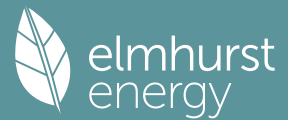
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8429 (42)
Hot water usage for mixer showers	55.1193	54.2910	53.0839	50.7745	49.0701	47.1695	46.0891	47.2871	48.6002	50.6409	53.0000	54.9081 (42a)
Hot water usage for baths	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458 (42b)
Hot water usage for other uses	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034 (42c)
Average daily hot water use (litres/day)												103.3666 (43)
Daily hot water use	112.4490	110.0485	107.1249	102.6783	99.0677	95.1859	93.6935	96.6046	99.6748	103.7501	108.2652	112.1573 (44)
Energy conte	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112 (45)
Energy content (annual)										Total = Sum(45)m =		1716.8969
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417 (46)
Water storage loss (or HIU loss):												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	224.6867	198.7934	211.2419	185.6534	179.9591	162.1340	159.9091	166.2115	168.0008	187.3828	199.3354	222.2061 (62)
WWHRS	-25.1982	-22.2855	-23.3361	-19.3232	-18.0086	-15.4101	-14.4445	-15.3602	-15.9438	-18.7960	-21.2936	-24.7316 (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	199.4884	176.5078	187.9057	166.3301	161.9505	146.7240	145.4646	150.8513	152.0570	168.5868	178.0418	197.4745 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2031.3827 (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	96.4914	85.7739	92.0210	82.8102	81.6195	74.9900	74.9529	77.0485	76.9407	84.0879	87.3595	95.6667 (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	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.2267	89.9295	81.2267	83.9342	81.2267	83.9342	81.2267	81.2267	83.9342	81.2267	83.9342	81.2267 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.6751	162.3425	158.1409	149.1963	137.9053	127.2934	120.2040	118.5367	122.7382	131.6828	142.9738	153.5857 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146 (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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)	129.6928	127.6397	123.6842	115.0141	109.7037	104.1528	100.7431	103.5598	106.8621	113.0214	121.3326	128.5842 (72)
Total internal gains	425.2385	433.5555	416.6956	401.7885	382.4795	366.0243	352.8177	353.9670	364.1784	379.5747	401.8845	417.0405 (73)

6. Solar gains

[Jan]	Area m2			Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W
North	0.7600			10.6334		0.6300		0.7000		0.7700		2.4698 (74)
South	10.9100			46.7521		0.6300		0.7000		0.7700		155.8825 (78)
Solar gains	158.3523	260.0152	333.2212	380.4303	400.3614	387.1705	377.4822	363.5042	349.3537	280.9784	187.8207	136.7558 (83)
Total gains	583.5908	693.5708	749.9168	782.2188	782.8409	753.1947	730.2999	717.4712	713.5322	660.5531	589.7052	553.7962 (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	19.7975	19.8472	19.8961	20.1292	20.1734	20.3818	20.3818	20.4209	20.3011	20.1734	20.0842	19.9917
alpha	2.3198	2.3231	2.3264	2.3419	2.3449	2.3588	2.3588	2.3614	2.3534	2.3449	2.3389	2.3328
util living area	0.8925	0.8484	0.8004	0.7288	0.6342	0.5052	0.3847	0.4047	0.5549	0.7343	0.8507	0.9021 (86)
MIT	18.5279	18.9433	19.4149	19.9645	20.4253	20.7651	20.9108	20.8963	20.6867	20.0966	19.2346	18.4552 (87)
Th 2	19.8468	19.8494	19.8519	19.8636	19.8658	19.8760	19.8760	19.8779	19.8721	19.8658	19.8613	19.8567 (88)
util rest of house	0.8787	0.8301	0.7762	0.6948	0.5853	0.4355	0.2969	0.3179	0.4883	0.6946	0.8296	0.8895 (89)
MIT 2	17.0261	17.5381	18.1181	18.7881	19.3248	19.6963	19.8274	19.8183	19.6180	18.9602	17.9181	16.9418 (90)
Living area fraction	fLA = Living area / (4) =											0.5365 (91)
MIT	17.8318	18.2920	18.8139	19.4192	19.9152	20.2697	20.4087	20.3967	20.1914	19.5699	18.6244	17.7537 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8318	18.2920	18.8139	19.4192	19.9152	20.2697	20.4087	20.3967	20.1914	19.5699	18.6244	17.7537 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8484	0.8004	0.7509	0.6801	0.5876	0.4610	0.3397	0.3592	0.5081	0.6830	0.8020	0.8598 (94)
Useful gains	495.1241	555.1474	563.0768	531.9818	459.9935	347.2111	248.0784	257.7487	362.5734	451.1896	472.9415	476.1613 (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	965.1551	952.7904	873.9317	737.9196	575.0320	392.7999	263.8637	276.3597	423.6907	627.8546	810.2463	957.3281 (97)
Space heating kWh	349.7031	267.2161	231.2760	148.2752	85.5886	0.0000	0.0000	0.0000	0.0000	131.4387	242.8595	357.9882 (98a)
Space heating requirement - total per year (kWh/year)												1814.3454
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	349.7031	267.2161	231.2760	148.2752	85.5886	0.0000	0.0000	0.0000	0.0000	131.4387	242.8595	357.9882 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1814.3454
Space heating per m2												(98c) / (4) = 32.8745 (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	349.7031	267.2161	231.2760	148.2752	85.5886	0.0000	0.0000	0.0000	0.0000	131.4387	242.8595	357.9882 (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)	378.8766	289.5082	250.5699	160.6449	92.7288	0.0000	0.0000	0.0000	0.0000	142.4038	263.1197	387.8528 (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	199.4884	176.5078	187.9057	166.3301	161.9505	146.7240	145.4646	150.8513	152.0570	168.5868	178.0418	197.4745 (64)
Water heating requirement	85.3053	84.9872	84.5266	83.8031	82.6980	79.8000	79.8000	79.8000	79.8000	83.5078	84.7565	79.8000 (216)
Fuel for water heating, kWh/month	233.8523	207.6876	222.3036	198.4774	195.8337	183.8646	182.2865	189.0367	190.5476	201.8813	210.0626	231.2977 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)

Full SAP Calculation Printout



Lighting	16.8773	13.5396	12.1909	8.9316	6.8990	5.6365	6.2935	8.1805	10.6257	13.9415	15.7469	17.3464	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-14.9047	-22.1465	-33.5373	-39.8042	-44.7856	-42.5061	-42.0050	-38.7338	-33.2821	-26.2491	-16.7893	-12.7584	(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	-5.2975	-11.3958	-23.1206	-35.4202	-47.5106	-47.9686	-47.3874	-39.7986	-28.7595	-16.5049	-7.1405	-4.1695	(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												1965.7047	(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												2447.1318	(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)												136.2094	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-681.9760	(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												3953.0699	(238)

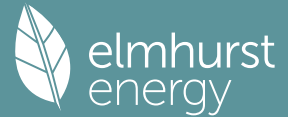
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1965.7047	0.2100	412.7980 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2447.1318	0.2100	513.8977 (264)
Space and water heating			926.6957 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	136.2094	0.1443	19.6592 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-367.5023	0.1335	-49.0544
PV Unit electricity exported	-314.4737	0.1253	-39.4127
Total			-88.4671 (269)
Total CO2, kg/year			869.8170 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.7600 (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	1965.7047	1.1300	2221.2463 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2447.1318	1.1300	2765.2589 (278)
Space and water heating			4986.5052 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	136.2094	1.5338	208.9226 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-367.5023	1.4933	-548.7759
PV Unit electricity exported	-314.4737	0.4600	-144.6635
Total			-693.4394 (283)
Total Primary energy kWh/year			4632.0892 (286)
Target Primary Energy Rate (TPER)			83.9300 (287)

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Plot Reference	Plot 25				Issued on Date	22/12/2025	
Assessment Reference	Plot 25			Plot Type Ref			
Plot Address	Flat 11, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	76 C	DER	7.12	TER	15.76		
Environmental	95 A	% DER < TER				54.82	
CO ₂ Emissions (t/year)	0.35	DFEE	48.81	TFEE	40.38		
Compliance Check	See BREL	% DFEE < TFEE				-20.87	
% DPER < TPER	12.08	DPER	73.79	TPER	83.93		
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	55.1900 (1b)	3.3500 (2b)	184.8865 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		184.8865 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 184.8865 (5)

2. Ventilation rate

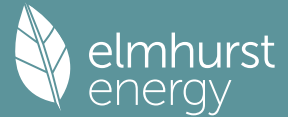
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1082 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.9000	(17)
Infiltration rate	0.2532	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2152 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.2744	0.2690	0.2636	0.2367	0.2313	0.2044	0.2044	0.1991	0.2152	0.2313	0.2421	0.2529 (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	0.5376	0.5362	0.5347	0.5280	0.5268	0.5209	0.5209	0.5198	0.5232	0.5268	0.5293	0.5320 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	51.9900		51.9900	0.1200	6.2388	9.0000	467.9100 (30)
Flat Ceiling	10.2100		10.2100	0.1200	1.2252	9.0000	91.8900 (30)
Total net area of external elements Aum(A, m ²)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.9145		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000	20.0000	508.0000 (32)
Corridor			31.8900	0.0000	0.0000	20.0000	637.8000 (32)
Party Floor 1			55.1900			40.0000	2207.6000 (32d)
Internal Walls			88.9400			9.0000	800.4600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		5083.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							92.1073 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E2 Other lintels (including other steel lintels)	9.0700	0.1690	1.5328
E3 Sill	7.1400	0.0070	0.0500
E4 Jamb	11.7800	0.0370	0.4359
E7 Party floor between dwellings (in blocks of flats)	16.6400	0.0370	0.6157
E16 Corner (normal)	5.0600	0.0890	0.4503
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	5.5400	0.1320	0.7313
E13 Gable (insulation at rafter level)	9.9900	0.0320	0.3197
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.0900	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	21.2800	0.0260	0.5533
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800
P5 Party wall - Roof (insulation at rafter level)	17.8500	0.1710	3.0524
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9853 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	48.8998 (37)

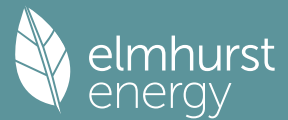
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	32.8029	32.7137	32.6263	32.2157	32.1389	31.7813	31.7813	31.7151	31.9190	32.1389	32.2943	32.4568	(38)
Heat transfer coeff	81.7027	81.6135	81.5261	81.1155	81.0387	80.6811	80.6811	80.6149	80.8188	81.0387	81.1941	81.3566	(39)
Average = Sum(39)m / 12 =												81.1152	
HLP	1.4804	1.4788	1.4772	1.4698	1.4684	1.4619	1.4619	1.4607	1.4644	1.4684	1.4712	1.4741	(40)
HLP (average)												1.4697	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.8429 (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	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458	(42b)
Hot water usage for other uses	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034	(42c)
Average daily hot water use (litres/day)												52.5484	(43)
Daily hot water use	57.3297	55.7576	54.0410	51.9039	49.9976	48.0164	47.6044	49.3175	51.0746	53.1092	55.2652	57.2492	(44)
Energy conte	90.7963	79.3980	83.0589	71.0538	67.3064	59.0418	57.5734	61.0654	62.9801	72.0686	78.7354	89.6384	(45)
Energy content (annual)										Total = Sum(45)m =		872.7165	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													
WWHRS	77.1768	67.4883	70.6001	60.3957	57.2104	50.1856	48.9374	51.9056	53.5331	61.2583	66.9251	76.1926	(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	77.1768	67.4883	70.6001	60.3957	57.2104	50.1856	48.9374	51.9056	53.5331	61.2583	66.9251	76.1926	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				741.8090	(64)
Electric shower(s)	44.1414	39.3303	42.9472	40.9840	41.7531	39.8284	41.1560	41.7531	40.9840	42.9472	42.1396	44.1414	(64a)
Heat gains from water heating, kWh/month	30.3296	26.7047	28.3868	25.3449	24.7409	22.5035	22.5233	23.4147	23.6293	26.0514	27.2662	30.0835	(65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												502.1057	(64a)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.0422	89.7252	81.0422	83.7436	81.0422	83.7436	81.0422	81.0422	83.7436	81.0422	83.7436	81.0422	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.6751	162.3425	158.1409	149.1963	137.9053	127.2934	120.2040	118.5367	122.7382	131.6828	142.9738	153.5857	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	(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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	(71)
Water heating gains (Table 5)	40.7655	39.7391	38.1543	35.2013	33.2539	31.2548	30.2733	31.4713	32.8184	35.0153	37.8697	40.4348	(72)
Total internal gains	333.1267	342.4507	327.9813	318.7850	302.8452	292.9357	282.1633	281.6940	289.9441	298.3842	315.2309	325.7066	(73)

6. Solar gains													
[Jan]													
	Area	Solar flux											
	m2	Table 6a											
		W/m2											
North	1.3700	10.6334											
South	19.6100	46.7521											
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453	(83)
Total gains	493.2738	605.9567	667.2890	709.2125	716.8336	694.7534	673.2978	655.9382	646.6889	583.5586	505.2765	463.9518	(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	17.2829	17.3017	17.3203	17.4080	17.4245	17.5017	17.5017	17.5161	17.4719	17.4245	17.3911	17.3564
alpha	2.1522	2.1534	2.1547	2.1605	2.1616	2.1668	2.1668	2.1677	2.1648	2.1616	2.1594	2.1571
util living area	0.9255	0.8885	0.8479	0.7858	0.7007	0.5786	0.4555	0.4799	0.6321	0.7978	0.8943	0.9336 (86)
MIT	17.8560	18.3129	18.8636	19.5260	20.1260	20.6014	20.8318	20.8048	20.4818	19.6885	18.6495	17.7602 (87)
Th 2	19.7022	19.7035	19.7047	19.7103	19.7113	19.7162	19.7162	19.7171	19.7143	19.7113	19.7092	19.7070 (88)
util rest of house	0.9145	0.8728	0.8258	0.7526	0.6493	0.4975	0.3445	0.3710	0.5574	0.7597	0.8765	0.9237 (89)
MIT 2	16.9067	17.3499	17.8832	18.5180	19.0723	19.4823	19.6483	19.6333	19.3897	18.6857	17.6915	16.8163 (90)
Living area fraction									fLA = Living area / (4) =			0.5365 (91)
MIT	17.4160	17.8665	18.4092	19.0588	19.6376	20.0828	20.2832	20.2618	19.9756	19.2237	18.2055	17.3227 (92)
Temperature adjustment												0.0000
adjusted MIT	17.4160	17.8665	18.4092	19.0588	19.6376	20.0828	20.2832	20.2618	19.9756	19.2237	18.2055	17.3227 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8887	0.8446	0.7990	0.7332	0.6460	0.5224	0.3961	0.4199	0.5740	0.7429	0.8501	0.8991 (94)
Useful gains	438.3924	511.7725	533.1971	519.9948	463.0653	362.9124	266.6638	275.4176	371.2005	433.4979	429.5212	417.1182 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1071.6122	1058.2445	970.9075	824.0341	643.2534	442.3544	297.1668	311.3197	474.8610	698.8546	901.6972	1067.6214 (97)
Space heating kWh	471.1155	367.2291	325.6565	218.9083	134.0599	0.0000	0.0000	0.0000	0.0000	197.4254	339.9667	483.9744 (98a)
Space heating requirement - total per year (kWh/year)												2538.3357
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	471.1155	367.2291	325.6565	218.9083	134.0599	0.0000	0.0000	0.0000	0.0000	197.4254	339.9667	483.9744 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2538.3357
Space heating per m2												(98c) / (4) = 45.9927 (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	758.4023	597.0401	612.6731	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6950	0.7618	0.7464	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	527.0628	454.8415	457.2904	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	782.7519	759.2733	740.5383	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	184.0961	226.4972	210.7364	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	46.0240	56.6243	52.6841	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												155.3324 (107)
Energy for space heating												45.9927 (99)
Energy for space cooling												2.8145 (108)
Total												48.8072 (109)
Fabric Energy Efficiency (DFEE)												48.8 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

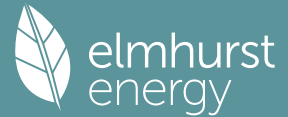
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	55.1900 (1b)	x 3.3500 (2b)	= 184.8865 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 184.8865 (5)

2. Ventilation rate

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

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Number of flueless gas fires

0 * 40 = 0.0000 (7c)

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

Air changes per hour
20.0000 / (5) = 0.1082 (8)
Yes
Blower Door
5.0000 (17)
0.3582 (18)
2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3044 (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	0.3882	0.3806	0.3729	0.3349	0.3273	0.2892	0.2892	0.2816	0.3044	0.3273	0.3425	0.3577 (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	0.5753	0.5724	0.5695	0.5561	0.5536	0.5418	0.5418	0.5397	0.5463	0.5536	0.5587	0.5640 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type			11.6700	1.1450	13.3626		(27)
EXT Wall	49.5100	13.7900	35.7200	0.1800	6.4296		(29a)
Warm Sloping Roof	51.9900		51.9900	0.1100	5.7189		(30)
Flat Ceiling	10.2100		10.2100	0.1100	1.1231		(30)
Total net area of external elements Aum(A, m2)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.7542		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000		(32)
Corridor			31.8900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							92.1073 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.0700	0.0500	0.4535
E3 Sill	7.1400	0.0500	0.3570
E4 Jamb	11.7800	0.0500	0.5890
E7 Party floor between dwellings (in blocks of flats)	16.6400	0.0700	1.1648
E16 Corner (normal)	5.0600	0.0900	0.4554
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E11 Eaves (insulation at rafter level)	5.5400	0.0400	0.2216
E13 Gable (insulation at rafter level)	9.9900	0.0800	0.7992
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.0900	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036
R6 Flat ceiling	21.2800	0.0600	1.2768
E12 Gable (insulation at ceiling level)	1.9200	0.0600	0.1152
P5 Party wall - Roof (insulation at rafter level)	17.8500	0.0800	1.4280
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4677 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 36.2219 (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	35.1029	34.9244	34.7494	33.9277	33.7739	33.0582	33.0582	32.9256	33.3339	33.7739	34.0849	34.4101 (38)
Heat transfer coeff	71.3248	71.1463	70.9713	70.1495	69.9958	69.2801	69.2801	69.1475	69.5558	69.9958	70.3068	70.6320 (39)
Average = Sum(39)m / 12 =												70.1488

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2923	1.2891	1.2859	1.2711	1.2683	1.2553	1.2553	1.2529	1.2603	1.2683	1.2739	1.2798 (40)
HLP (average)												1.2710
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8429 (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	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458 (42b)
Hot water usage for other uses	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034 (42c)
Average daily hot water use (litres/day)												52.5484 (43)
Daily hot water use	57.3297	55.7576	54.0410	51.9039	49.9976	48.0164	47.6044	49.3175	51.0746	53.1092	55.2652	57.2492 (44)
Energy conte	90.7963	79.3980	83.0589	71.0538	67.3064	59.0418	57.5734	61.0654	62.9801	72.0686	78.7354	89.6384 (45)
Energy content (annual)										Total = Sum(45)m =		872.7165
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	77.1768	67.4883	70.6001	60.3957	57.2104	50.1856	48.9374	51.9056	53.5331	61.2583	66.9251	76.1926 (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	77.1768	67.4883	70.6001	60.3957	57.2104	50.1856	48.9374	51.9056	53.5331	61.2583	66.9251	76.1926 (64)
Total per year (kWh/year) = Sum(64)m =												741.8090 (64)

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12Total per year (kWh/year)	742 (64)										
Electric shower(s)	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 502.1057 (64a)										
44.1414	39.3303	42.9472	40.9840	41.7531	39.8284	41.1560	41.7531	40.9840	42.9472	42.1396	44.1414 (64a)
Heat gains from water heating, kWh/month											
30.3296	26.7047	28.3868	25.3449	24.7409	22.5035	22.5233	23.4147	23.6293	26.0514	27.2662	30.0835 (65)

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

Metabolic gains (Table 5), Watts											
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5											
	81.2267	89.9295	81.2267	83.9342	81.2267	83.9342	81.2267	81.2267	83.9342	81.2267	83.9342 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5											
	160.6751	162.3425	158.1409	149.1963	137.9053	127.2934	120.2040	118.5367	122.7382	131.6828	142.9738 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5											
	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146 (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)											
	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)											
	40.7655	39.7391	38.1543	35.2013	33.2539	31.2548	30.2733	31.4713	32.8184	35.0153	37.8697 (72)
Total internal gains											
	333.3112	342.6549	328.1658	318.9757	303.0297	293.1263	282.3478	281.8785	290.1347	298.5687	315.4216 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
North					0.7600	10.6334	0.6300	0.7000	0.7700	2.4698 (74)		
South					10.9100	46.7521	0.6300	0.7000	0.7700	155.8825 (78)		
Solar gains	158.3523	260.0152	333.2212	380.4303	400.3614	387.1705	377.4822	363.5042	349.3537	280.9784	187.8207	136.7558 (83)
Total gains	491.6635	602.6702	661.3870	699.4059	703.3911	680.2968	659.8300	645.3827	639.4885	579.5471	503.2423	462.6468 (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
tau	19.7975	19.8472	19.8961	20.1292	20.1734	20.3818	20.3818	20.4209	20.3011	20.1734	20.0842
alpha	2.3198	2.3231	2.3264	2.3419	2.3449	2.3588	2.3588	2.3614	2.3534	2.3449	2.3389
util living area											
	0.9204	0.8791	0.8341	0.7652	0.6734	0.5433	0.4185	0.4410	0.5963	0.7761	0.8847 (86)
MIT											
	18.2760	18.7269	19.2354	19.8348	20.3407	20.7244	20.8929	20.8750	20.6323	19.9655	19.0252 (87)
Th 2											
	19.8468	19.8494	19.8519	19.8636	19.8658	19.8760	19.8760	19.8779	19.8721	19.8658	19.8613 (88)
util rest of house											
	0.9096	0.8635	0.8125	0.7333	0.6256	0.4717	0.3252	0.3491	0.5289	0.7394	0.8672 (89)
MIT 2											
	17.4065	17.8439	18.3354	18.9116	19.3765	19.7094	19.8299	19.8210	19.6362	19.0474	18.1509 (90)
Living area fraction											
	17.8730	18.3176	18.8183	19.4069	19.8938	20.2539	20.4002	20.3865	20.1706	19.5400	18.6200 (91)
MIT											
	17.8730	18.3176	18.8183	19.4069	19.8938	20.2539	20.4002	20.3865	20.1706	19.5400	18.6200 (92)
Temperature adjustment											
	17.8730	18.3176	18.8183	19.4069	19.8938	20.2539	20.4002	20.3865	20.1706	19.5400	18.6200 (93)
adjusted MIT											
	17.8730	18.3176	18.8183	19.4069	19.8938	20.2539	20.4002	20.3865	20.1706	19.5400	18.6200 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8857	0.8383	0.7896	0.7189	0.6268	0.4970	0.3702	0.3923	0.5479	0.7274	0.8437	0.8966 (94)
Useful gains	435.4877	505.2048	522.2455	502.8159	440.9146	338.1242	244.2923	253.1829	350.3740	421.5838	424.5741	414.8213 (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												
	968.0890	954.6126	874.2434	737.0533	573.5333	391.7055	263.2761	275.6544	422.2466	625.7606	809.9325	960.4431 (97)
Space heating kWh												
	396.2554	302.0021	261.8865	168.6509	98.6683	0.0000	0.0000	0.0000	0.0000	151.9076	277.4580	405.9426 (98a)
Space heating requirement - total per year (kWh/year)												
												2062.7713
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												
	396.2554	302.0021	261.8865	168.6509	98.6683	0.0000	0.0000	0.0000	0.0000	151.9076	277.4580	405.9426 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
												2062.7713
Space heating per m2												
										(98c) / (4) =		37.3758 (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	651.2326	512.6725	525.5212	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7567	0.8188	0.8065	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	492.8202	419.7662	423.8113	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	765.6479	743.3336	728.0077	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	196.4359	240.7341	226.3221	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	49.1090	60.1835	56.5805	0.0000	0.0000	0.0000	0.0000 (107)

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Space cooling requirement	165.8730	(107)
Energy for space heating	37.3758	(99)
Energy for space cooling	3.0055	(108)
Total	40.3813	(109)
Fabric Energy Efficiency (TFEE)	40.4	(109)

Full SAP Calculation Printout



Plot Reference	Plot 25			Issued on Date	22/12/2025
Assessment Reference	Plot 25	Plot Type Ref			
Plot Address	Flat 11, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	76 C	DER	7.12	TER	15.76
Environmental	95 A	% DER < TER			54.82
CO ₂ Emissions (t/year)	0.35	DFEE	48.81	TFEE	40.38
Compliance Check	See BREL	% DFEE < TFEE			-20.87
% DPER < TPER	12.08	DPER	73.79	TPER	83.93
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	55.1900 (1b)	3.3500 (2b)	184.8865 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		184.8865 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	184.8865 (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	2.9000	(17)
Infiltration rate	0.1450	(18)
Number of sides sheltered	2	(19)

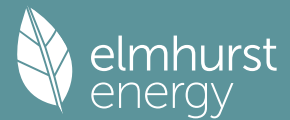
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1232 (21)

	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	0.1571	0.1541	0.1510	0.1356	0.1325	0.1171	0.1171	0.1140	0.1232	0.1325	0.1387	0.1448 (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	0.2971	0.2941	0.2910	0.2756	0.2725	0.2571	0.2571	0.2540	0.2632	0.2725	0.2787	0.2848 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	51.9900		51.9900	0.1200	6.2388	9.0000	467.9100 (30)
Flat Ceiling	10.2100		10.2100	0.1200	1.2252	9.0000	91.8900 (30)
Total net area of external elements Aum (A, m ²)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.9145		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000	20.0000	508.0000 (32)
Corridor			31.8900	0.0000	0.0000	20.0000	637.8000 (32)
Party Floor 1			55.1900			40.0000	2207.6000 (32d)
Internal Walls			88.9400			9.0000	800.4600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5083.4000 (34)

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

92.1073 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	9.0700	0.1690	1.5328
E2 Other lintels (including other steel lintels)	7.1400	0.0070	0.0500
E3 Sill	11.7800	0.0370	0.4359
E4 Jamb	16.6400	0.0370	0.6157
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0890	0.4503
E16 Corner (normal)	5.0600	0.0310	0.1569
E18 Party wall between dwellings	5.5400	0.1320	0.7313
E11 Eaves (insulation at rafter level)	9.9900	0.0320	0.3197
E13 Gable (insulation at rafter level)	10.0900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072
E25 Staggered party wall between dwellings	21.2800	0.0260	0.5533
R6 Flat ceiling	1.9200	0.2500	0.4800
E12 Gable (insulation at ceiling level)	17.8500	0.1710	3.0524
P5 Party wall - Roof (insulation at rafter level)			

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

8.9853 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 48.8998 (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	18.1295	17.9415	17.7535	16.8135	16.6255	15.6856	15.6856	15.4976	16.0616	16.6255	17.0015	17.3775 (38)
Heat transfer coeff	67.0293	66.8413	66.6533	65.7133	65.5254	64.5854	64.5854	64.3974	64.9614	65.5254	65.9013	66.2773 (39)
Average = Sum(39)m / 12 =												65.6663

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2145	1.2111	1.2077	1.1907	1.1873	1.1702	1.1702	1.1668	1.1770	1.1873	1.1941	1.2009 (40)
HLP (average)												1.1898
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8429 (42)
Hot water usage for mixer showers	55.1193	54.2910	53.0839	50.7745	49.0701	47.1695	46.0891	47.2871	48.6002	50.6409	53.0000	54.9081 (42a)
Hot water usage for baths	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458 (42b)
Hot water usage for other uses	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034 (42c)
Average daily hot water use (litres/day)												103.3666 (43)
Daily hot water use	112.4490	110.0485	107.1249	102.6783	99.0677	95.1859	93.6935	96.6046	99.6748	103.7501	108.2652	112.1573 (44)
Energy conte	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112 (45)
Energy content (annual)										Total = Sum(45)m =		1716.8969
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417 (46)
Water storage loss (or HIU loss):												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8694 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2034.2279 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	59.2155	52.1053	54.7451	46.7367	44.3436	38.9165	37.6770	39.7725	40.8672	46.8120	51.2860	58.3907 (65)

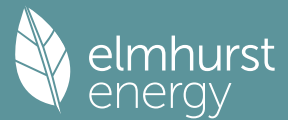
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.0422	89.7252	81.0422	83.7436	81.0422	83.7436	81.0422	81.0422	83.7436	81.0422	83.7436	81.0422 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.6751	162.3425	158.1409	149.1963	137.9053	127.2934	120.2040	118.5367	122.7382	131.6828	142.9738	153.5857 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146 (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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)	79.5908	77.5376	73.5821	64.9121	59.6016	54.0507	50.6411	53.4577	56.7600	62.9193	71.2305	78.4822 (72)
Total internal gains	371.9519	380.2492	363.4091	348.4958	329.1930	315.7316	302.5311	303.6804	313.8857	326.2882	348.5918	363.7539 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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North	1.3700		10.6334		0.4000		0.0000		0.7700		4.4869 (74)		
South	19.6100		46.7521		0.3500		0.7000		0.7700		155.6602 (78)		
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)	
Total gains	532.0990	643.7552	702.7168	738.9233	743.1814	717.5493	693.6656	677.9246	670.6305	611.4626	538.6374	501.9992 (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	21.0662	21.1255	21.1851	21.4881	21.5498	21.8634	21.8634	21.9272	21.7369	21.5498	21.4268	21.3053	
alpha	2.4044	2.4084	2.4123	2.4325	2.4367	2.4576	2.4576	2.4618	2.4491	2.4367	2.4285	2.4204	
util living area	0.9047	0.8590	0.8092	0.7342	0.6359	0.5021	0.3814	0.4030	0.5583	0.7464	0.8646	0.9145 (86)	
MIT	18.5818	19.0146	19.4884	20.0343	20.4765	20.7957	20.9245	20.9112	20.7165	20.1385	19.2808	18.5078 (87)	
Th 2	19.9084	19.9111	19.9138	19.9275	19.9302	19.9439	19.9439	19.9466	19.9384	19.9302	19.9247	19.9193 (88)	
util rest of house	0.8925	0.8421	0.7864	0.7017	0.5892	0.4361	0.2989	0.3212	0.4948	0.7090	0.8456	0.9036 (89)	
MIT 2	17.1299	17.6652	18.2490	18.9164	19.4322	19.7847	19.9014	19.8940	19.7046	19.0567	18.0156	17.0445 (90)	
Living area fraction	fLA = Living area / (4) =												0.5365 (91)
MIT	17.9089	18.3892	18.9140	19.5162	19.9924	20.3271	20.4503	20.4397	20.2475	19.6371	18.6944	17.8296 (92)	
Temperature adjustment													0.0000
adjusted MIT	17.9089	18.3892	18.9140	19.5162	19.9924	20.3271	20.4503	20.4397	20.2475	19.6371	18.6944	17.8296 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8643	0.8139	0.7622	0.6880	0.5921	0.4610	0.3395	0.3605	0.5142	0.6976	0.8193	0.8762 (94)	
Useful gains	459.9132	523.9599	535.5993	508.3978	440.0240	330.7630	235.4700	244.4058	344.8449	426.5336	441.2872	439.8641 (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	912.1944	901.6359	827.4316	697.6233	543.3651	369.8873	248.6715	260.1463	399.3488	592.1606	764.0842	903.3310 (97)	
Space heating kWh	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (98a)	
Space heating requirement - total per year (kWh/year)												1721.0066	
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	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1721.0066	
Space heating per m2	(98c) / (4) =											31.1833 (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	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (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)	336.4972	253.7983	217.1232	136.2423	76.8858	0.0000	0.0000	0.0000	0.0000	123.2265	232.4138	344.8194 (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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (64)	
Efficiency of water heater (217)m	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073 (216)	
Fuel for water heating, kWh/month	58.8516	51.9653	54.9926	47.8301	46.0139	41.0796	40.2591	42.0680	42.7635	48.1446	51.7571	58.1396 (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	16.0921	14.5348	16.0921	15.5730	16.0921	15.5730	16.0921	16.0921	15.5730	16.0921	15.5730	16.0921 (231)	
Lighting	15.3831	12.3409	11.1116	8.1408	6.2882	5.1375	5.7363	7.4563	9.6850	12.7072	14.3527	15.8106 (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												1721.0066 (211)	

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	348.4073	
Water heating fuel used	583.8650	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	189.4717	(230a)
Total electricity for the above, kWh/year	189.4717	(231)
Electricity for lighting (calculated in Appendix L)	124.1501	(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	2618.4933	(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	1721.0066	0.1548	266.3671 (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)	583.8650	0.1411	82.4015 (264)
Space and water heating			348.7685 (265)
Pumps, fans and electric keep-hot	189.4717	0.1387	26.2821 (267)
Energy for lighting	124.1501	0.1443	17.9187 (268)
Total CO2, kg/year			392.9693 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.1200 (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	1721.0066	1.5730	2707.1220 (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)	583.8650	1.5219	888.5624 (278)
Space and water heating			3595.6845 (279)
Pumps, fans and electric keep-hot	189.4717	1.5128	286.6328 (281)
Energy for lighting	124.1501	1.5338	190.4256 (282)
Total Primary energy kWh/year			4072.7429 (286)
Dwelling Primary energy Rate (DPER)			73.7900 (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	55.1900 (1b)	x 3.3500 (2b)	= 184.8865 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 184.8865 (5)

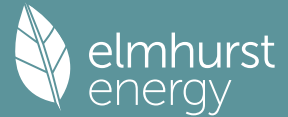
2. Ventilation rate

	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) =	0.1082 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3582	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3044 (21)

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

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Adj infilt rate	0.3882	0.3806	0.3729	0.3349	0.3273	0.2892	0.2892	0.2816	0.3044	0.3273	0.3425	0.3577 (22b)
Effective ac	0.5753	0.5724	0.5695	0.5561	0.5536	0.5418	0.5418	0.5397	0.5463	0.5536	0.5587	0.5640 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type			11.6700	1.1450	13.3626		(27)
EXT Wall	49.5100	13.7900	35.7200	0.1800	6.4296		(29a)
Warm Sloping Roof	51.9900		51.9900	0.1100	5.7189		(30)
Flat Ceiling	10.2100		10.2100	0.1100	1.1231		(30)
Total net area of external elements Aum(A, m2)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	28.7542		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000		(32)
Corridor			31.8900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							92.1073 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.0700	0.0500	0.4535
E3 Sill	7.1400	0.0500	0.3570
E4 Jamb	11.7800	0.0500	0.5890
E7 Party floor between dwellings (in blocks of flats)	16.6400	0.0700	1.1648
E16 Corner (normal)	5.0600	0.0900	0.4554
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E11 Eaves (insulation at rafter level)	5.5400	0.0400	0.2216
E13 Gable (insulation at rafter level)	9.9900	0.0800	0.7992
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.0900	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036
R6 Flat ceiling	21.2800	0.0600	1.2768
E12 Gable (insulation at ceiling level)	1.9200	0.0600	0.1152
P5 Party wall - Roof (insulation at rafter level)	17.8500	0.0800	1.4280
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4677 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	36.2219 (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	35.1029	34.9244	34.7494	33.9277	33.7739	33.0582	33.0582	32.9256	33.3339	33.7739	34.0849	34.4101 (38)
Heat transfer coeff	71.3248	71.1463	70.9713	70.1495	69.9958	69.2801	69.2801	69.1475	69.5558	69.9958	70.3068	70.6320 (39)
Average = Sum(39)m / 12 =												70.1488
HLP	1.2923	1.2891	1.2859	1.2711	1.2683	1.2553	1.2553	1.2529	1.2603	1.2683	1.2739	1.2798 (40)
HLP (average)												1.2710
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

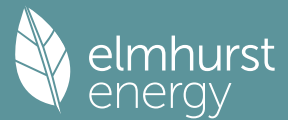
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8429 (42)
Hot water usage for mixer showers	55.1193	54.2910	53.0839	50.7745	49.0701	47.1695	46.0891	47.2871	48.6002	50.6409	53.0000	54.9081 (42a)
Hot water usage for baths	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458 (42b)
Hot water usage for other uses	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034 (42c)
Average daily hot water use (litres/day)												103.3666 (43)
Daily hot water use	112.4490	110.0485	107.1249	102.6783	99.0677	95.1859	93.6935	96.6046	99.6748	103.7501	108.2652	112.1573 (44)
Energy conte	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112 (45)
Energy content (annual)										Total = Sum(45)m =		1716.8969
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417 (46)
Water storage loss (or HIU loss):												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	224.6867	198.7934	211.2419	185.6534	179.9591	162.1340	159.9091	166.2115	168.0008	187.3828	199.3354	222.2061 (62)
WWHRS	-25.1982	-22.2855	-23.3361	-19.3232	-18.0086	-15.4101	-14.4445	-15.3602	-15.9438	-18.7960	-21.2936	-24.7316 (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	199.4884	176.5078	187.9057	166.3301	161.9505	146.7240	145.4646	150.8513	152.0570	168.5868	178.0418	197.4745 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2031.3827 (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	96.4914	85.7739	92.0210	82.8102	81.6195	74.9900	74.9529	77.0485	76.9407	84.0879	87.3595	95.6667 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462	92.1462 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.2267	89.9295	81.2267	83.9342	81.2267	83.9342	81.2267	81.2267	83.9342	81.2267	83.9342	81.2267 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.6751	162.3425	158.1409	149.1963	137.9053	127.2934	120.2040	118.5367	122.7382	131.6828	142.9738	153.5857 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146	32.2146 (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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)	129.6928	127.6397	123.6842	115.0141	109.7037	104.1528	100.7431	103.5598	106.8621	113.0214	121.3326	128.5842 (72)
Total internal gains	425.2385	433.5555	416.6956	401.7885	382.4795	366.0243	352.8177	353.9670	364.1784	379.5747	401.8845	417.0405 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				0.7600	10.6334	0.6300	0.7000		2.4698 (74)			
South				10.9100	46.7521	0.6300	0.7000		155.8825 (78)			
Solar gains	158.3523	260.0152	333.2212	380.4303	400.3614	387.1705	377.4822	363.5042	349.3537	280.9784	187.8207	136.7558 (83)
Total gains	583.5908	693.5708	749.9168	782.2188	782.8409	753.1947	730.2999	717.4712	713.5322	660.5531	589.7052	553.7962 (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	19.7975	19.8472	19.8961	20.1292	20.1734	20.3818	20.3818	20.4209	20.3011	20.1734	20.0842	19.9917
alpha	2.3198	2.3231	2.3264	2.3419	2.3449	2.3588	2.3588	2.3614	2.3534	2.3449	2.3389	2.3328
util living area	0.8925	0.8484	0.8004	0.7288	0.6342	0.5052	0.3847	0.4047	0.5549	0.7343	0.8507	0.9021 (86)
MIT	18.5279	18.9433	19.4149	19.9645	20.4253	20.7651	20.9108	20.8963	20.6867	20.0966	19.2346	18.4552 (87)
Th 2	19.8468	19.8494	19.8519	19.8636	19.8658	19.8760	19.8760	19.8779	19.8721	19.8658	19.8613	19.8567 (88)
util rest of house	0.8787	0.8301	0.7762	0.6948	0.5853	0.4355	0.2969	0.3179	0.4883	0.6946	0.8296	0.8895 (89)
MIT 2	17.0261	17.5381	18.1181	18.7881	19.3248	19.6963	19.8274	19.8183	19.6180	18.9602	17.9181	16.9418 (90)
Living area fraction	17.8318	18.2920	18.8139	19.4192	19.9152	20.2697	20.4087	20.3967	20.1914	19.5699	18.6244	17.7537 (92)
MIT	17.8318	18.2920	18.8139	19.4192	19.9152	20.2697	20.4087	20.3967	20.1914	19.5699	18.6244	17.7537 (93)
Temperature adjustment												0.0000
adjusted MIT	17.8318	18.2920	18.8139	19.4192	19.9152	20.2697	20.4087	20.3967	20.1914	19.5699	18.6244	17.7537 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8484	0.8004	0.7509	0.6801	0.5876	0.4610	0.3397	0.3592	0.5081	0.6830	0.8020	0.8598 (94)
Ext temp.	495.1241	555.1474	563.0768	531.9818	459.9935	347.2111	248.0784	257.7487	362.5734	451.1896	472.9415	476.1613 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	965.1551	952.7904	873.9317	737.9196	575.0320	392.7999	263.8637	276.3597	423.6907	627.8546	810.2463	957.3281 (97)
Space heating requirement - total per year (kWh/year)	349.7031	267.2161	231.2760	148.2752	85.5886	0.0000	0.0000	0.0000	0.0000	131.4387	242.8595	357.9882 (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)	349.7031	267.2161	231.2760	148.2752	85.5886	0.0000	0.0000	0.0000	0.0000	131.4387	242.8595	357.9882 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1814.3454
Space heating per m2												32.8745 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	349.7031	267.2161	231.2760	148.2752	85.5886	0.0000	0.0000	0.0000	0.0000	131.4387	242.8595	357.9882 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	378.8766	289.5082	250.5699	160.6449	92.7288	0.0000	0.0000	0.0000	0.0000	142.4038	263.1197	387.8528 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	199.4884	176.5078	187.9057	166.3301	161.9505	146.7240	145.4646	150.8513	152.0570	168.5868	178.0418	197.4745 (64)
Water heating requirement	85.3053	84.9872	84.5266	83.8031	82.6980	79.8000	79.8000	79.8000	79.8000	83.5078	84.7565	79.8000 (216)
Fuel for water heating, kWh/month	233.8523	207.6876	222.3036	198.4774	195.8337	183.8646	182.2865	189.0367	190.5476	201.8813	210.0626	231.2977 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)

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Lighting	16.8773	13.5396	12.1909	8.9316	6.8990	5.6365	6.2935	8.1805	10.6257	13.9415	15.7469	17.3464	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-14.9047	-22.1465	-33.5373	-39.8042	-44.7856	-42.5061	-42.0050	-38.7338	-33.2821	-26.2491	-16.7893	-12.7584	(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	-5.2975	-11.3958	-23.1206	-35.4202	-47.5106	-47.9686	-47.3874	-39.7986	-28.7595	-16.5049	-7.1405	-4.1695	(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												1965.7047	(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												2447.1318	(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)												136.2094	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-681.9760	(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												3953.0699	(238)

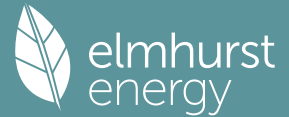
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1965.7047	0.2100	412.7980 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2447.1318	0.2100	513.8977 (264)
Space and water heating			926.6957 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	136.2094	0.1443	19.6592 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-367.5023	0.1335	-49.0544
PV Unit electricity exported	-314.4737	0.1253	-39.4127
Total			-88.4671 (269)
Total CO2, kg/year			869.8170 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.7600 (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	1965.7047	1.1300	2221.2463 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2447.1318	1.1300	2765.2589 (278)
Space and water heating			4986.5052 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	136.2094	1.5338	208.9226 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-367.5023	1.4933	-548.7759
PV Unit electricity exported	-314.4737	0.4600	-144.6635
Total			-693.4394 (283)
Total Primary energy kWh/year			4632.0892 (286)
Target Primary Energy Rate (TPER)			83.9300 (287)

Full SAP Calculation Printout



Plot Reference	Plot 25				Issued on Date	22/12/2025	
Assessment Reference	Plot 25			Plot Type Ref			
Plot Address	Flat 11, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	76 C	DER	7.12	TER	15.76		
Environmental	95 A	% DER < TER				54.82	
CO ₂ Emissions (t/year)	0.35	DFEE	48.81	TFEE	40.38		
Compliance Check	See BREL	% DFEE < TFEE				-20.87	
% DPER < TPER	12.08	DPER	73.79	TPER	83.93		
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	55.1900 (1b)	3.3500 (2b)	184.8865 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		184.8865 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 184.8865 (5)

2. Ventilation rate

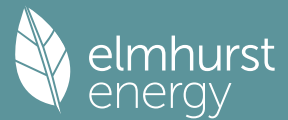
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.9000 (17)
Infiltration rate	0.1450 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1232 (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	0.1571	0.1541	0.1510	0.1356	0.1325	0.1171	0.1171	0.1140	0.1232	0.1325	0.1387	0.1448 (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	0.2971	0.2941	0.2910	0.2756	0.2725	0.2571	0.2571	0.2540	0.2632	0.2725	0.2787	0.2848 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	51.9900		51.9900	0.1200	6.2388	9.0000	467.9100 (30)
Flat Ceiling	10.2100		10.2100	0.1200	1.2252	9.0000	91.8900 (30)
Total net area of external elements Aum (A, m ²)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.9145		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000	20.0000	508.0000 (32)
Corridor			31.8900	0.0000	0.0000	20.0000	637.8000 (32)
Party Floor 1			55.1900			40.0000	2207.6000 (32d)
Internal Walls			88.9400			9.0000	800.4600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5083.4000 (34)

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

92.1073 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	9.0700	0.1690	1.5328
E2 Other lintels (including other steel lintels)	7.1400	0.0070	0.0500
E3 Sill	11.7800	0.0370	0.4359
E4 Jamb	16.6400	0.0370	0.6157
E7 Party floor between dwellings (in blocks of flats)	5.0600	0.0890	0.4503
E16 Corner (normal)	5.0600	0.0310	0.1569
E18 Party wall between dwellings	5.5400	0.1320	0.7313
E11 Eaves (insulation at rafter level)	9.9900	0.0320	0.3197
E13 Gable (insulation at rafter level)	10.0900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072
E25 Staggered party wall between dwellings	21.2800	0.0260	0.5533
R6 Flat ceiling	1.9200	0.2500	0.4800
E12 Gable (insulation at ceiling level)	17.8500	0.1710	3.0524
P5 Party wall - Roof (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9853 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	48.8998 (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	18.1295	17.9415	17.7535	16.8135	16.6255	15.6856	15.6856	15.4976	16.0616	16.6255	17.0015	17.3775 (38)
Heat transfer coeff	67.0293	66.8413	66.6533	65.7133	65.5254	64.5854	64.5854	64.3974	64.9614	65.5254	65.9013	66.2773 (39)
Average = Sum(39)m / 12 =												65.6663
HLP	Jan 1.2145	Feb 1.2111	Mar 1.2077	Apr 1.1907	May 1.1873	Jun 1.1702	Jul 1.1702	Aug 1.1668	Sep 1.1770	Oct 1.1873	Nov 1.1941	Dec 1.2009 (40)
HLP (average)												1.1898
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8429 (42)
Hot water usage for mixer showers	55.1193	54.2910	53.0839	50.7745	49.0701	47.1695	46.0891	47.2871	48.6002	50.6409	53.0000	54.9081 (42a)
Hot water usage for baths	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458 (42b)
Hot water usage for other uses	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034 (42c)
Average daily hot water use (litres/day)												103.3666 (43)
Daily hot water use	Jan 112.4490	Feb 110.0485	Mar 107.1249	Apr 102.6783	May 99.0677	Jun 95.1859	Jul 93.6935	Aug 96.6046	Sep 99.6748	Oct 103.7501	Nov 108.2652	Dec 112.1573 (44)
Energy conte	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112 (45)
Energy content (annual)										Total = Sum(45)m =		1716.8969
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417 (46)
Water storage loss (or HIU loss):												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8694 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (64)
										Total per year (kWh/year) = Sum(64)m =		2034.2279 (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	59.2155	52.1053	54.7451	46.7367	44.3436	38.9165	37.6770	39.7725	40.8672	46.8120	51.2860	58.3907 (65)

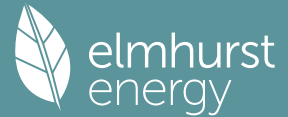
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.5747	15.6097	12.6947	9.6107	7.1841	6.0651	6.5536	8.5186	11.4336	14.5176	16.9442	18.0632 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	239.8137	242.3022	236.0312	222.6810	205.8288	189.9901	179.4089	176.9204	183.1914	196.5416	213.3938	229.2324 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005 (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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)	79.5908	77.5376	73.5821	64.9121	59.6016	54.0507	50.6411	53.4577	56.7600	62.9193	71.2305	78.4822 (72)
Total internal gains	421.7381	420.2085	407.0670	381.9628	357.3735	334.8650	321.3626	323.6557	336.1440	358.7375	386.3275	410.5368 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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North	1.3700	10.6334	0.4000	0.0000	0.7700	4.4869 (74)
South	19.6100	46.7521	0.3500	0.7000	0.7700	155.6602 (78)

Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)
Total gains	581.8852	683.7145	746.3747	772.3902	771.3619	736.6827	712.4970	697.8999	692.8889	643.9118	576.3731	548.7820 (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	21.0662	21.1255	21.1851	21.4881	21.5498	21.8634	21.8634	21.9272	21.7369	21.5498	21.4268	21.3053
alpha	2.4044	2.4084	2.4123	2.4325	2.4367	2.4576	2.4576	2.4618	2.4491	2.4367	2.4285	2.4204
util living area	0.8884	0.8446	0.7916	0.7189	0.6218	0.4922	0.3727	0.3932	0.5458	0.7288	0.8487	0.8996 (86)
MIT	18.7166	19.1076	19.5729	20.0831	20.5033	20.8047	20.9283	20.9160	20.7309	20.1880	19.3704	18.6395 (87)
Th 2	19.9084	19.9111	19.9138	19.9275	19.9302	19.9439	19.9439	19.9466	19.9384	19.9302	19.9247	19.9193 (88)
util rest of house	0.8747	0.8266	0.7677	0.6857	0.5749	0.4268	0.2917	0.3129	0.4826	0.6904	0.8282	0.8871 (89)
MIT 2	17.2956	17.7774	18.3484	18.9710	19.4595	19.7922	19.9037	19.8970	19.7173	19.1110	18.1229	17.2069 (90)
Living area fraction									fLA = Living area / (4) =			0.5365 (91)
MIT	18.0580	18.4911	19.0054	19.5676	20.0195	20.3354	20.4534	20.4437	20.2611	19.6888	18.7922	17.9755 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0580	18.4911	19.0054	19.5676	20.0195	20.3354	20.4534	20.4437	20.2611	19.6888	18.7922	17.9755 (93)

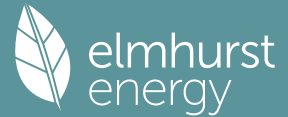
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8459	0.7989	0.7449	0.6736	0.5790	0.4520	0.3317	0.3518	0.5027	0.6809	0.8025	0.8589 (94)
Useful gains	492.2226	546.2098	555.9560	520.2682	446.6387	332.9500	236.3318	245.4961	348.3348	438.4125	462.5447	471.3467 (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	922.1873	908.4438	833.5239	701.0068	545.1374	370.4242	248.8726	260.4019	400.2338	595.5500	770.5297	913.0035 (97)
Space heating kWh	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927 (98a)
Space heating requirement - total per year (kWh/year)												1640.4926
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1640.4926
Space heating per m2										(98c) / (4) =		29.7245 (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	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927 (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)	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927 (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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (64)
Efficiency of water heater (217)m	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073 (216)
Fuel for water heating, kWh/month	58.8516	51.9653	54.9926	47.8301	46.0139	41.0796	40.2591	42.0680	42.7635	48.1446	51.7571	58.1396 (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	16.0921	14.5348	16.0921	15.5730	16.0921	15.5730	16.0921	16.0921	15.5730	16.0921	15.5730	16.0921 (231)
Lighting	15.3831	12.3409	11.1116	8.1408	6.2882	5.1375	5.7363	7.4563	9.6850	12.7072	14.3527	15.8106 (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 (233a)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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												1640.4926 (211)
Space heating fuel - main system 2												0.0000 (213)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	348.4073
Water heating fuel used	583.8650 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	189.4717 (230a)
Total electricity for the above, kWh/year	189.4717 (231)
Electricity for lighting (calculated in Appendix L)	124.1501 (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	2537.9794 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1640.4926	16.4900	270.5172 (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)	583.8650	16.4900	96.2793 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	189.4717	16.4900	31.2439 (249)
Energy for lighting	124.1501	16.4900	20.4724 (250)
Additional standing charges			0.0000 (251)
Total energy cost			418.5128 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.5038 (257)
SAP value	75.6236
SAP rating (Section 12)	76 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1640.4926	0.1548	253.9129 (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)	583.8650	0.1411	82.4015 (264)
Space and water heating			336.3144 (265)
Pumps, fans and electric keep-hot	189.4717	0.1387	26.2821 (267)
Energy for lighting	124.1501	0.1443	17.9187 (268)
Total CO2, kg/year			380.5152 (272)
CO2 emissions per m2			6.8900 (273)
EI value			94.9108
EI rating			95 (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

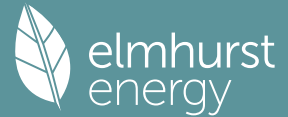
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	55.1900 (1b)	x 3.3500 (2b)	= 184.8865 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 184.8865 (5)

2. Ventilation rate

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

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.9000 (17)
Infiltration rate 0.1450 (18)
Number of sides sheltered 2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1232 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1325	0.1294	0.1294	0.1202	0.1232	0.1048	0.1017	0.1017	0.1048	0.1171	0.1171	0.1202	(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	0.2725	0.2694	0.2694	0.2602	0.2632	0.2448	0.2417	0.2417	0.2448	0.2571	0.2571	0.2602	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			1.3700	1.3258	1.8163			(27)
Window S/W			19.6100	1.2357	24.2329			(27)
Door			2.1200	1.4000	2.9680			(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400	(29a)
Warm Sloping Roof	51.9900		51.9900	0.1200	6.2388	9.0000	467.9100	(30)
Flat Ceiling	10.2100		10.2100	0.1200	1.2252	9.0000	91.8900	(30)
Total net area of external elements Aum(A, m2)			111.7100					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.9145			(33)
Main dwelling								
Party Wall			25.4000	0.0000	0.0000	20.0000	508.0000	(32)
Corridor			31.8900	0.0000	0.0000	20.0000	637.8000	(32)
Party Floor 1			55.1900			40.0000	2207.6000	(32d)
Internal Walls			88.9400			9.0000	800.4600	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 5083.4000 (34)
List of Thermal Bridges 92.1073 (35)

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	9.0700	0.1690	1.5328	
E3 Sill	7.1400	0.0070	0.0500	
E4 Jamb	11.7800	0.0370	0.4359	
E7 Party floor between dwellings (in blocks of flats)	16.6400	0.0370	0.6157	
E16 Corner (normal)	5.0600	0.0890	0.4503	
E18 Party wall between dwellings	5.0600	0.0310	0.1569	
E11 Eaves (insulation at rafter level)	5.5400	0.1320	0.7313	
E13 Gable (insulation at rafter level)	9.9900	0.0320	0.3197	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.0900	0.0000	0.0000	
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072	
R6 Flat ceiling	21.2800	0.0260	0.5533	
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800	
P5 Party wall - Roof (insulation at rafter level)	17.8500	0.1710	3.0524	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				8.9853 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 48.8998 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan 16.6255 Feb 16.4375 Mar 16.4375 Apr 15.8736 May 16.0616 Jun 14.9336 Jul 14.7456 Aug 14.7456 Sep 14.9336 Oct 15.6856 Nov 15.6856 Dec 15.8736 (38)
Heat transfer coeff 65.5254 65.3374 65.3374 64.7734 64.9614 63.8334 63.6454 63.6454 63.8334 64.5854 64.5854 64.7734 (39)
Average = Sum(39)m / 12 = 64.5697

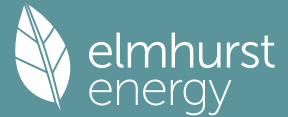
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1873	1.1839	1.1839	1.1736	1.1770	1.1566	1.1532	1.1532	1.1566	1.1702	1.1702	1.1736	(40)
HLP (average)												1.1700	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8429 (42)
Hot water usage for mixer showers 55.1193 54.2910 53.0839 50.7745 49.0701 47.1695 46.0891 47.2871 48.6002 50.6409 53.0000 54.9081 (42a)
Hot water usage for baths 23.8263 23.4725 22.9742 22.0554 21.3674 20.6046 20.1925 20.6873 21.2261 22.0424 22.9801 23.7458 (42b)
Hot water usage for other uses 33.5034 32.2851 31.0668 29.8485 28.6302 27.4119 27.4119 28.6302 29.8485 31.0668 32.2851 33.5034 (42c)
Average daily hot water use (litres/day) 103.3666 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	112.4490	110.0485	107.1249	102.6783	99.0677	95.1859	93.6935	96.6046	99.6748	103.7501	108.2652	112.1573	(44)
Energy conte	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112	(45)
Energy content (annual)										Total = Sum(45)m =		1716.8969	
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417	(46)
Water storage loss (or HIU loss):													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													

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WWHRS	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (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)
	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (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	59.2155	52.1053	54.7451	46.7367	44.3436	38.9165	37.6770	39.7725	40.8672	46.8120	51.2860	58.3907 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.5747	15.6097	12.6947	9.6107	7.1841	6.0651	6.5536	8.5186	11.4336	14.5176	16.9442	18.0632 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	239.8137	242.3022	236.0312	222.6810	205.8288	189.9901	179.4089	176.9204	183.1914	196.5416	213.3938	229.2324 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005 (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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)	79.5908	77.5376	73.5821	64.9121	59.6016	54.0507	50.6411	53.4577	56.7600	62.9193	71.2305	78.4822 (72)
Total internal gains	421.7381	420.2085	407.0670	381.9628	357.3735	334.8650	321.3626	323.6557	336.1440	358.7375	386.3275	410.5368 (73)

6. Solar gains

[Jan]													
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North					1.3700	9.3942	0.4000		0.0000		0.7700		3.9640 (74)
South					19.6100	41.2355	0.3500		0.7000		0.7700		137.2930 (78)
Solar gains	141.2570	238.3980	320.7220	376.5211	389.5723	387.1771	367.7729	347.2820	346.5035	271.4082	172.2620	124.7200 (83)	
Total gains	562.9951	658.6065	727.7890	758.4838	746.9458	722.0421	689.1355	670.9377	682.6476	630.1457	558.5894	535.2568 (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	21.5498	21.6118	21.6118	21.7999	21.7369	22.1210	22.1863	22.1863	22.1210	21.8634	21.8634	21.7999
alpha	2.4367	2.4408	2.4408	2.4533	2.4491	2.4747	2.4791	2.4791	2.4747	2.4576	2.4576	2.4533
util living area	0.8821	0.8366	0.7763	0.6912	0.5786	0.4275	0.3256	0.3495	0.5114	0.7087	0.8393	0.8935 (86)
MIT	18.9383	19.3059	19.7599	20.2511	20.6388	20.8852	20.9570	20.9468	20.7947	20.3073	19.5473	18.8535 (87)
Th 2	19.9302	19.9329	19.9329	19.9411	19.9384	19.9549	19.9576	19.9576	19.9549	19.9439	19.9439	19.9411 (88)
util rest of house	0.8671	0.8171	0.7499	0.6541	0.5247	0.3546	0.2397	0.2632	0.4443	0.6666	0.8168	0.8800 (89)
MIT 2	17.5876	18.0388	18.5901	19.1796	19.6164	19.8774	19.9380	19.9314	19.7954	19.2610	18.3546	17.4894 (90)
Living area fraction	18.3122	18.7186	19.2177	19.7545	20.1650	20.4181	20.4847	20.4762	20.3315	19.8223	18.9945	18.2213 (91)
MIT	18.3122	18.7186	19.2177	19.7545	20.1650	20.4181	20.4847	20.4762	20.3315	19.8223	18.9945	18.2213 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3122	18.7186	19.2177	19.7545	20.1650	20.4181	20.4847	20.4762	20.3315	19.8223	18.9945	18.2213 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8393	0.7911	0.7300	0.6470	0.5368	0.3878	0.2840	0.3071	0.4695	0.6613	0.7929	0.8525 (94)
Ext temp.	472.5475	521.0517	531.3116	490.7265	400.9282	279.9909	195.7067	206.0282	320.4747	416.7231	442.9196	456.3197 (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	859.1840	844.0663	772.1354	638.3075	471.9415	301.1722	202.6924	214.8794	359.4805	550.4174	716.5421	856.3873 (97)
Space heating requirement - total per year (kWh/year)	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503 (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)	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1437.1157
Space heating per m2												26.0394 (99)

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

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

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503	(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)	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503	(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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626	(64)
Efficiency of water heater	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	(216)
Fuel for water heating, kWh/month	58.8516	51.9653	54.9926	47.8301	46.0139	41.0796	40.2591	42.0680	42.7635	48.1446	51.7571	58.1396	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	16.0921	14.5348	16.0921	15.5730	16.0921	15.5730	16.0921	16.0921	15.5730	16.0921	15.5730	16.0921	(231)
Lighting	15.3831	12.3409	11.1116	8.1408	6.2882	5.1375	5.7363	7.4563	9.6850	12.7072	14.3527	15.8106	(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												1437.1157	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												348.4073	
Water heating fuel used												583.8650	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												189.4717	(230a)
Total electricity for the above, kWh/year												189.4717	(231)
Electricity for lighting (calculated in Appendix L)												124.1501	(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												2334.6025	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1437.1157	28.4300	408.5720	(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)	583.8650	28.4300	165.9928	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	189.4717	28.4300	53.8668	(249)
Energy for lighting	124.1501	28.4300	35.2959	(250)
Additional standing charges			0.0000	(251)
Total energy cost			663.7275	(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	1437.1157	0.1552	222.9942	(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)	583.8650	0.1411	82.4015	(264)
Space and water heating			305.3956	(265)
Pumps, fans and electric keep-hot	189.4717	0.1387	26.2821	(267)
Energy for lighting	124.1501	0.1443	17.9187	(268)
Total CO2, kg/year			349.5964	(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	1437.1157	1.5744	2262.6664	(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)	583.8650	1.5219	888.5624	(278)

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Space and water heating			3151.2288 (279)
Pumps, fans and electric keep-hot	189.4717	1.5128	286.6328 (281)
Energy for lighting	124.1501	1.5338	190.4256 (282)
Total Primary energy kWh/year			3628.2872 (286)

SAP 10 EPC IMPROVEMENTS

Plot 25

Current energy efficiency rating: C 76
Current environmental impact rating: A 95

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

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

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

Potential energy efficiency rating: C 76
Potential environmental impact rating: A 95

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 £664	Potential £664	Saving £0
Electricity			
Space heating	£462	£462	£0
Water heating	£166	£166	£0
Lighting	£35	£35	£0
Total cost of fuels	£664	£664	£0
Total cost of uses	£663	£663	£0
Delivered energy	42 kWh/m²	42 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	6 kg/m²	6 kg/m²	0 kg/m²
Primary energy	66 kWh/m²	66 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	55.1900 (1b)	x 3.3500 (2b)	= 184.8865 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 184.8865 (5)

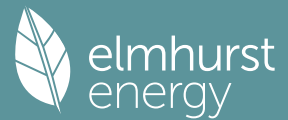
2. Ventilation rate

	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		2.9000 (17)
Infiltration rate		0.1450 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1232 (21)

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

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	0.1571	0.1541	0.1510	0.1356	0.1325	0.1171	0.1171	0.1140	0.1232	0.1325	0.1387	0.1448 (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	0.2971	0.2941	0.2910	0.2756	0.2725	0.2571	0.2571	0.2540	0.2632	0.2725	0.2787	0.2848 (25)

3. Heat losses and heat loss parameter

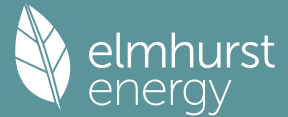
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			1.3700	1.3258	1.8163			(27)
Window S/W			19.6100	1.2357	24.2329			(27)
Door			2.1200	1.4000	2.9680			(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400	(29a)
Warm Sloping Roof	51.9900		51.9900	0.1200	6.2388	9.0000	467.9100	(30)
Flat Ceiling	10.2100		10.2100	0.1200	1.2252	9.0000	91.8900	(30)
Total net area of external elements Aum(A, m2)			111.7100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.9145			(33)
Main dwelling								
Party Wall			25.4000	0.0000	0.0000	20.0000	508.0000	(32)
Corridor			31.8900	0.0000	0.0000	20.0000	637.8000	(32)
Party Floor 1			55.1900			40.0000	2207.6000	(32d)
Internal Walls			88.9400			9.0000	800.4600	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							5083.4000	(34)
List of Thermal Bridges							92.1073	(35)
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				9.0700	0.1690		1.5328	
E3 Sill				7.1400	0.0070		0.0500	
E4 Jamb				11.7800	0.0370		0.4359	
E7 Party floor between dwellings (in blocks of flats)				16.6400	0.0370		0.6157	
E16 Corner (normal)				5.0600	0.0890		0.4503	
E18 Party wall between dwellings				5.0600	0.0310		0.1569	
E11 Eaves (insulation at rafter level)				5.5400	0.1320		0.7313	
E13 Gable (insulation at rafter level)				9.9900	0.0320		0.3197	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				10.0900	0.0000		0.0000	
E25 Staggered party wall between dwellings				5.0600	0.1200		0.6072	
R6 Flat ceiling				21.2800	0.0260		0.5533	
E12 Gable (insulation at ceiling level)				1.9200	0.2500		0.4800	
P5 Party wall - Roof (insulation at rafter level)				17.8500	0.1710		3.0524	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.9853	(36)
Point Thermal Bridges							0.0000	(36a) =
Total fabric heat loss							48.8998	(33) + (36) + (36a) = (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	18.1295	17.9415	17.7535	16.8135	16.6255	15.6856	15.6856	15.4976	16.0616	16.6255	17.0015	17.3775	(38)
Average = Sum(39)m / 12 =	67.0293	66.8413	66.6533	65.7133	65.5254	64.5854	64.5854	64.3974	64.9614	65.5254	65.9013	66.2773	(39)
													65.6663
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2145	1.2111	1.2077	1.1907	1.1873	1.1702	1.1702	1.1668	1.1770	1.1873	1.1941	1.2009	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.8429 (42)
Hot water usage for mixer showers													
Hot water usage for baths	55.1193	54.2910	53.0839	50.7745	49.0701	47.1695	46.0891	47.2871	48.6002	50.6409	53.0000	54.9081	(42a)
Hot water usage for other uses	23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458	(42b)
Average daily hot water use (litres/day)	33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034	(42c)
													103.3666 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	112.4490	110.0485	107.1249	102.6783	99.0677	95.1859	93.6935	96.6046	99.6748	103.7501	108.2652	112.1573	(44)
Energy content (annual)	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112	(45)
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417	(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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626	(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	59.2155	52.1053	54.7451	46.7367	44.3436	38.9165	37.6770	39.7725	40.8672	46.8120	51.2860	58.3907	(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	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.5747	15.6097	12.6947	9.6107	7.1841	6.0651	6.5536	8.5186	11.4336	14.5176	16.9442	18.0632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	239.8137	242.3022	236.0312	222.6810	205.8288	189.9901	179.4089	176.9204	183.1914	196.5416	213.3938	229.2324	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	(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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	(71)
Water heating gains (Table 5)	79.5908	77.5376	73.5821	64.9121	59.6016	54.0507	50.6411	53.4577	56.7600	62.9193	71.2305	78.4822	(72)
Total internal gains	421.7381	420.2085	407.0670	381.9628	357.3735	334.8650	321.3626	323.6557	336.1440	358.7375	386.3275	410.5368	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W		
North				1.3700	10.6334	0.4000	0.0000	0.7700		4.4869 (74)		
South				19.6100	46.7521	0.3500	0.7000	0.7700		155.6602 (78)		
Solar gains	160.1471	263.5060	339.3077	390.4275	413.9884	401.8177	391.1344	374.2442	356.7448	285.1744	190.0456	138.2453 (83)
Total gains	581.8852	683.7145	746.3747	772.3902	771.3619	736.6827	712.4970	697.8999	692.8889	643.9118	576.3731	548.7820 (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	21.0662	21.1255	21.1851	21.4881	21.5498	21.8634	21.8634	21.9272	21.7369	21.5498	21.4268	21.3053	21.0000 (85)
alpha	2.4044	2.4084	2.4123	2.4325	2.4367	2.4576	2.4576	2.4618	2.4491	2.4367	2.4285	2.4204	
util living area	0.8884	0.8446	0.7916	0.7189	0.6218	0.4922	0.3727	0.3932	0.5458	0.7288	0.8487	0.8996	(86)
MIT	18.7166	19.1076	19.5729	20.0831	20.5033	20.8047	20.9283	20.9160	20.7309	20.1880	19.3704	18.6395	(87)
Th 2	19.9084	19.9111	19.9138	19.9275	19.9302	19.9439	19.9439	19.9466	19.9384	19.9302	19.9247	19.9193	(88)
util rest of house	0.8747	0.8266	0.7677	0.6857	0.5749	0.4268	0.2917	0.3129	0.4826	0.6904	0.8282	0.8871	(89)
MIT 2	17.2956	17.7774	18.3484	18.9710	19.4595	19.7922	19.9037	19.8970	19.7173	19.1110	18.1229	17.2069	(90)
Living area fraction	18.0580	18.4911	19.0054	19.5676	20.0195	20.3354	20.4534	20.4437	20.2611	19.6888	18.7922	17.9755	(91)
MIT	18.0580	18.4911	19.0054	19.5676	20.0195	20.3354	20.4534	20.4437	20.2611	19.6888	18.7922	17.9755	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0580	18.4911	19.0054	19.5676	20.0195	20.3354	20.4534	20.4437	20.2611	19.6888	18.7922	17.9755	(93)

8. Space heating requirement

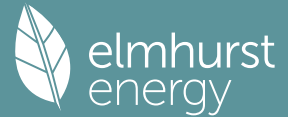
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8459	0.7989	0.7449	0.6736	0.5790	0.4520	0.3317	0.3518	0.5027	0.6809	0.8025	0.8589	(94)
Useful gains	492.2226	546.2098	555.9560	520.2682	446.6387	332.9500	236.3318	245.4961	348.3348	438.4125	462.5447	471.3467	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	922.1873	908.4438	833.5239	701.0068	545.1374	370.4242	248.8726	260.4019	400.2338	595.5500	770.5297	913.0035	(97)
Space heating kWh	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927	(98a)
Space heating requirement - total per year (kWh/year)												1640.4926	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1640.4926	
Space heating per m ²										(98c) / (4) =		29.7245	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927	(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)	319.8938	243.4213	206.5105	130.1318	73.2831	0.0000	0.0000	0.0000	0.0000	116.9103	221.7492	328.5927	(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)

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	1640.4926	0.1548	253.9129 (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)	583.8650	0.1411	82.4015 (264)
Space and water heating			336.3144 (265)
Pumps, fans and electric keep-hot	189.4717	0.1387	26.2821 (267)
Energy for lighting	124.1501	0.1443	17.9187 (268)
Total CO2, kg/year			380.5152 (272)
CO2 emissions per m2			6.8900 (273)
EI value			94.9108
EI rating			95 (274)
EI band			A

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1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	55.1900 (1b)	x 3.3500 (2b)	= 184.8865 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 184.8865 (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		2.9000	(17)
Infiltration rate		0.1450	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1232	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate	0.1325	0.1294	0.1294	0.1202	0.1232	0.1048	0.1017	0.1017	0.1048	0.1171	0.1171	0.1202
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	0.2725	0.2694	0.2694	0.2602	0.2632	0.2448	0.2417	0.2417	0.2448	0.2571	0.2571	0.2602 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window N/E			1.3700	1.3258	1.8163		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	23.1000	26.4100	0.1300	3.4333	14.0000	369.7400 (29a)
Warm Sloping Roof	51.9900		51.9900	0.1200	6.2388	9.0000	467.9100 (30)
Flat Ceiling	10.2100		10.2100	0.1200	1.2252	9.0000	91.8900 (30)
Total net area of external elements Aum(A, m2)			111.7100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.9145		(33)
Main dwelling							
Party Wall			25.4000	0.0000	0.0000	20.0000	508.0000 (32)
Corridor			31.8900	0.0000	0.0000	20.0000	637.8000 (32)
Party Floor 1			55.1900			40.0000	2207.6000 (32d)
Internal Walls			88.9400			9.0000	800.4600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5083.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		92.1073 (35)

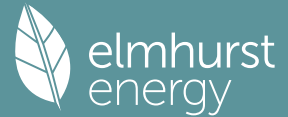
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.0700	0.1690	1.5328
E3 Sill	7.1400	0.0070	0.0500
E4 Jamb	11.7800	0.0370	0.4359
E7 Party floor between dwellings (in blocks of flats)	16.6400	0.0370	0.6157
E16 Corner (normal)	5.0600	0.0890	0.4503
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	5.5400	0.1320	0.7313
E13 Gable (insulation at rafter level)	9.9900	0.0320	0.3197
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.0900	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	21.2800	0.0260	0.5533
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800
P5 Party wall - Roof (insulation at rafter level)	17.8500	0.1710	3.0524

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.9853 (36)
Point Thermal bridges		0.0000
Total fabric heat loss	(33) + (36) + (36a) =	48.8998 (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	16.6255	16.4375	16.4375	15.8736	16.0616	14.9336	14.7456	14.7456	14.9336	15.6856	15.6856	15.8736 (38)
Average = Sum(39)m / 12 =	65.5254	65.3374	65.3374	64.7734	64.9614	63.8334	63.6454	63.6454	63.8334	64.5854	64.5854	64.7734 (39)
												64.5697
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1873	1.1839	1.1839	1.1736	1.1770	1.1566	1.1532	1.1532	1.1566	1.1702	1.1702	1.1736 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8429 (42)	
Hot water usage for mixer showers													
55.1193	54.2910	53.0839	50.7745	49.0701	47.1695	46.0891	47.2871	48.6002	50.6409	53.0000	54.9081 (42a)		
Hot water usage for baths													
23.8263	23.4725	22.9742	22.0554	21.3674	20.6046	20.1925	20.6873	21.2261	22.0424	22.9801	23.7458 (42b)		
Hot water usage for other uses													
33.5034	32.2851	31.0668	29.8485	28.6302	27.4119	27.4119	28.6302	29.8485	31.0668	32.2851	33.5034 (42c)		
Average daily hot water use (litres/day)												103.3666 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	112.4490	110.0485	107.1249	102.6783	99.0677	95.1859	93.6935	96.6046	99.6748	103.7501	108.2652	112.1573 (44)	
Energy content	178.0918	156.7077	164.6470	140.5615	133.3642	117.0422	113.3142	119.6166	122.9090	140.7879	154.2436	175.6112 (45)	
Energy content (annual)											Total = Sum(45)m =	1716.8969	
Distribution loss (46)m = 0.15 x (45)m	26.7138	23.5061	24.6970	21.0842	20.0046	17.5563	16.9971	17.9425	18.4363	21.1182	23.1365	26.3417 (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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (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	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626 (64)	
												Total per year (kWh/year) = Sum(64)m =	2034.2279 (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	59.2155	52.1053	54.7451	46.7367	44.3436	38.9165	37.6770	39.7725	40.8672	46.8120	51.2860	58.3907 (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	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755	110.5755 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.5747	15.6097	12.6947	9.6107	7.1841	6.0651	6.5536	8.5186	11.4336	14.5176	16.9442	18.0632 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	239.8137	242.3022	236.0312	222.6810	205.8288	189.9901	179.4089	176.9204	183.1914	196.5416	213.3938	229.2324 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005	47.9005 (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)	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170	-73.7170 (71)
Water heating gains (Table 5)	79.5908	77.5376	73.5821	64.9121	59.6016	54.0507	50.6411	53.4577	56.7600	62.9193	71.2305	78.4822 (72)
Total internal gains	421.7381	420.2085	407.0670	381.9628	357.3735	334.8650	321.3626	323.6557	336.1440	358.7375	386.3275	410.5368 (73)

6. Solar gains

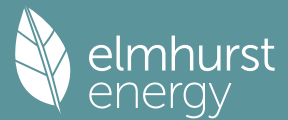
[Jan]			Area	Solar flux	g	FF	Access	Gains				
			m2	Table 6a	Specific data	Specific data	factor	W				
				W/m2	or Table 6b	or Table 6c	Table 6d					
North			1.3700	9.3942	0.4000	0.0000	0.7700	3.9640 (74)				
South			19.6100	41.2355	0.3500	0.7000	0.7700	137.2930 (78)				
Solar gains	141.2570	238.3980	320.7220	376.5211	389.5723	387.1771	367.7729	347.2820	346.5035	271.4082	172.2620	124.7200 (83)
Total gains	562.9951	658.6065	727.7890	758.4838	746.9458	722.0421	689.1355	670.9377	682.6476	630.1457	558.5894	535.2568 (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	21.5498	21.6118	21.6118	21.7999	21.7369	22.1210	22.1863	22.1863	22.1210	21.8634	21.8634	21.7999
alpha	2.4367	2.4408	2.4408	2.4533	2.4491	2.4747	2.4791	2.4791	2.4747	2.4576	2.4576	2.4533
util living area	0.8821	0.8366	0.7763	0.6912	0.5786	0.4275	0.3256	0.3495	0.5114	0.7087	0.8393	0.8935 (86)
MIT	18.9383	19.3059	19.7599	20.2511	20.6388	20.8852	20.9570	20.9468	20.7947	20.3073	19.5473	18.8535 (87)
Th 2	19.9302	19.9329	19.9329	19.9411	19.9384	19.9549	19.9576	19.9576	19.9549	19.9439	19.9439	19.9411 (88)
util rest of house	0.8671	0.8171	0.7499	0.6541	0.5247	0.3546	0.2397	0.2632	0.4443	0.6666	0.8168	0.8800 (89)
MIT 2	17.5876	18.0388	18.5901	19.1796	19.6164	19.8774	19.9380	19.9314	19.7954	19.2610	18.3546	17.4894 (90)
Living area fraction	18.3122	18.7186	19.2177	19.7545	20.1650	20.4181	20.4847	20.4762	20.3315	19.8223	18.9945	18.2213 (91)
MIT	18.3122	18.7186	19.2177	19.7545	20.1650	20.4181	20.4847	20.4762	20.3315	19.8223	18.9945	18.2213 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3122	18.7186	19.2177	19.7545	20.1650	20.4181	20.4847	20.4762	20.3315	19.8223	18.9945	18.2213 (93)

8. Space heating requirement

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8393	0.7911	0.7300	0.6470	0.5368	0.3878	0.2840	0.3071	0.4695	0.6613	0.7929	0.8525	(94)
Useful gains	472.5475	521.0517	531.3116	490.7265	400.9282	279.9909	195.7067	206.0282	320.4747	416.7231	442.9196	456.3197	(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	859.1840	844.0663	772.1354	638.3075	471.9415	301.1722	202.6924	214.8794	359.4805	550.4174	716.5421	856.3873	(97)
Space heating kWh	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503	(98a)
Space heating requirement - total per year (kWh/year)												1437.1157	
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	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1437.1157	
Space heating per m2											(98c) / (4) =	26.0394	(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	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503	(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)	287.6576	217.0658	179.1729	106.2583	52.8339	0.0000	0.0000	0.0000	0.0000	99.4685	197.0082	297.6503	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2												0.0000	(213)	
Water heating														
Water heating requirement	205.0432	181.0509	191.5984	166.6435	160.3156	143.1242	140.2656	146.5680	148.9910	167.7393	180.3256	202.5626	(64)	
Efficiency of water heater (217)m	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	348.4073	(216)	
Fuel for water heating, kWh/month	58.8516	51.9653	54.9926	47.8301	46.0139	41.0796	40.2591	42.0680	42.7635	48.1446	51.7571	58.1396	(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	16.0921	14.5348	16.0921	15.5730	16.0921	15.5730	16.0921	16.0921	15.5730	16.0921	15.5730	16.0921	(231)	
Lighting	15.3831	12.3409	11.1116	8.1408	6.2882	5.1375	5.7363	7.4563	9.6850	12.7072	14.3527	15.8106	(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												1437.1157	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												348.4073		
Water heating fuel used												583.8650	(219)	
Space cooling fuel												0.0000	(221)	
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)														
mechanical ventilation fans (SFP = 0.8400)													189.4717	(230a)
Total electricity for the above, kWh/year													189.4717	(231)
Electricity for lighting (calculated in Appendix L)													124.1501	(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													2334.6025	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1437.1157	28.4300	408.5720	(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)	583.8650	28.4300	165.9928	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	189.4717	28.4300	53.8668	(249)
Energy for lighting	124.1501	28.4300	35.2959	(250)

Full SAP Calculation Printout



Additional standing charges
Total energy cost

0.0000 (251)
663.7275 (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	1437.1157	0.1552	222.9942	(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)	583.8650	0.1411	82.4015	(264)
Space and water heating			305.3956	(265)
Pumps, fans and electric keep-hot	189.4717	0.1387	26.2821	(267)
Energy for lighting	124.1501	0.1443	17.9187	(268)
Total CO2, kg/year			349.5964	(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	1437.1157	1.5744	2262.6664	(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)	583.8650	1.5219	888.5624	(278)
Space and water heating			3151.2288	(279)
Pumps, fans and electric keep-hot	189.4717	1.5128	286.6328	(281)
Energy for lighting	124.1501	1.5338	190.4256	(282)
Total Primary energy kWh/year			3628.2872	(286)