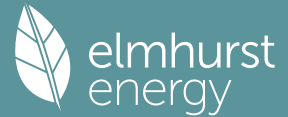


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Plot Reference	79596-08				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	30 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	78 C	DER	7.03	TER	14.53		
Environmental	95 A	% DER < TER				51.62	
CO ₂ Emissions (t/year)	0.29	DFEE	39.47	TFEE	43.42		
Compliance Check	See BREL	% DFEE < TFEE				9.10	
% DPER < TPER	5.35	DPER	72.38	TPER	76.47		
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.6800 (5)

2. Ventilation rate

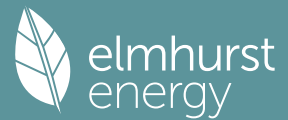
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	1.8400 (17)
Infiltration rate	0.0920 (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) = 0.0782 (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	0.0997	0.0977	0.0958	0.0860	0.0841	0.0743	0.0743	0.0723	0.0782	0.0841	0.0880	0.0919 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			3.0400	0.1100	0.3344	75.0000	228.0000 (28a)
Main	68.4200	11.8600	56.5600	0.1900	10.7464	110.0000	6221.5998 (29a)
PIJ	42.0000		42.0000	0.0800	3.3600	9.0000	378.0000 (30)
PIR	8.1600		8.1600	0.1300	1.0608	9.0000	73.4400 (30)
Total net area of external elements A _{um} (A, m ²)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.9927		(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000	110.0000	3273.6000 (32)
Party Floor 1			44.5900			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity C _m = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	10563.4398 (34)

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

221.7812 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.0700	0.0200	0.1614
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421
E3 Sill	22.2000	0.0260	0.5772
E4 Jamb	1.0100	0.0930	0.0939
E5 Ground floor (normal)	27.3100	0.0370	1.0105
E7 Party floor between dwellings (in blocks of flats)	12.0000	0.0510	0.6120
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	11.4000	0.0650	0.7410
E18 Party wall between dwellings	7.0300	0.1080	0.7592
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.7100	0.0970	1.4269
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	16.6500	0.0970	1.6150
E12 Gable (insulation at ceiling level)	8.7300	0.0460	0.4016
P5 Party wall - Roof (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4324 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.4251 (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	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	(38)
Heat transfer coeff	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	(39)
Average = Sum(39)m / 12 =												56.5123	
HLP	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	(40)
HLP (average)												1.1865	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6206 (42)
Hot water usage for mixer showers													
74.1921	73.0772	71.4525	68.3438	66.0498	63.4914	62.0373	63.6497	65.4172	68.1641	71.3395	73.9079	73.9079	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267	31.2267	(42c)
Average daily hot water use (litres/day)												96.7906	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.4189	103.1684	100.4081	96.1640	92.7344	89.0406	87.5864	90.3343	93.2374	97.1198	101.4307	105.1346	(44)
Energy conte	166.9577	146.9104	154.3236	131.6437	124.8383	109.4858	105.9282	111.8528	114.9710	131.7906	144.5066	164.6154	(45)
Energy content (annual)										Total = Sum(45)m =		1607.8240	
Distribution loss (46)m = 0.15 x (45)m													
25.0437	22.0366	23.1485	19.7466	18.7258	16.4229	15.8892	16.7779	17.2457	19.7686	21.6760	24.6923	24.6923	(46)
Water storage loss (or HIU loss):													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	191.5668	(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													
193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	191.5668	(64)
12Total per year (kWh/year)												1925.1550	(64)
Electric shower(s)												1925	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
55.5134	48.8477	51.3126	43.7715	41.5088	36.4040	35.2211	37.1911	38.2279	43.8204	48.0484	54.7346	54.7346	(65)

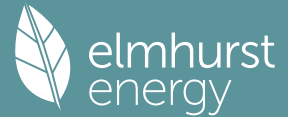
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
71.5266	79.1902	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
141.0819	142.5459	138.8567	131.0028	121.0887	111.7708	105.5459	104.0819	107.7712	115.6250	125.5391	134.8570	134.8570	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	(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)													
-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	(71)
Water heating gains (Table 5)													
74.6148	72.6900	68.9685	60.7938	55.7913	50.5611	47.3402	49.9880	53.0943	58.8984	66.7339	73.5680	73.5680	(72)
Total internal gains	334.5326	341.7353	326.6610	313.0166	295.7158	283.5520	271.7219	272.9057	282.0854	293.3592	313.4931	327.2608	(73)

6. Solar gains

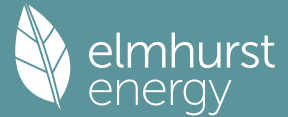
[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
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												W/m2	or Table 6b		or Table 6c		Table 6d			
North						1.0800		10.6334				0.7300		0.7000		0.7700		4.0668 (74)		
East						1.6100		19.6403				0.7300		0.7000		0.7700		11.1977 (76)		
South						0.7200		46.7521				0.7300		0.7000		0.7700		11.9203 (78)		
West						2.5000		19.6403				0.7300		0.7000		0.7700		17.3877 (80)		
East						3.8000		19.6403				0.6800		0.7000		0.7700		24.6190 (76)		
Solar gains		69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)							
Total gains		403.7240	473.1085	536.1387	612.3171	659.9414	655.9447	626.3969	578.7810	523.2904	447.1658	398.9792	384.7040 (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	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230							
alpha	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615							
util living area	0.9869	0.9733	0.9422	0.8589	0.7139	0.5333	0.3931	0.4421	0.6812	0.9089	0.9754	0.9894 (86)								
MIT	19.6622	19.8976	20.2290	20.6128	20.8664	20.9709	20.9940	20.9900	20.9179	20.5552	20.0277	19.6046 (87)								
Th 2	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308 (88)								
util rest of house	0.9833	0.9661	0.9268	0.8241	0.6535	0.4514	0.2995	0.3428	0.5975	0.8773	0.9675	0.9863 (89)								
MIT 2	18.3998	18.6957	19.1056	19.5570	19.8243	19.9147	19.9289	19.9273	19.8778	19.5058	18.8634	18.3268 (90)								
Living area fraction										fLA = Living area / (4) =		0.4422 (91)								
MIT	18.9580	19.2271	19.6024	20.0238	20.2851	20.3817	20.3998	20.3972	20.3377	19.9698	19.3782	18.8918 (92)								
Temperature adjustment												0.0000								
adjusted MIT	18.9580	19.2271	19.6024	20.0238	20.2851	20.3817	20.3998	20.3972	20.3377	19.9698	19.3782	18.8918 (93)								
8. Space heating requirement																				
Utilisation	0.9788	0.9601	0.9211	0.8275	0.6745	0.4867	0.3409	0.3867	0.6310	0.8786	0.9622	0.9824 (94)								
Useful gains	395.1744	454.2123	493.8537	506.6783	445.1431	319.2520	213.5448	223.8064	330.1849	392.8897	383.8859	377.9306 (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	828.3562	809.6579	740.4445	628.6333	485.1625	326.7371	214.7374	225.8886	352.5068	529.5097	693.8679	830.2687 (97)								
Space heating kWh	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (98a)								
Space heating requirement - total per year (kWh/year)												1523.5642								
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	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (98c)								
Space heating requirement after solar contribution - total per year (kWh/year)												1523.5642								
Space heating per m2										(98c) / (4) =		31.9875 (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	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (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)	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668 (64)								
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)								
Fuel for water heating, kWh/month	55.4961	49.0122	51.8803	45.1406	43.4417	38.7991	38.0297	39.7253	40.3689	45.4314	48.8219	54.8258 (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	2.0034	1.8096	2.0034	1.9388	2.0034	1.9388	2.0034	2.0034	1.9388	2.0034	1.9388	2.0034 (231)								
Lighting	13.7238	11.0098	9.9131	7.2628	5.6100	4.5834	5.1176	6.6520	8.6403	11.3366	12.8047	14.1053 (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)								

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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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											1523.5642	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											349.4100	
Water heating fuel used											550.9731	(219)
Space cooling fuel											0.0000	(221)
Electricity for pumps and fans:												
(MEVDecentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)												
mechanical ventilation fans (SFP = 0.1671)											23.5888	(230a)
Total electricity for the above, kWh/year											23.5888	(231)
Electricity for lighting (calculated in Appendix L)											110.7593	(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											2208.8855	(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	1523.5642	0.1560	237.6879	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(273)
Water heating (other fuel)	550.9731	0.1411	77.7537	(264)
Space and water heating			315.4417	(265)
Pumps, fans and electric keep-hot	23.5888	0.1387	3.2721	(267)
Energy for lighting	110.7593	0.1443	15.9860	(268)
Total CO2, kg/year			334.6997	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.0300	(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	1523.5642	1.5776	2403.5078	(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)	550.9731	1.5218	838.4842	(278)
Space and water heating			3241.9921	(279)
Pumps, fans and electric keep-hot	23.5888	1.5128	35.6851	(281)
Energy for lighting	110.7593	1.5338	169.8863	(282)
Total Primary energy kWh/year			3447.5636	(286)
Dwelling Primary energy Rate (DPER)			72.3800	(287)

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

CALCULATION OF TARGET EMISSIONS

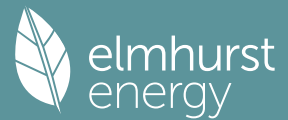
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)	
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	47.6300		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e) ... (3n) =	115.6800 (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) =	0.1729 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4229 (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) =	0.3595 (21)

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Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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													
Effective ac	0.4583	0.4493	0.4403	0.3954	0.3864	0.3415	0.3415	0.3325	0.3595	0.3864	0.4044	0.4224	(22b)
	0.6050	0.6009	0.5969	0.5782	0.5747	0.5583	0.5583	0.5553	0.5646	0.5747	0.5818	0.5892	(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			2.1500	1.0000	2.1500		(26)
TER Opening Type			9.7100	1.1450	11.1183		(27)
GF			3.0400	0.1300	0.3952		(28a)
Main	68.4200	11.8600	56.5600	0.1800	10.1808		(29a)
PIJ	42.0000		42.0000	0.1100	4.6200		(30)
PIR	8.1600		8.1600	0.1100	0.8976		(30)
Total net area of external elements Aum(A, m2)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.3619	(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000		(32)

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

221.7812 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.0700	0.0500	0.4035
E3 Sill	8.0700	0.0500	0.4035
E4 Jamb	22.2000	0.0500	1.1100
E5 Ground floor (normal)	1.0100	0.1600	0.1616
E7 Party floor between dwellings (in blocks of flats)	27.3100	0.0700	1.9117
E16 Corner (normal)	12.0000	0.0900	1.0800
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0900	-0.4320
E18 Party wall between dwellings	11.4000	0.0600	0.6840
P1 Party wall - Ground floor	7.0300	0.0800	0.5624
E25 Staggered party wall between dwellings	4.8000	0.0600	0.2880
E10 Eaves (insulation at ceiling level)	14.7100	0.0600	0.8826
E11 Eaves (insulation at rafter level)	1.0100	0.0400	0.0404
E12 Gable (insulation at ceiling level)	16.6500	0.0600	0.9990
P5 Party wall - Roof (insulation at rafter level)	8.7300	0.0800	0.6984
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.7931 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 38.1550 (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	23.0964	22.9407	22.7881	22.0714	21.9373	21.3130	21.3130	21.1974	21.5534	21.9373	22.2085	22.4922	(38)
Average = Sum(39)m / 12 =	61.2514	61.0957	60.9431	60.2264	60.0923	59.4680	59.4680	59.3524	59.7085	60.0923	60.3636	60.6472	(39)
												60.2257	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2860	1.2827	1.2795	1.2645	1.2616	1.2485	1.2485	1.2461	1.2536	1.2616	1.2673	1.2733	(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													1.6206 (42)
Hot water usage for mixer showers	65.9486	64.9575	63.5133	60.7501	58.7109	56.4368	55.1443	56.5775	58.1486	60.5903	63.4129	65.6959	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267	(42c)
Average daily hot water use (litres/day)													89.1903 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	153.9019	135.3481	142.1214	121.2482	114.9588	100.8113	97.5916	103.0959	106.0081	121.5131	133.2137	151.7574	(44)
Energy content (annual)													(45)
Distribution loss (46)m = 0.15 x (45)m	23.0853	20.3022	21.3182	18.1872	17.2438	15.1217	14.6387	15.4644	15.9012	18.2270	19.9821	22.7636	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	200.4968	177.4338	188.7163	166.3401	161.5537	145.9031	144.1866	149.6908	151.1000	168.1080	178.3055	198.3523	(62)
WWHRS	-30.1489	-26.6640	-27.9210	-23.1197	-21.5467	-18.4377	-17.2824	-18.3781	-19.0763	-22.4889	-25.4772	-29.5906	(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	170.3479	150.7698	160.7953	143.2204	140.0070	127.4655	126.9042	131.3128	132.0237	145.6191	152.8284	168.7617	(64)
Total per year (kWh/year)													1750.0557 (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	88.4483	78.6718	84.5313	76.3885	75.4997	69.5932	69.7251	71.5553	71.3212	77.6790	80.3670	87.7352	(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	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.5266	79.1902	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	73.9108	71.5266	73.9108	71.5266 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.0819	142.5459	138.8567	131.0028	121.0887	111.7708	105.5459	104.0819	107.7712	115.6250	125.5391	134.8570 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031 (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)	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246 (71)
Water heating gains (Table 5)	118.8821	117.0711	113.6173	106.0952	101.4781	96.6573	93.7166	96.1765	99.0572	104.4073	111.6209	117.9237 (72)
Total internal gains	381.7998	389.1164	374.3098	361.3180	344.4026	329.6481	318.0983	319.0943	328.0484	341.8681	361.3800	374.6165 (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						1.0800	10.6334	0.6300	0.7000	0.7700		3.5097 (74)
East						5.4100	19.6403	0.6300	0.7000	0.7700		32.4726 (76)
South						0.7200	46.7521	0.6300	0.7000	0.7700		10.2874 (78)
West						2.5000	19.6403	0.6300	0.7000	0.7700		15.0058 (80)
Solar gains	61.2754	116.4330	185.8150	265.6406	323.3274	330.5887	314.8565	271.5054	214.0167	136.3635	75.7236	50.8590 (83)
Total gains	443.0753	505.5494	560.1248	626.9586	667.7300	660.2369	632.9548	590.5996	542.0651	478.2316	437.1037	425.4755 (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	47.9057	48.0277	48.1480	48.7210	48.8297	49.3423	49.3423	49.4384	49.1436	48.8297	48.6103	48.3829
alpha	4.1937	4.2018	4.2099	4.2481	4.2553	4.2895	4.2895	4.2959	4.2762	4.2553	4.2407	4.2255
util living area	0.9828	0.9694	0.9408	0.8650	0.7316	0.5521	0.4079	0.4531	0.6863	0.9004	0.9688	0.9853 (86)
MIT	19.5868	19.8119	20.1408	20.5496	20.8300	20.9611	20.9915	20.9868	20.9032	20.5302	19.9966	19.5538 (87)
Th 2	19.8518	19.8544	19.8569	19.8688	19.8710	19.8814	19.8814	19.8833	19.8774	19.8710	19.8665	19.8618 (88)
util rest of house	0.9780	0.9610	0.9246	0.8300	0.6697	0.4652	0.3069	0.3475	0.5995	0.8660	0.9588	0.9812 (89)
MIT 2	18.2489	18.5330	18.9416	19.4340	19.7350	19.8598	19.8787	19.8787	19.8152	19.4275	18.7774	18.2143 (90)
Living area fraction	18.8405	19.0985	19.4718	19.9273	20.2192	20.3468	20.3707	20.3687	20.2963	19.9151	19.3165	0.4422 (91)
MIT	18.8405	19.0985	19.4718	19.9273	20.2192	20.3468	20.3707	20.3687	20.2963	19.9151	19.3165	18.8066 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8405	19.0985	19.4718	19.9273	20.2192	20.3468	20.3707	20.3687	20.2963	19.9151	19.3165	18.8066 (93)

8. Space heating requirement

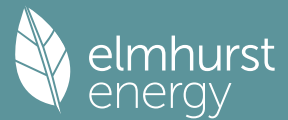
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9724	0.9541	0.9181	0.8320	0.6899	0.5023	0.3516	0.3942	0.6337	0.8675	0.9526	0.9760 (94)
Useful gains	430.8366	482.3306	514.2265	521.6388	460.6892	331.6581	222.5409	232.7984	343.5079	414.8870	416.3924	415.2809 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	890.6252	867.4648	790.5447	664.1343	511.9369	341.7478	224.2370	235.5493	369.9712	559.7653	737.4296	885.8488 (97)
Space heating kWh	342.0828	258.8102	205.5808	102.5968	38.1283	0.0000	0.0000	0.0000	0.0000	107.7895	231.1468	350.1025 (98a)
Space heating requirement - total per year (kWh/year)												1636.2375
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	342.0828	258.8102	205.5808	102.5968	38.1283	0.0000	0.0000	0.0000	0.0000	107.7895	231.1468	350.1025 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1636.2375
Space heating per m ²												34.3531 (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	342.0828	258.8102	205.5808	102.5968	38.1283	0.0000	0.0000	0.0000	0.0000	107.7895	231.1468	350.1025 (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)	370.6205	280.4010	222.7310	111.1558	41.3091	0.0000	0.0000	0.0000	0.0000	116.7816	250.4299	379.3093 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating
Water heating requirement

Full SAP Calculation Printout



Efficiency of water heater (217)m	170.3479	150.7698	160.7953	143.2204	140.0070	127.4655	126.9042	131.3128	132.0237	145.6191	152.8284	168.7617 (64)
Fuel for water heating, kWh/month	85.5910	85.2603	84.6119	83.3247	81.5695	79.8000	79.8000	79.8000	79.8000	83.3952	84.9851	79.8000 (216)
Space cooling fuel requirement (221)m	199.0254	176.8347	190.0386	171.8823	171.6414	159.7312	159.0278	164.5524	165.4432	174.6132	179.8296	197.0183 (219)
Pumps and Fa	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)
Lighting	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)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	14.8618	11.9227	10.7351	7.8650	6.0751	4.9634	5.5419	7.2036	9.3568	12.2766	13.8664	15.2749 (232)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	-22.7539	-32.3275	-46.8495	-53.1634	-57.7966	-54.1780	-53.5635	-50.3615	-44.7422	-37.2379	-25.1240	-19.6475 (233a)
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 (234a)
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 (235a)
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 (235c)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	-12.1159	-25.5679	-50.9442	-76.6767	-101.5102	-101.9848	-100.7312	-85.1883	-62.3440	-36.5571	-16.1797	-9.5706 (233b)
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 (234b)
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 (235b)
Annual totals kWh/year	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Space heating fuel - main system 1												1772.7383 (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												2109.6380 (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)												119.9433 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1177.1160 (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												2911.2036 (238)

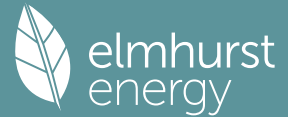
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1772.7383	0.2100	372.2750 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2109.6380	0.2100	443.0240 (264)
Space and water heating			815.2990 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	119.9433	0.1443	17.3115 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-497.7454	0.1344	-66.8873
PV Unit electricity exported	-679.3706	0.1258	-85.4969
Total			-152.3842 (269)
Total CO2, kg/year			692.1556 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.5300 (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	1772.7383	1.1300	2003.1943 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2109.6380	1.1300	2383.8910 (278)
Space and water heating			4387.0853 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	119.9433	1.5338	183.9731 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-497.7454	1.4966	-744.9438
PV Unit electricity exported	-679.3706	0.4619	-313.8317
Total			-1058.7755 (283)
Total Primary energy kWh/year			3642.3837 (286)
Target Primary Energy Rate (TPER)			76.4700 (287)

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Plot Reference	79596-08				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	30 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	78 C		DER	7.03		TER	14.53
Environmental	95 A		% DER < TER				51.62
CO ₂ Emissions (t/year)	0.29		DFEE	39.47		TFEE	43.42
Compliance Check	See BREL		% DFEE < TFEE				9.10
% DPER < TPER	5.35		DPER	72.38		TPER	76.47
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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

1. Overall dwelling characteristics

		Area (m ²)		Storey height (m)		Volume (m ³)
Main dwelling						
Ground floor		3.0400 (1b)	x	2.8500 (2b)	=	8.6640 (1b) - (3b)
First floor		44.5900 (1c)	x	2.4000 (2c)	=	107.0160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	115.6800 (5)

2. Ventilation rate

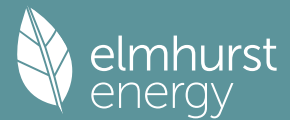
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	
Pressure test	20.0000 / (5) =	
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate	1.8400 (17)	
Number of sides sheltered	0.2649 (18)	
	2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	
	0.8500 (20)	
	0.2252 (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	0.2871	0.2814	0.2758	0.2477	0.2420	0.2139	0.2139	0.2083	0.2252	0.2420	0.2533	0.2646 (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	0.5412	0.5396	0.5380	0.5307	0.5293	0.5229	0.5229	0.5217	0.5253	0.5293	0.5321	0.5350 (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							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			3.0400	0.1100	0.3344	75.0000	228.0000 (28a)
Main	68.4200	11.8600	56.5600	0.1900	10.7464	110.0000	6221.5998 (29a)
PIJ	42.0000		42.0000	0.0800	3.3600	9.0000	378.0000 (30)
PIR	8.1600		8.1600	0.1300	1.0608	9.0000	73.4400 (30)
Total net area of external elements Aum(A, m ²)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x k)			(26)...(30) + (32) =		29.9927		(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000	110.0000	3273.6000 (32)
Party Floor 1			44.5900			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10563.4398 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							221.7812 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.0700	0.0200	0.1614
E3 Sill	8.0700	0.0300	0.2421
E4 Jamb	22.2000	0.0260	0.5772
E5 Ground floor (normal)	1.0100	0.0930	0.0939
E7 Party floor between dwellings (in blocks of flats)	27.3100	0.0370	1.0105
E16 Corner (normal)	12.0000	0.0510	0.6120
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368
E18 Party wall between dwellings	11.4000	0.0650	0.7410
P1 Party wall - Ground floor	7.0300	0.1080	0.7592
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112
E10 Eaves (insulation at ceiling level)	14.7100	0.0970	1.4269
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172
E12 Gable (insulation at ceiling level)	16.6500	0.0970	1.6150
P5 Party wall - Roof (insulation at rafter level)	8.7300	0.0460	0.4016
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4324 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.4251 (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	20.6602	20.5991	20.5393	20.2580	20.2054	19.9605	19.9605	19.9151	20.0548	20.2054	20.3119	20.4231	(38)
Heat transfer coeff	58.0853	58.0243	57.9644	57.6832	57.6305	57.3856	57.3856	57.3403	57.4800	57.6305	57.7370	57.8483	(39)
Average = Sum(39)m / 12 =												57.6829	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2195	1.2182	1.2170	1.2111	1.2100	1.2048	1.2048	1.2039	1.2068	1.2100	1.2122	1.2145	(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													1.6206 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.2234	21.8934	21.4286	20.5716	19.9299	19.2184	18.8341	19.2956	19.7981	20.5595	21.4341	22.1483	(42b)
Hot water usage for other uses	31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267	(42c)
Average daily hot water use (litres/day)												48.9925	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	53.4501	51.9845	50.3843	48.3918	46.6146	44.7675	44.3832	45.9802	47.6183	49.5151	51.5253	53.3750	(44)
Energy content (annual)	84.6519	74.0253	77.4387	66.2459	62.7522	55.0469	53.6776	56.9331	58.7181	67.1916	73.4072	83.5723	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
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	(57)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
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	(61)
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	(62)
Total heat required for water heating calculated for each month	71.9541	62.9215	65.8229	56.3090	53.3393	46.7899	45.6260	48.3932	49.9104	57.1128	62.3961	71.0365	(63a)
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	(63b)
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	(63c)
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	(63d)
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	(64)
Output from w/h	71.9541	62.9215	65.8229	56.3090	53.3393	46.7899	45.6260	48.3932	49.9104	57.1128	62.3961	71.0365	(64)
12Total per year (kWh/year)												691.6117	(64)
Electric shower(s)	41.1563	36.6706	40.0429	38.2124	38.9295	37.1349	38.3728	38.9295	38.2124	40.0429	39.2899	41.1563	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												468.1505	(64a)
Heat gains from water heating, kWh/month	28.2776	24.8980	26.4665	23.6304	23.0672	20.9812	20.9997	21.8307	22.0307	24.2889	25.4215	28.0482	(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	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.5266	79.1902	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	73.9108	71.5266	73.9108	71.5266	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.0819	142.5459	138.8567	131.0028	121.0887	111.7708	105.5459	104.0819	107.7712	115.6250	125.5391	134.8570	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	(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)	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	(71)
Water heating gains (Table 5)	38.0075	37.0506	35.5732	32.8200	31.0043	29.1406	28.2254	29.3423	30.5982	32.6464	35.3077	37.6992	(72)
Total internal gains	297.9253	306.0959	293.2657	285.0428	270.9288	262.1314	252.6071	252.2600	259.5894	267.1073	282.0668	291.3920	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	1.0800	10.6334	0.7300	0.7000	0.7700	4.0668 (74)
East	1.6100	19.6403	0.7300	0.7000	0.7700	11.1977 (76)
South	0.7200	46.7521	0.7300	0.7000	0.7700	11.9203 (78)
West	2.5000	19.6403	0.7300	0.7000	0.7700	17.3877 (80)

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East	3.8000				19.6403		0.6800		0.7000		0.7700		24.6190 (76)	
Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432	(83)	
Total gains	367.1167	437.4692	502.7433	584.3432	635.1544	634.5241	607.2821	558.1353	500.7943	420.9139	367.5529	348.8352	(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	50.5169	50.5700	50.6223	50.8691	50.9155	51.1328	51.1328	51.1733	51.0489	50.9155	50.8216	50.7239	
alpha	4.3678	4.3713	4.3748	4.3913	4.3944	4.4089	4.4089	4.4116	4.4033	4.3944	4.3881	4.3816	
util living area	0.9910	0.9804	0.9547	0.8789	0.7397	0.5557	0.4107	0.4633	0.7096	0.9260	0.9821	0.9928	(86)
MIT	19.5225	19.7681	20.1209	20.5499	20.8384	20.9642	20.9924	20.9873	20.8992	20.4882	19.9223	19.4739	(87)
Th 2	19.9044	19.9054	19.9064	19.9112	19.9120	19.9161	19.9161	19.9169	19.9146	19.9120	19.9103	19.9084	(88)
util rest of house	0.9884	0.9748	0.9419	0.8468	0.6796	0.4707	0.3121	0.3587	0.6252	0.8985	0.9761	0.9907	(89)
MIT 2	18.5797	18.8225	19.1662	19.5685	19.8104	19.9005	19.9142	19.9134	19.8630	19.5250	18.9806	18.5346	(90)
Living area fraction	0.9884	0.9748	0.9419	0.8468	0.6796	0.4707	0.3121	0.3587	0.6252	0.8985	0.9761	0.9907	(91)
MIT	18.9966	19.2406	19.5883	20.0025	20.2650	20.3708	20.3910	20.3882	20.3212	19.9509	19.3970	18.9499	(92)
Temperature adjustment	18.9966	19.2406	19.5883	20.0025	20.2650	20.3708	20.3910	20.3882	20.3212	19.9509	19.3970	18.9499	(93)
adjusted MIT	18.9966	19.2406	19.5883	20.0025	20.2650	20.3708	20.3910	20.3882	20.3212	19.9509	19.3970	18.9499	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9856	0.9705	0.9374	0.8498	0.7002	0.5073	0.3557	0.4050	0.6587	0.8996	0.9724	0.9882	(94)
Useful gains	361.8122	424.5772	471.2660	496.5760	444.7359	321.8827	216.0292	226.0292	329.8982	378.6586	357.3990	344.7066	(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	853.6571	832.1031	758.6567	640.4256	493.6033	331.1628	217.5461	228.6856	357.5927	538.8985	709.9905	853.2566	(97)
Space heating kWh	365.9326	273.8574	213.8187	103.5717	36.3573	0.0000	0.0000	0.0000	0.0000	119.2185	253.8659	378.3612	(98a)
Space heating requirement - total per year (kWh/year)												1744.9834	
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	365.9326	273.8574	213.8187	103.5717	36.3573	0.0000	0.0000	0.0000	0.0000	119.2185	253.8659	378.3612	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1744.9834	
Space heating per m2												36.6362	(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	539.4248	424.6536	435.7860	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9098	0.9503	0.9297	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	490.7727	403.5343	405.1585	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	716.2418	685.8307	629.7515	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	162.3377	210.0285	167.0972	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	40.5844	52.5071	41.7743	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												134.8659 (107)
Energy for space heating												36.6362 (99)
Energy for space cooling												2.8315 (108)
Total												39.4678 (109)
Fabric Energy Efficiency (DFEE)												39.5 (109)

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

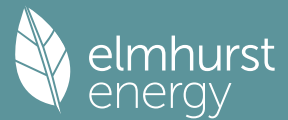
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	3.0400 (1b)	x	2.8500 (2b)	= 8.6640 (1b) - (3b)
First floor	44.5900 (1c)	x	2.4000 (2c)	= 107.0160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 115.6800 (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)

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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	Air changes per hour	0.1729 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50				5.0000 (17)
Infiltration rate				0.4229 (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) =			0.3595 (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)
	0.4583	0.4493	0.4403	0.3954	0.3864	0.3415	0.3415	0.3325	0.3595	0.3864	0.4044	0.4224	(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	0.6050	0.6009	0.5969	0.5782	0.5747	0.5583	0.5583	0.5553	0.5646	0.5747	0.5818	0.5892	(25)

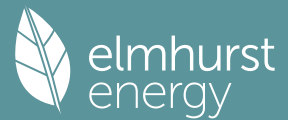
3. Heat losses and heat loss parameter

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			2.1500	1.0000	2.1500		(26)
TER Opening Type			9.7100	1.1450	11.1183		(27)
GF			3.0400	0.1300	0.3952		(28a)
Main	68.4200	11.8600	56.5600	0.1800	10.1808		(29a)
PIJ	42.0000		42.0000	0.1100	4.6200		(30)
PIR	8.1600		8.1600	0.1100	0.8976		(30)
Total net area of external elements Aum(A, m2)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.3619		(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							221.7812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				8.0700	0.0500		0.4035
E3 Sill				8.0700	0.0500		0.4035
E4 Jamb				22.2000	0.0500		1.1100
E5 Ground floor (normal)				1.0100	0.1600		0.1616
E7 Party floor between dwellings (in blocks of flats)				27.3100	0.0700		1.9117
E16 Corner (normal)				12.0000	0.0900		1.0800
E17 Corner (inverted - internal area greater than external area)				4.8000	-0.0900		-0.4320
E18 Party wall between dwellings				11.4000	0.0600		0.6840
P1 Party wall - Ground floor				7.0300	0.0800		0.5624
E25 Staggered party wall between dwellings				4.8000	0.0600		0.2880
E10 Eaves (insulation at ceiling level)				14.7100	0.0600		0.8826
E11 Eaves (insulation at rafter level)				1.0100	0.0400		0.0404
E12 Gable (insulation at ceiling level)				16.6500	0.0600		0.9990
P5 Party wall - Roof (insulation at rafter level)				8.7300	0.0800		0.6984
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.7931 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	38.1550 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6206 (42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	22.2234	21.8934	21.4286	20.5716	19.9299	19.2184	18.8341	19.2956	19.7981	20.5595	21.4341	22.1483	(42b)
Hot water usage for other uses													
	31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267	(42c)
Average daily hot water use (litres/day)													48.9925 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	53.4501	51.9845	50.3843	48.3918	46.6146	44.7675	44.3832	45.9802	47.6183	49.5151	51.5253	53.3750	(44)
Energy content (annual)	84.6519	74.0253	77.4387	66.2459	62.7522	55.0469	53.6776	56.9331	58.7181	67.1916	73.4072	83.5723	(45)
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	71.9541	62.9215	65.8229	56.3090	53.3393	46.7899	45.6260	48.3932	49.9104	57.1128	62.3961	71.0365	(62)

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WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	71.9541	62.9215	65.8229	56.3090	53.3393	46.7899	45.6260	48.3932	49.9104	57.1128	62.3961	71.0365 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											691.6117 (64)
Electric shower(s)	41.1563	36.6706	40.0429	38.2124	38.9295	37.1349	38.3728	38.9295	38.2124	40.0429	39.2899	41.1563 (64a)
Heat gains from water heating, kWh/month	28.2776	24.8980	26.4665	23.6304	23.0672	20.9812	20.9997	21.8307	22.0307	24.2889	25.4215	28.0482 (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	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.5266	79.1902	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	73.9108	71.5266	73.9108	71.5266 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.0819	142.5459	138.8567	131.0028	121.0887	111.7708	105.5459	104.0819	107.7712	115.6250	125.5391	134.8570 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031 (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)	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246 (71)
Water heating gains (Table 5)	38.0075	37.0506	35.5732	32.8200	31.0043	29.1406	28.2254	29.3423	30.5982	32.6464	35.3077	37.6992 (72)
Total internal gains	297.9253	306.0959	293.2657	285.0428	270.9288	262.1314	252.6071	252.2600	259.5894	267.1073	282.0668	291.3920 (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				1.0800	10.6334	0.6300	0.7000	0.7700	3.5097 (74)			
East				5.4100	19.6403	0.6300	0.7000	0.7700	32.4726 (76)			
South				0.7200	46.7521	0.6300	0.7000	0.7700	10.2874 (78)			
West				2.5000	19.6403	0.6300	0.7000	0.7700	15.0058 (80)			
Solar gains	61.2754	116.4330	185.8150	265.6406	323.3274	330.5887	314.8565	271.5054	214.0167	136.3635	75.7236	50.8590 (83)
Total gains	359.2007	422.5289	479.0807	550.6834	594.2562	592.7201	567.4636	523.7654	473.6061	403.4708	357.7904	342.2510 (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	47.9057	48.0277	48.1480	48.7210	48.8297	49.3423	49.3423	49.4384	49.1436	48.8297	48.6103	48.3829
alpha	4.1937	4.2018	4.2099	4.2481	4.2553	4.2895	4.2895	4.2959	4.2762	4.2553	4.2407	4.2255
util living area	0.9919	0.9834	0.9637	0.9035	0.7841	0.6041	0.4520	0.5056	0.7501	0.9388	0.9844	0.9934 (86)
MIT	19.3963	19.6324	19.9836	20.4415	20.7754	20.9454	20.9874	20.9801	20.8627	20.4049	19.8245	19.3627 (87)
Th 2	19.8518	19.8544	19.8569	19.8688	19.8710	19.8814	19.8814	19.8833	19.8774	19.8710	19.8665	19.8618 (88)
util rest of house	0.9895	0.9786	0.9529	0.8752	0.7256	0.5130	0.3415	0.3903	0.6656	0.9144	0.9789	0.9914 (89)
MIT 2	18.4153	18.6504	18.9957	19.4371	19.7264	19.8570	19.8782	19.8777	19.8053	19.4162	18.8515	18.3894 (90)
Living area fraction	18.8491	19.0846	19.4325	19.8812	20.1902	20.3383	20.3686	20.3651	20.2729	19.8534	19.2817	18.8198 (92)
Temperature adjustment	18.8491	19.0846	19.4325	19.8812	20.1902	20.3383	20.3686	20.3651	20.2729	19.8534	19.2817	18.8198 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9867	0.9743	0.9479	0.8755	0.7434	0.5515	0.3905	0.4412	0.6977	0.9140	0.9752	0.9889 (94)
Ext temp.	354.4116	411.6866	454.1102	482.1368	441.7951	326.9142	221.5740	231.1081	330.4405	368.7634	348.9298	338.4608 (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	891.1512	866.6172	788.1484	661.3586	510.1975	341.2435	224.1137	235.3380	368.5718	556.0558	735.3325	886.6479 (97)
Space heating requirement - total per year (kWh/year)	399.3343	305.7133	248.5244	129.0397	50.8914	0.0000	0.0000	0.0000	0.0000	139.3456	278.2100	407.8512 (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)
Space heating contribution - total per year (kWh/year)	399.3343	305.7133	248.5244	129.0397	50.8914	0.0000	0.0000	0.0000	0.0000	139.3456	278.2100	407.8512 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	399.3343	305.7133	248.5244	129.0397	50.8914	0.0000	0.0000	0.0000	0.0000	139.3456	278.2100	1958.9098 (99)
Space heating per m2	(98c) / (4) =											41.1276 (99)

8c. Space cooling requirement

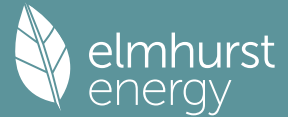
Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	558.9993	440.0633	451.0783	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8752	0.9271	0.9019	0.0000	0.0000	0.0000	0.0000 (101)

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Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	489.2214	407.9755	406.8167	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	667.3800	639.2896	589.5789	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	128.2742	172.0977	135.9751	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	32.0685	43.0244	33.9938	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												109.0867 (107)
Energy for space heating												41.1276 (99)
Energy for space cooling												2.2903 (108)
Total												43.4179 (109)
Fabric Energy Efficiency (TFEE)												43.4 (109)

Full SAP Calculation Printout



Plot Reference	79596-08				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	30 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	78 C	DER	7.03	TER	14.53		
Environmental	95 A	% DER < TER				51.62	
CO ₂ Emissions (t/year)	0.29	DFEE	39.47	TFEE	43.42		
Compliance Check	See BREL	% DFEE < TFEE				9.10	
% DPER < TPER	5.35	DPER	72.38	TPER	76.47		
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.6800 (5)

2. Ventilation rate

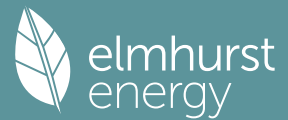
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	1.8400 (17)
Infiltration rate	0.0920 (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) = 0.0782 (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	0.0997	0.0977	0.0958	0.0860	0.0841	0.0743	0.0743	0.0723	0.0782	0.0841	0.0880	0.0919 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			3.0400	0.1100	0.3344	75.0000	228.0000 (28a)
Main	68.4200	11.8600	56.5600	0.1900	10.7464	110.0000	6221.5998 (29a)
PIJ	42.0000		42.0000	0.0800	3.3600	9.0000	378.0000 (30)
PIR	8.1600		8.1600	0.1300	1.0608	9.0000	73.4400 (30)
Total net area of external elements A _{um} (A, m ²)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.9927		(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000	110.0000	3273.6000 (32)
Party Floor 1			44.5900			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity C _m = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	10563.4398 (34)

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

221.7812 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.0700	0.0200	0.1614
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421
E3 Sill	22.2000	0.0260	0.5772
E4 Jamb	1.0100	0.0930	0.0939
E5 Ground floor (normal)	27.3100	0.0370	1.0105
E7 Party floor between dwellings (in blocks of flats)	12.0000	0.0510	0.6120
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	11.4000	0.0650	0.7410
E18 Party wall between dwellings	7.0300	0.1080	0.7592
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.7100	0.0970	1.4269
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	16.6500	0.0970	1.6150
E12 Gable (insulation at ceiling level)	8.7300	0.0460	0.4016
P5 Party wall - Roof (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4324 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.4251 (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	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	(38)
Heat transfer coeff	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	(39)
Average = Sum(39)m / 12 =													56.5123
HLP	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	(40)
HLP (average)													1.1865
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6206 (42)
Hot water usage for mixer showers													
74.1921	73.0772	71.4525	68.3438	66.0498	63.4914	62.0373	63.6497	65.4172	68.1641	71.3395	73.9079	73.9079	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267	31.2267	(42c)
Average daily hot water use (litres/day)													96.7906 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.4189	103.1684	100.4081	96.1640	92.7344	89.0406	87.5864	90.3343	93.2374	97.1198	101.4307	105.1346	(44)
Energy conte	166.9577	146.9104	154.3236	131.6437	124.8383	109.4858	105.9282	111.8528	114.9710	131.7906	144.5066	164.6154	(45)
Energy content (annual)										Total = Sum(45)m =			1607.8240
Distribution loss (46)m = 0.15 x (45)m													
25.0437	22.0366	23.1485	19.7466	18.7258	16.4229	15.8892	16.7779	17.2457	19.7686	21.6760	24.6923	24.6923	(46)
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	191.5668	(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													
193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	191.5668	(64)
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
55.5134	48.8477	51.3126	43.7715	41.5088	36.4040	35.2211	37.1911	38.2279	43.8204	48.0484	54.7346	54.7346	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
71.5266	79.1902	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
141.0819	142.5459	138.8567	131.0028	121.0887	111.7708	105.5459	104.0819	107.7712	115.6250	125.5391	134.8570	134.8570	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	(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)													
-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	(71)
Water heating gains (Table 5)													
74.6148	72.6900	68.9685	60.7938	55.7913	50.5611	47.3402	49.9880	53.0943	58.8984	66.7339	73.5680	73.5680	(72)
Total internal gains													
334.5326	341.7353	326.6610	313.0166	295.7158	283.5520	271.7219	272.9057	282.0854	293.3592	313.4931	327.2608	327.2608	(73)

6. Solar gains

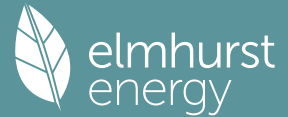
[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
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												W/m2	or Table 6b		or Table 6c		Table 6d			
North						1.0800	10.6334			0.7300	0.7000		0.7700		4.0668 (74)					
East						1.6100	19.6403			0.7300	0.7000		0.7700		11.1977 (76)					
South						0.7200	46.7521			0.7300	0.7000		0.7700		11.9203 (78)					
West						2.5000	19.6403			0.7300	0.7000		0.7700		17.3877 (80)					
East						3.8000	19.6403			0.6800	0.7000		0.7700		24.6190 (76)					
Solar gains		69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)							
Total gains		403.7240	473.1085	536.1387	612.3171	659.9414	655.9447	626.3969	578.7810	523.2904	447.1658	398.9792	384.7040 (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	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230								
alpha	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615								
util living area	0.9869	0.9733	0.9422	0.8589	0.7139	0.5333	0.3931	0.4421	0.6812	0.9089	0.9754	0.9894 (86)								
MIT	19.6622	19.8976	20.2290	20.6128	20.8664	20.9709	20.9940	20.9900	20.9179	20.5552	20.0277	19.6046 (87)								
Th 2	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308 (88)								
util rest of house	0.9833	0.9661	0.9268	0.8241	0.6535	0.4514	0.2995	0.3428	0.5975	0.8773	0.9675	0.9863 (89)								
MIT 2	18.3998	18.6957	19.1056	19.5570	19.8243	19.9147	19.9289	19.9273	19.8778	19.5058	18.8634	18.3268 (90)								
Living area fraction										fLA = Living area / (4) =		0.4422 (91)								
MIT	18.9580	19.2271	19.6024	20.0238	20.2851	20.3817	20.3998	20.3972	20.3377	19.9698	19.3782	18.8918 (92)								
Temperature adjustment												0.0000								
adjusted MIT	18.9580	19.2271	19.6024	20.0238	20.2851	20.3817	20.3998	20.3972	20.3377	19.9698	19.3782	18.8918 (93)								
8. Space heating requirement																				
Utilisation	0.9788	0.9601	0.9211	0.8275	0.6745	0.4867	0.3409	0.3867	0.6310	0.8786	0.9622	0.9824 (94)								
Useful gains	395.1744	454.2123	493.8537	506.6783	445.1431	319.2520	213.5448	223.8064	330.1849	392.8897	383.8859	377.9306 (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	828.3562	809.6579	740.4445	628.6333	485.1625	326.7371	214.7374	225.8886	352.5068	529.5097	693.8679	830.2687 (97)								
Space heating kWh	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (98a)								
Space heating requirement - total per year (kWh/year)												1523.5642								
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	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (98c)								
Space heating requirement after solar contribution - total per year (kWh/year)												1523.5642								
Space heating per m2										(98c) / (4) =		31.9875 (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	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (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)	322.2873	238.8594	183.4636	87.8076	29.7745	0.0000	0.0000	0.0000	0.0000	101.6453	223.1870	336.5395 (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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668 (64)								
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)								
Fuel for water heating, kWh/month	55.4961	49.0122	51.8803	45.1406	43.4417	38.7991	38.0297	39.7253	40.3689	45.4314	48.8219	54.8258 (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	2.0034	1.8096	2.0034	1.9388	2.0034	1.9388	2.0034	2.0034	1.9388	2.0034	1.9388	2.0034 (231)								
Lighting	13.7238	11.0098	9.9131	7.2628	5.6100	4.5834	5.1176	6.6520	8.6403	11.3366	12.8047	14.1053 (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)								

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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	(235d)
Annual totals kWh/year											
Space heating fuel - main system 1										1523.5642	(211)
Space heating fuel - main system 2										0.0000	(213)
Space heating fuel - secondary										0.0000	(215)
Efficiency of water heater										349.4100	
Water heating fuel used										550.9731	(219)
Space cooling fuel										0.0000	(221)
Electricity for pumps and fans:											
(MEVDecentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)											
mechanical ventilation fans (SFP = 0.1671)										23.5888	(230a)
Total electricity for the above, kWh/year										23.5888	(231)
Electricity for lighting (calculated in Appendix L)										110.7593	(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										2208.8855	(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	1523.5642	0.1560	237.6879	(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)	550.9731	0.1411	77.7537	(264)
Space and water heating			315.4417	(265)
Pumps, fans and electric keep-hot	23.5888	0.1387	3.2721	(267)
Energy for lighting	110.7593	0.1443	15.9860	(268)
Total CO2, kg/year			334.6997	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.0300	(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	1523.5642	1.5776	2403.5078	(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)	550.9731	1.5218	838.4842	(278)
Space and water heating			3241.9921	(279)
Pumps, fans and electric keep-hot	23.5888	1.5128	35.6851	(281)
Energy for lighting	110.7593	1.5338	169.8863	(282)
Total Primary energy kWh/year			3447.5636	(286)
Dwelling Primary energy Rate (DPER)			72.3800	(287)

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

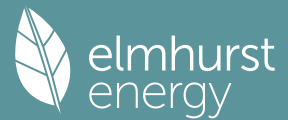
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)	
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	47.6300			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e) ... (3n) =	115.6800	(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) =	0.1729 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4229 (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) =	0.3595 (21)

Full SAP Calculation Printout



Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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													
Effective ac	0.4583	0.4493	0.4403	0.3954	0.3864	0.3415	0.3415	0.3325	0.3595	0.3864	0.4044	0.4224	(22b)
	0.6050	0.6009	0.5969	0.5782	0.5747	0.5583	0.5583	0.5553	0.5646	0.5747	0.5818	0.5892	(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			2.1500	1.0000	2.1500		(26)
TER Opening Type			9.7100	1.1450	11.1183		(27)
GF			3.0400	0.1300	0.3952		(28a)
Main	68.4200	11.8600	56.5600	0.1800	10.1808		(29a)
PIJ	42.0000		42.0000	0.1100	4.6200		(30)
PIR	8.1600		8.1600	0.1100	0.8976		(30)
Total net area of external elements Aum(A, m2)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.3619	(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000		(32)

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

221.7812 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.0700	0.0500	0.4035
E3 Sill	8.0700	0.0500	0.4035
E4 Jamb	22.2000	0.0500	1.1100
E5 Ground floor (normal)	1.0100	0.1600	0.1616
E7 Party floor between dwellings (in blocks of flats)	27.3100	0.0700	1.9117
E16 Corner (normal)	12.0000	0.0900	1.0800
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0900	-0.4320
E18 Party wall between dwellings	11.4000	0.0600	0.6840
P1 Party wall - Ground floor	7.0300	0.0800	0.5624
E25 Staggered party wall between dwellings	4.8000	0.0600	0.2880
E10 Eaves (insulation at ceiling level)	14.7100	0.0600	0.8826
E11 Eaves (insulation at rafter level)	1.0100	0.0400	0.0404
E12 Gable (insulation at ceiling level)	16.6500	0.0600	0.9990
P5 Party wall - Roof (insulation at rafter level)	8.7300	0.0800	0.6984

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

8.7931 (36)

Point Thermal Bridges

(33a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 38.1550 (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	23.0964	22.9407	22.7881	22.0714	21.9373	21.3130	21.3130	21.1974	21.5534	21.9373	22.2085	22.4922	(38)
Average = Sum(39)m / 12 =	61.2514	61.0957	60.9431	60.2264	60.0923	59.4680	59.4680	59.3524	59.7085	60.0923	60.3636	60.6472	(39)
												60.2257	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2860	1.2827	1.2795	1.2645	1.2616	1.2485	1.2485	1.2461	1.2536	1.2616	1.2673	1.2733	(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													1.6206 (42)
Hot water usage for mixer showers	65.9486	64.9575	63.5133	60.7501	58.7109	56.4368	55.1443	56.5775	58.1486	60.5903	63.4129	65.6959 (42a)	
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)	
Hot water usage for other uses	31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267 (42c)	
Average daily hot water use (litres/day)												89.1903 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.1753	95.0487	92.4690	88.5702	85.3956	81.9860	80.6934	83.2622	85.9688	89.5460	93.5041	96.9226 (44)	
Energy content (annual)	153.9019	135.3481	142.1214	121.2482	114.9588	100.8113	97.5916	103.0959	106.0081	121.5131	133.2137	151.7574 (45)	
Distribution loss (46)m = 0.15 x (45)m	23.0853	20.3022	21.3182	18.1872	17.2438	15.1217	14.6387	15.4644	15.9012	18.2270	19.9821	22.7636 (46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	200.4968	177.4338	188.7163	166.3401	161.5537	145.9031	144.1866	149.6908	151.1000	168.1080	178.3055	198.3523 (62)	
WWHRS	-30.1489	-26.6640	-27.9210	-23.1197	-21.5467	-18.4377	-17.2824	-18.3781	-19.0763	-22.4889	-25.4772	-29.5906 (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	170.3479	150.7698	160.7953	143.2204	140.0070	127.4655	126.9042	131.3128	132.0237	145.6191	152.8284	168.7617 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1750.0557 (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	88.4483	78.6718	84.5313	76.3885	75.4997	69.5932	69.7251	71.5553	71.3212	77.6790	80.3670	87.7352 (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	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307	81.0307 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.5266	79.1902	71.5266	73.9108	71.5266	73.9108	71.5266	71.5266	73.9108	71.5266	73.9108	71.5266 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.0819	142.5459	138.8567	131.0028	121.0887	111.7708	105.5459	104.0819	107.7712	115.6250	125.5391	134.8570 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031	31.1031 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246 (71)
Water heating gains (Table 5)	118.8821	117.0711	113.6173	106.0952	101.4781	96.6573	93.7166	96.1765	99.0572	104.4073	111.6209	117.9237 (72)
Total internal gains	381.7998	389.1164	374.3098	361.3180	344.4026	329.6481	318.0983	319.0943	328.0484	341.8681	361.3800	374.6165 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	g Specific data or Table 6c	FF			Access factor Table 6d			Gains W
North					1.0800	10.6334	0.6300		0.7000			0.7700			3.5097 (74)
East					5.4100	19.6403	0.6300		0.7000			0.7700			32.4726 (76)
South					0.7200	46.7521	0.6300		0.7000			0.7700			10.2874 (78)
West					2.5000	19.6403	0.6300		0.7000			0.7700			15.0058 (80)
Solar gains	61.2754	116.4330	185.8150	265.6406	323.3274	330.5887	314.8565	271.5054	214.0167	136.3635	75.7236			50.8590 (83)	
Total gains	443.0753	505.5494	560.1248	626.9586	667.7300	660.2369	632.9548	590.5996	542.0651	478.2316	437.1037	425.4755			(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	47.9057	48.0277	48.1480	48.7210	48.8297	49.3423	49.3423	49.4384	49.1436	48.8297	48.6103	48.3829
alpha	4.1937	4.2018	4.2099	4.2481	4.2553	4.2895	4.2895	4.2959	4.2762	4.2553	4.2407	4.2255
util living area	0.9828	0.9694	0.9408	0.8650	0.7316	0.5521	0.4079	0.4531	0.6863	0.9004	0.9688	0.9853 (86)
MIT	19.5868	19.8119	20.1408	20.5496	20.8300	20.9611	20.9915	20.9868	20.9032	20.5302	19.9966	19.5538 (87)
Th 2	19.8518	19.8544	19.8569	19.8688	19.8710	19.8814	19.8814	19.8833	19.8774	19.8710	19.8665	19.8618 (88)
util rest of house	0.9780	0.9610	0.9246	0.8300	0.6697	0.4652	0.3069	0.3475	0.5995	0.8660	0.9588	0.9812 (89)
MIT 2	18.2489	18.5330	18.9416	19.4340	19.7350	19.8598	19.8787	19.8787	19.8152	19.4275	18.7774	18.2143 (90)
Living area fraction	18.8405	19.0985	19.4718	19.9273	20.2192	20.3468	20.3707	20.3687	20.2963	19.9151	19.3165	0.4422 (91)
MIT	18.8405	19.0985	19.4718	19.9273	20.2192	20.3468	20.3707	20.3687	20.2963	19.9151	19.3165	18.8066 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8405	19.0985	19.4718	19.9273	20.2192	20.3468	20.3707	20.3687	20.2963	19.9151	19.3165	18.8066 (93)

8. Space heating requirement

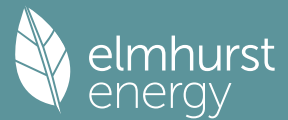
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9724	0.9541	0.9181	0.8320	0.6899	0.5023	0.3516	0.3942	0.6337	0.8675	0.9526	0.9760 (94)
Useful gains	430.8366	482.3306	514.2265	521.6388	460.6892	331.6581	222.5409	232.7984	343.5079	414.8870	416.3924	415.2809 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	890.6252	867.4648	790.5447	664.1343	511.9369	341.7478	224.2370	235.5493	369.9712	559.7653	737.4296	885.8488 (97)
Space heating kWh	342.0828	258.8102	205.5808	102.5968	38.1283	0.0000	0.0000	0.0000	0.0000	107.7895	231.1468	350.1025 (98a)
Space heating requirement - total per year (kWh/year)												1636.2375
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	342.0828	258.8102	205.5808	102.5968	38.1283	0.0000	0.0000	0.0000	0.0000	107.7895	231.1468	350.1025 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1636.2375
Space heating per m ²										(98c) / (4) =		34.3531 (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	342.0828	258.8102	205.5808	102.5968	38.1283	0.0000	0.0000	0.0000	0.0000	107.7895	231.1468	350.1025 (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)	370.6205	280.4010	222.7310	111.1558	41.3091	0.0000	0.0000	0.0000	0.0000	116.7816	250.4299	379.3093 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating
Water heating requirement

Full SAP Calculation Printout



Efficiency of water heater (217)m	170.3479	150.7698	160.7953	143.2204	140.0070	127.4655	126.9042	131.3128	132.0237	145.6191	152.8284	168.7617 (64)
Fuel for water heating, kWh/month	85.5910	85.2603	84.6119	83.3247	81.5695	79.8000	79.8000	79.8000	79.8000	83.3952	84.9851	79.8000 (216)
Space cooling fuel requirement (221)m	199.0254	176.8347	190.0386	171.8823	171.6414	159.7312	159.0278	164.5524	165.4432	174.6132	179.8296	197.0183 (219)
Pumps and Fa	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)
Lighting	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)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	14.8618	11.9227	10.7351	7.8650	6.0751	4.9634	5.5419	7.2036	9.3568	12.2766	13.8664	15.2749 (232)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	-22.7539	-32.3275	-46.8495	-53.1634	-57.7966	-54.1780	-53.5635	-50.3615	-44.7422	-37.2379	-25.1240	-19.6475 (233a)
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 (234a)
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 (235a)
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 (235c)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	-12.1159	-25.5679	-50.9442	-76.6767	-101.5102	-101.9848	-100.7312	-85.1883	-62.3440	-36.5571	-16.1797	-9.5706 (233b)
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 (234b)
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 (235b)
Annual totals kWh/year	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Space heating fuel - main system 1												1772.7383 (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												2109.6380 (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)												119.9433 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1177.1160 (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												2911.2036 (238)

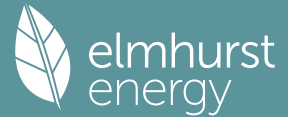
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1772.7383	0.2100	372.2750 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2109.6380	0.2100	443.0240 (264)
Space and water heating			815.2990 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	119.9433	0.1443	17.3115 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-497.7454	0.1344	-66.8873
PV Unit electricity exported	-679.3706	0.1258	-85.4969
Total			-152.3842 (269)
Total CO2, kg/year			692.1556 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.5300 (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	1772.7383	1.1300	2003.1943 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2109.6380	1.1300	2383.8910 (278)
Space and water heating			4387.0853 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	119.9433	1.5338	183.9731 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-497.7454	1.4966	-744.9438
PV Unit electricity exported	-679.3706	0.4619	-313.8317
Total			-1058.7755 (283)
Total Primary energy kWh/year			3642.3837 (286)
Target Primary Energy Rate (TPER)			76.4700 (287)

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Plot Reference	79596-08				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	30 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	78 C	DER	7.03	TER	14.53		
Environmental	95 A	% DER < TER				51.62	
CO ₂ Emissions (t/year)	0.29	DFEE	39.47	TFEE	43.42		
Compliance Check	See BREL	% DFEE < TFEE				9.10	
% DPER < TPER	5.35	DPER	72.38	TPER	76.47		
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.6800 (5)

2. Ventilation rate

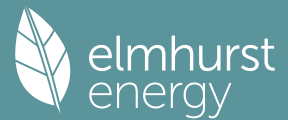
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	1.8400 (17)
Infiltration rate	0.0920 (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) = 0.0782 (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	0.0997	0.0977	0.0958	0.0860	0.0841	0.0743	0.0743	0.0723	0.0782	0.0841	0.0880	0.0919 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			3.0400	0.1100	0.3344	75.0000	228.0000 (28a)
Main	68.4200	11.8600	56.5600	0.1900	10.7464	110.0000	6221.5998 (29a)
PIJ	42.0000		42.0000	0.0800	3.3600	9.0000	378.0000 (30)
PIR	8.1600		8.1600	0.1300	1.0608	9.0000	73.4400 (30)
Total net area of external elements A _{um} (A, m ²)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.9927		(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000	110.0000	3273.6000 (32)
Party Floor 1			44.5900			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10563.4398 (34)

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

221.7812 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.0700	0.0200	0.1614
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421
E3 Sill	22.2000	0.0260	0.5772
E4 Jamb	1.0100	0.0930	0.0939
E5 Ground floor (normal)	27.3100	0.0370	1.0105
E7 Party floor between dwellings (in blocks of flats)	12.0000	0.0510	0.6120
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	11.4000	0.0650	0.7410
E18 Party wall between dwellings	7.0300	0.1080	0.7592
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.7100	0.0970	1.4269
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	16.6500	0.0970	1.6150
E12 Gable (insulation at ceiling level)	8.7300	0.0460	0.4016
P5 Party wall - Roof (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4324 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.4251 (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	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	(38)
Heat transfer coeff	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	(39)
Average = Sum(39)m / 12 =												56.5123	
HLP	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	(40)
HLP (average)												1.1865	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6206 (42)
Hot water usage for mixer showers													
74.1921	73.0772	71.4525	68.3438	66.0498	63.4914	62.0373	63.6497	65.4172	68.1641	71.3395	73.9079	73.9079	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267	31.2267	(42c)
Average daily hot water use (litres/day)												96.7906	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.4189	103.1684	100.4081	96.1640	92.7344	89.0406	87.5864	90.3343	93.2374	97.1198	101.4307	105.1346	(44)
Energy conte	166.9577	146.9104	154.3236	131.6437	124.8383	109.4858	105.9282	111.8528	114.9710	131.7906	144.5066	164.6154	(45)
Energy content (annual)										Total = Sum(45)m =		1607.8240	
Distribution loss (46)m = 0.15 x (45)m													
25.0437	22.0366	23.1485	19.7466	18.7258	16.4229	15.8892	16.7779	17.2457	19.7686	21.6760	24.6923	24.6923	(46)
Water storage loss (or HIU loss):													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	191.5668	(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													
193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	191.5668	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
55.5134	48.8477	51.3126	43.7715	41.5088	36.4040	35.2211	37.1911	38.2279	43.8204	48.0484	54.7346	54.7346	(65)

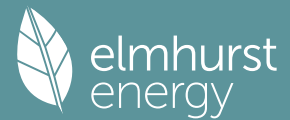
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
15.6791	13.9261	11.3254	8.5741	6.4092	5.4109	5.8467	7.5998	10.2004	12.9518	15.1166	16.1149	16.1149	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
210.5700	212.7551	207.2488	195.5266	180.7294	166.8222	157.5312	155.3462	160.8525	172.5747	187.3719	201.2791	201.2791	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	(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)													
-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	(71)
Water heating gains (Table 5)													
74.6148	72.6900	68.9685	60.7938	55.7913	50.5611	47.3402	49.9880	53.0943	58.8984	66.7339	73.5680	73.5680	(72)
Total internal gains													
379.6206	378.1278	366.2994	343.6511	321.6866	301.5508	289.4748	291.6905	302.9037	323.1814	347.9790	369.7186	369.7186	(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			1.0800		10.6334		0.7300		0.7000		0.7700		4.0668 (74)
East			1.6100		19.6403		0.7300		0.7000		0.7700		11.1977 (76)
South			0.7200		46.7521		0.7300		0.7000		0.7700		11.9203 (78)
West			2.5000		19.6403		0.7300		0.7000		0.7700		17.3877 (80)
East			3.8000		19.6403		0.6800		0.7000		0.7700		24.6190 (76)

Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)
Total gains	448.8120	509.5010	575.7770	642.9515	685.9121	673.9435	644.1497	597.5658	544.1087	476.9880	433.4651	427.1618 (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	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	
alpha	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	
util living area	0.9806	0.9654	0.9279	0.8411	0.6950	0.5207	0.3826	0.4290	0.6618	0.8909	0.9671	0.9842 (86)	
MIT	19.7645	19.9747	20.3005	20.6492	20.8801	20.9735	20.9946	20.9911	20.9268	20.6006	20.1014	19.7023 (87)	
Th 2	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308 (88)	
util rest of house	0.9754	0.9564	0.9096	0.8041	0.6343	0.4401	0.2914	0.3322	0.5784	0.8554	0.9569	0.9799 (89)	
MIT 2	18.5282	18.7908	19.1903	19.5959	19.8362	19.9162	19.9291	19.9277	19.8842	19.5552	18.9540	18.4500 (90)	
Living area fraction	fLA = Living area / (4) =												0.4422 (91)
MIT	19.0748	19.3143	19.6811	20.0616	20.2978	20.3837	20.4002	20.3979	20.3452	20.0175	19.4613	19.0037 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.0748	19.3143	19.6811	20.0616	20.2978	20.3837	20.4002	20.3979	20.3452	20.0175	19.4613	19.0037 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9700	0.9500	0.9047	0.8090	0.6560	0.4749	0.3317	0.3750	0.6122	0.8586	0.9513	0.9750	(94)
Useful gains	435.3471	484.0182	520.8960	520.1490	449.9907	320.0518	213.6912	224.0882	333.0885	409.5607	412.3406	416.4703	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
Space heating kWh	834.9606	814.5843	744.8970	630.7681	485.8794	326.8509	214.7592	225.9300	352.9298	532.2032	698.5659	836.5910	(97)
Space heating requirement - total per year (kWh/year)	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(98a)
Solar heating kWh												1402.3545	
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating kWh												0.0000	
Space heating requirement after solar contribution - total per year (kWh/year)	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(98c)
Space heating per m2												1402.3545	
										(98c) / (4) =		29.4427	(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	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(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)	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	55.4961	49.0122	51.8803	45.1406	43.4417	38.7991	38.0297	39.7253	40.3689	45.4314	48.8219	54.8258	(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	2.0034	1.8096	2.0034	1.9388	2.0034	1.9388	2.0034	2.0034	1.9388	2.0034	1.9388	2.0034	(231)
Lighting	13.7238	11.0098	9.9131	7.2628	5.6100	4.5834	5.1176	6.6520	8.6403	11.3366	12.8047	14.1053	(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)													

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(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												1402.3545	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												550.9731	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)													
mechanical ventilation fans (SFP = 0.1671)												23.5888	(230a)
Total electricity for the above, kWh/year												23.5888	(231)
Electricity for lighting (calculated in Appendix L)												110.7593	(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												2087.6757	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1402.3545	16.4900	231.2483	(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)	550.9731	16.4900	90.8555	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	23.5888	16.4900	3.8898	(249)
Energy for lighting	110.7593	16.4900	18.2642	(250)
Additional standing charges			0.0000	(251)
Total energy cost			344.2577	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.3379	(257)
SAP value		78.3121	
SAP rating (Section 12)		78	(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	1402.3545	0.1561	218.8935	(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)	550.9731	0.1411	77.7537	(264)
Space and water heating			296.6473	(265)
Pumps, fans and electric keep-hot	23.5888	0.1387	3.2721	(267)
Energy for lighting	110.7593	0.1443	15.9860	(268)
Total CO2, kg/year			315.9053	(272)
CO2 emissions per m2			6.6300	(273)
EI value			95.4301	
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

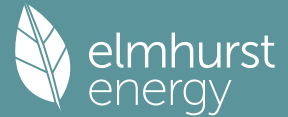
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)	
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.6800	(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)

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Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7a)
0 * 10 = 0.0000 (7b)
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
0.0000 / (5) = 0.0000 (8)
Yes
Blower Door
1.8400 (17)
0.0920 (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) = 0.0782 (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	0.0841	0.0821	0.0821	0.0762	0.0782	0.0665	0.0645	0.0645	0.0665	0.0743	0.0743	0.0762	(22b)
Mechanical extract ventilation - decentralised													
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Door			2.1500	1.0000	2.1500			(26)
Window			5.9100	1.2357	7.3032			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			3.0400	0.1100	0.3344	75.0000	228.0000	(28a)
Main	68.4200	11.8600	56.5600	0.1900	10.7464	110.0000	6221.5998	(29a)
PIJ	42.0000		42.0000	0.0800	3.3600	9.0000	378.0000	(30)
PIR	8.1600		8.1600	0.1300	1.0608	9.0000	73.4400	(30)
Total net area of external elements Aum(A, m2)			121.6200					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.9927			(33)
Main dwelling								
Party Wall 1			29.7600	0.0000	0.0000	110.0000	3273.6000	(32)
Party Floor 1			44.5900			0.0000	0.0000	(32d)
Timber			43.2000			9.0000	388.8000	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 10563.4398 (34)
List of Thermal Bridges 221.7812 (35)

	Length	Psi-value	Total	
K1 Element	8.0700	0.0200	0.1614	
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421	
E3 Sill	22.2000	0.0260	0.5772	
E4 Jamb	1.0100	0.0930	0.0939	
E5 Ground floor (normal)	27.3100	0.0370	1.0105	
E7 Party floor between dwellings (in blocks of flats)	12.0000	0.0510	0.6120	
E16 Corner (normal)	4.8000	-0.0910	-0.4368	
E17 Corner (inverted - internal area greater than external area)	11.4000	0.0650	0.7410	
E18 Party wall between dwellings	7.0300	0.1080	0.7592	
P1 Party wall - Ground floor	4.8000	0.0440	0.2112	
E25 Staggered party wall between dwellings	14.7100	0.0970	1.4269	
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172	
E11 Eaves (insulation at rafter level)	16.6500	0.0970	1.6150	
E12 Gable (insulation at ceiling level)	8.7300	0.0460	0.4016	
P5 Party wall - Roof (insulation at rafter level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4324	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 37.4251	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m
Heat transfer coeff
Average = Sum(39)m / 12 =

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	(40)
HLP (average)													1.1865
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6206 (42)
Hot water usage for mixer showers
Hot water usage for baths
Hot water usage for other uses
Average daily hot water use (litres/day)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.4189	103.1684	100.4081	96.1640	92.7344	89.0406	87.5864	90.3343	93.2374	97.1198	101.4307	105.1346	(44)
Energy conte	166.9577	146.9104	154.3236	131.6437	124.8383	109.4858	105.9282	111.8528	114.9710	131.7906	144.5066	164.6154	(45)
Energy content (annual)										Total = Sum(45)m =		1607.8240	
Distribution loss (46)m = 0.15 x (45)m	25.0437	22.0366	23.1485	19.7466	18.7258	16.4229	15.8892	16.7779	17.2457	19.7686	21.6760	24.6923	(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)

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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												
	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668 (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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668 (64)
Total per year (kWh/year) = Sum(64)m =												1925.1550 (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												
	55.5134	48.8477	51.3126	43.7715	41.5088	36.4040	35.2211	37.1911	38.2279	43.8204	48.0484	54.7346 (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	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	15.6791	13.9261	11.3254	8.5741	6.4092	5.4109	5.8467	7.5998	10.2004	12.9518	15.1166	16.1149 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	210.5700	212.7551	207.2488	195.5266	180.7294	166.8222	157.5312	155.3462	160.8525	172.5747	187.3719	201.2791 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443 (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)												
	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246 (71)
Water heating gains (Table 5)												
	74.6148	72.6900	68.9685	60.7938	55.7913	50.5611	47.3402	49.9880	53.0943	58.8984	66.7339	73.5680 (72)
Total internal gains	379.6206	378.1278	366.2994	343.6511	321.6866	301.5508	289.4748	291.6905	302.9037	323.1814	347.9790	369.7186 (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			1.0800	9.3942		0.7300		0.7000		0.7700		3.5928 (74)
East			1.6100	17.3606		0.7300		0.7000		0.7700		9.8979 (76)
South			0.7200	41.2355		0.7300		0.7000		0.7700		10.5138 (78)
West			2.5000	17.3606		0.7300		0.7000		0.7700		15.3695 (80)
East			3.8000	17.3606		0.6800		0.7000		0.7700		21.7615 (76)
Solar gains	61.1354	119.0803	198.3912	289.1354	343.1963	357.3562	333.8896	284.2819	234.7264	146.6665	77.6248	51.9098 (83)
Total gains	440.7560	497.2080	564.6906	632.7865	664.8829	658.9070	623.3643	575.9725	537.6301	469.8479	425.6038	421.6284 (84)

7. Mean internal temperature (heating season)

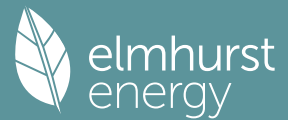
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230
alpha	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615
util living area	0.9783	0.9622	0.9194	0.8170	0.6480	0.4550	0.3425	0.3888	0.6303	0.8772	0.9632	0.9820 (86)
MIT	19.8535	20.0525	20.3743	20.7155	20.9201	20.9868	20.9970	20.9948	20.9440	20.6524	20.1756	19.7975 (87)
Th 2	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308 (88)
util rest of house												
	0.9722	0.9518	0.8983	0.7738	0.5787	0.3686	0.2472	0.2868	0.5409	0.8363	0.9512	0.9768 (89)
MIT 2	18.6414	18.8890	19.2806	19.6700	19.8736	19.9250	19.9301	19.9294	19.8980	19.6146	19.0472	18.5712 (90)
Living area fraction												
MIT	19.1773	19.4034	19.7642	20.1323	20.3363	20.3945	20.4018	20.4005	20.3605	20.0734	19.5461	19.1134 (92)
Temperature adjustment												
adjusted MIT	19.1773	19.4034	19.7642	20.1323	20.3363	20.3945	20.4018	20.4005	20.3605	20.0734	19.5461	19.1134 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9667	0.9456	0.8945	0.7826	0.6060	0.4066	0.2894	0.3320	0.5783	0.8425	0.9458	0.9717 (94)
Useful gains	426.0705	470.1523	505.1008	495.2344	402.8904	267.8968	180.4282	191.2096	310.8991	395.8276	402.5462	409.6967 (95)
Ext temp.	5.1000	5.7000	7.3000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	5.0000 (96)
Heat loss rate W	795.5427	774.4129	704.3819	583.9027	425.8936	270.9473	180.9439	192.1681	325.5395	501.4592	663.8003	797.5816 (97)
Space heating kWh	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864 (98a)
Space heating requirement - total per year (kWh/year)												1263.8503
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	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1263.8503
Space heating per m2											(98c) / (4) =	26.5348 (99)

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

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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	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864	(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)	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864	(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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	55.4961	49.0122	51.8803	45.1406	43.4417	38.7991	38.0297	39.7253	40.3689	45.4314	48.8219	54.8258	(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	2.0034	1.8096	2.0034	1.9388	2.0034	1.9388	2.0034	2.0034	1.9388	2.0034	1.9388	2.0034	(231)
Lighting	13.7238	11.0098	9.9131	7.2628	5.6100	4.5834	5.1176	6.6520	8.6403	11.3366	12.8047	14.1053	(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												1263.8503	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												550.9731	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)													
mechanical ventilation fans (SFP = 0.1671)												23.5888	(230a)
Total electricity for the above, kWh/year												23.5888	(231)
Electricity for lighting (calculated in Appendix L)												110.7593	(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												1949.1715	(238)

10a. Fuel costs - using BEDF prices (591)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1263.8503	28.4300	359.3126	(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)	550.9731	28.4300	156.6416	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	23.5888	28.4300	6.7063	(249)
Energy for lighting	110.7593	28.4300	31.4889	(250)
Additional standing charges			0.0000	(251)
Total energy cost			554.1494	(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	1263.8503	0.1564	197.7250	(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)	550.9731	0.1411	77.7537	(264)
Space and water heating			275.4788	(265)
Pumps, fans and electric keep-hot	23.5888	0.1387	3.2721	(267)
Energy for lighting	110.7593	0.1443	15.9860	(268)
Total CO2, kg/year			294.7368	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1263.8503	1.5792	1995.8410 (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)	550.9731	1.5218	838.4842 (278)
Space and water heating			2834.3253 (279)
Pumps, fans and electric keep-hot	23.5888	1.5128	35.6851 (281)
Energy for lighting	110.7593	1.5338	169.8863 (282)
Total Primary energy kWh/year			3039.8968 (286)

SAP 10 EPC IMPROVEMENTS

001

Current energy efficiency rating: C 78
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 78
Potential environmental impact rating: A 95

Fuel prices for cost data on this page from database revision number 591 TEST (27 Feb 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current	Potential	Saving
Electricity	£554	£554	£0
Space heating	£366	£366	£0
Water heating	£157	£157	£0
Lighting	£31	£31	£0
Total cost of fuels	£554	£554	£0
Total cost of uses	£554	£554	£0
Delivered energy	41 kWh/m²	41 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	64 kWh/m²	64 kWh/m²	0 kWh/m²

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

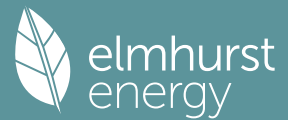
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.6800 (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	1.8400 (17)
Infiltration rate	0.0920 (18)
Number of sides sheltered	2 (19)

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Shelter factor												(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.0782 (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)
	0.0997	0.0977	0.0958	0.0860	0.0841	0.0743	0.0743	0.0723	0.0782	0.0841	0.0880	0.0919 (22b)
Mechanical extract ventilation - decentralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

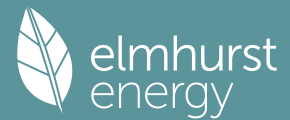
3. Heat losses and heat loss parameter

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								
Door			2.1500	1.0000	2.1500			(26)
Window			5.9100	1.2357	7.3032			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			3.0400	0.1100	0.3344	75.0000	228.0000	(28a)
Main	68.4200	11.8600	56.5600	0.1900	10.7464	110.0000	6221.5998	(29a)
PIJ	42.0000		42.0000	0.0800	3.3600	9.0000	378.0000	(30)
PIR	8.1600		8.1600	0.1300	1.0608	9.0000	73.4400	(30)
Total net area of external elements Aum(A, m2)			121.6200					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.9927		(33)
Main dwelling								
Party Wall 1			29.7600	0.0000	0.0000	110.0000	3273.6000	(32)
Party Floor 1			44.5900			0.0000	0.0000	(32d)
Timber			43.2000			9.0000	388.8000	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							10563.4398	(34)
List of Thermal Bridges							221.7812	(35)
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				8.0700	0.0200		0.1614	
E3 Sill				8.0700	0.0300		0.2421	
E4 Jamb				22.2000	0.0260		0.5772	
E5 Ground floor (normal)				1.0100	0.0930		0.0939	
E7 Party floor between dwellings (in blocks of flats)				27.3100	0.0370		1.0105	
E16 Corner (normal)				12.0000	0.0510		0.6120	
E17 Corner (inverted - internal area greater than external area)				4.8000	-0.0910		-0.4368	
E18 Party wall between dwellings				11.4000	0.0650		0.7410	
P1 Party wall - Ground floor				7.0300	0.1080		0.7592	
E25 Staggered party wall between dwellings				4.8000	0.0440		0.2112	
E10 Eaves (insulation at ceiling level)				14.7100	0.0970		1.4269	
E11 Eaves (insulation at rafter level)				1.0100	0.0170		0.0172	
E12 Gable (insulation at ceiling level)				16.6500	0.0970		1.6150	
P5 Party wall - Roof (insulation at rafter level)				8.7300	0.0460		0.4016	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.4324	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	37.4251	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6206 (42)
Hot water usage for mixer showers												
Hot water usage for baths	74.1921	73.0772	71.4525	68.3438	66.0498	63.4914	62.0373	63.6497	65.4172	68.1641	71.3395	73.9079 (42a)
Hot water usage for other uses	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Average daily hot water use (litres/day)	31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267 (42c)
												96.7906 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	105.4189	103.1684	100.4081	96.1640	92.7344	89.0406	87.5864	90.3343	93.2374	97.1198	101.4307	105.1346 (44)
Energy content (annual)	166.9577	146.9104	154.3236	131.6437	124.8383	109.4858	105.9282	111.8528	114.9710	131.7906	144.5066	164.6154 (45)
Distribution loss (46)m = 0.15 x (45)m	25.0437	22.0366	23.1485	19.7466	18.7258	16.4229	15.8892	16.7779	17.2457	19.7686	21.6760	24.6923 (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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668 (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												

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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668 (64)
	Total per year (kWh/year) = Sum(64)m = 1925.1550 (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	55.5134	48.8477	51.3126	43.7715	41.5088	36.4040	35.2211	37.1911	38.2279	43.8204	48.0484	54.7346 (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	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6791	13.9261	11.3254	8.5741	6.4092	5.4109	5.8467	7.5998	10.2004	12.9518	15.1166	16.1149	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.5700	212.7551	207.2488	195.5266	180.7294	166.8222	157.5312	155.3462	160.8525	172.5747	187.3719	201.2791	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	(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)	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	(71)
Water heating gains (Table 5)	74.6148	72.6900	68.9685	60.7938	55.7913	50.5611	47.3402	49.9880	53.0943	58.8984	66.7339	73.5680	(72)
Total internal gains	379.6206	378.1278	366.2994	343.6511	321.6866	301.5508	289.4748	291.6905	302.9037	323.1814	347.9790	369.7186	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.0800	10.6334	0.7300	0.7000	0.7700	4.0668	(74)
East	1.6100	19.6403	0.7300	0.7000	0.7700	11.1977	(76)
South	0.7200	46.7521	0.7300	0.7000	0.7700	11.9203	(78)
West	2.5000	19.6403	0.7300	0.7000	0.7700	17.3877	(80)
East	3.8000	19.6403	0.6800	0.7000	0.7700	24.6190	(76)

Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432	(83)
Total gains	448.8120	509.5010	575.7770	642.9515	685.9121	673.9435	644.1497	597.5658	544.1087	476.9880	433.4651	427.1618	(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	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230
alpha	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615
util living area	0.9806	0.9654	0.9279	0.8411	0.6950	0.5207	0.3826	0.4290	0.6618	0.8909	0.9671	0.9842 (86)
MIT	19.7645	19.9747	20.3005	20.6492	20.8801	20.9735	20.9946	20.9911	20.9268	20.6006	20.1014	19.7023 (87)
Th 2	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308 (88)
util rest of house	0.9754	0.9564	0.9096	0.8041	0.6343	0.4401	0.2914	0.3322	0.5784	0.8554	0.9569	0.9799 (89)
MIT 2	18.5282	18.7908	19.1903	19.5959	19.8362	19.9162	19.9291	19.9277	19.8842	19.5552	18.9540	18.4500 (90)
Living area fraction	19.0748	19.3143	19.6811	20.0616	20.2978	20.3837	20.4002	20.3979	20.3452	20.0175	19.4613	19.0037 (91)
MIT	19.0748	19.3143	19.6811	20.0616	20.2978	20.3837	20.4002	20.3979	20.3452	20.0175	19.4613	19.0037 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0748	19.3143	19.6811	20.0616	20.2978	20.3837	20.4002	20.3979	20.3452	20.0175	19.4613	19.0037 (93)

8. Space heating requirement

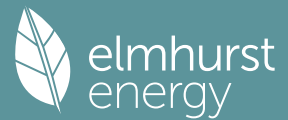
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9700	0.9500	0.9047	0.8090	0.6560	0.4749	0.3317	0.3750	0.6122	0.8586	0.9513	0.9750	(94)	
Useful gains	435.3471	484.0182	520.8960	520.1490	449.9907	320.0518	213.6912	224.0882	333.0885	409.5607	412.3406	416.4703	(95)	
Ext temp.	4.3000	4.9000	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	834.9606	814.5843	744.8970	630.7681	485.8794	326.8509	214.7592	225.9300	352.9298	532.2032	698.5659	836.5910	(97)	
Space heating kWh	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(98a)	
Space heating requirement - total per year (kWh/year)	1402.3545													
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	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	1402.3545													
Space heating per m2											(98c) / (4) =			29.4427 (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													

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Space heating efficiency (main heating system 1)	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	297.3124	222.1404	166.6567	79.6457	26.7012	0.0000	0.0000	0.0000	0.0000	91.2460	206.0823	312.5698	(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 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	(215)
Water heating requirement	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	55.4961	49.0122	51.8803	45.1406	43.4417	38.7991	38.0297	39.7253	40.3689	45.4314	48.8219	54.8258	(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	2.0034	1.8096	2.0034	1.9388	2.0034	1.9388	2.0034	2.0034	1.9388	2.0034	1.9388	2.0034	(231)
Lighting	13.7238	11.0098	9.9131	7.2628	5.6100	4.5834	5.1176	6.6520	8.6403	11.3366	12.8047	14.1053	(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												1402.3545	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												550.9731	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)													
mechanical ventilation fans (SFP = 0.1671)												23.5888	(230a)
Total electricity for the above, kWh/year												23.5888	(231)
Electricity for lighting (calculated in Appendix L)												110.7593	(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												2087.6757	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1402.3545	16.4900	231.2483	(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)	550.9731	16.4900	90.8555	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	23.5888	16.4900	3.8898	(249)
Energy for lighting	110.7593	16.4900	18.2642	(250)
Additional standing charges			0.0000	(251)
Total energy cost			344.2577	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.3379	(257)
SAP value		78.3121	
SAP rating (Section 12)		78	(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	1402.3545	0.1561	218.8935	(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)	550.9731	0.1411	77.7537	(264)
Space and water heating			296.6473	(265)
Pumps, fans and electric keep-hot	23.5888	0.1387	3.2721	(267)
Energy for lighting	110.7593	0.1443	15.9860	(268)
Total CO2, kg/year			315.9053	(272)
CO2 emissions per m2			6.6300	(273)
EI value			95.4301	
EI rating			95	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	3.0400 (1b)	x 2.8500 (2b)	= 8.6640 (1b) - (3b)
First floor	44.5900 (1c)	x 2.4000 (2c)	= 107.0160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.6800 (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		1.8400	(17)
Infiltration rate		0.0920	(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) =	0.0782	(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	0.0841	0.0821	0.0821	0.0762	0.0782	0.0665	0.0645	0.0645	0.0665	0.0743	0.0743	0.0762	(22b)
Mechanical extract ventilation - decentralised													
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			3.0400	0.1100	0.3344	75.0000	228.0000 (28a)
Main	68.4200	11.8600	56.5600	0.1900	10.7464	110.0000	6221.5998 (29a)
PIJ	42.0000		42.0000	0.0800	3.3600	9.0000	378.0000 (30)
PIR	8.1600		8.1600	0.1300	1.0608	9.0000	73.4400 (30)
Total net area of external elements Aum(A, m ²)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.9927		(33)
Main dwelling							
Party Wall 1			29.7600	0.0000	0.0000	110.0000	3273.6000 (32)
Party Floor 1			44.5900			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	10563.4398	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		221.7812	(35)

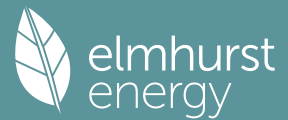
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.0700	0.0200	0.1614
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421
E3 Sill	22.2000	0.0260	0.5772
E4 Jamb	1.0100	0.0930	0.0939
E5 Ground floor (normal)	27.3100	0.0370	1.0105
E6 Corner (normal)	12.0000	0.0510	0.6120
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368
E18 Party wall between dwellings	11.4000	0.0650	0.7410
P1 Party wall - Ground floor	7.0300	0.1080	0.7592
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112
E10 Eaves (insulation at ceiling level)	14.7100	0.0970	1.4269
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172
E12 Gable (insulation at ceiling level)	16.6500	0.0970	1.6150
P5 Party wall - Roof (insulation at rafter level)	8.7300	0.0460	0.4016

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		7.4324	(36)
Point Thermal bridges		0.0000	(36a)
Total fabric heat loss	(33) + (36) + (36a) =	37.4251	(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
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(38)m	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	19.0872	(38)
Heat transfer coeff	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	56.5123	(39)
Average = Sum(39)m / 12 =													56.5123
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	1.1865	(40)
HLP (average)													1.1865
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6206 (42)
Hot water usage for mixer showers	74.1921	73.0772	71.4525	68.3438	66.0498	63.4914	62.0373	63.6497	65.4172	68.1641	71.3395	73.9079	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	31.2267	30.0912	28.9557	27.8202	26.6846	25.5491	25.5491	26.6846	27.8202	28.9557	30.0912	31.2267	(42c)
Average daily hot water use (litres/day)													96.7906 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.4189	103.1684	100.4081	96.1640	92.7344	89.0406	87.5864	90.3343	93.2374	97.1198	101.4307	105.1346	(44)
Energy conte	166.9577	146.9104	154.3236	131.6437	124.8383	109.4858	105.9282	111.8528	114.9710	131.7906	144.5066	164.6154	(45)
Energy content (annual)													Total = Sum(45)m = 1607.8240
Distribution loss (46)m = 0.15 x (45)m	25.0437	22.0366	23.1485	19.7466	18.7258	16.4229	15.8892	16.7779	17.2457	19.7686	21.6760	24.6923	(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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	(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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668	(64)
													Total per year (kWh/year) = Sum(64)m = 1925.1550 (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	55.5134	48.8477	51.3126	43.7715	41.5088	36.4040	35.2211	37.1911	38.2279	43.8204	48.0484	54.7346	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	97.2369	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6791	13.9261	11.3254	8.5741	6.4092	5.4109	5.8467	7.5998	10.2004	12.9518	15.1166	16.1149	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.5700	212.7551	207.2488	195.5266	180.7294	166.8222	157.5312	155.3462	160.8525	172.5747	187.3719	201.2791	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	46.3443	(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)	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	-64.8246	(71)
Water heating gains (Table 5)	74.6148	72.6900	68.9685	60.7938	55.7913	50.5611	47.3402	49.9880	53.0943	58.8984	66.7339	73.5680	(72)
Total internal gains	379.6206	378.1278	366.2994	343.6511	321.6866	301.5508	289.4748	291.6905	302.9037	323.1814	347.9790	369.7186	(73)

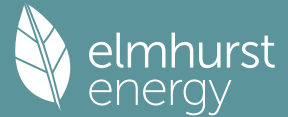
6. Solar gains

[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				1.0800	9.3942	0.7300	0.7000	0.7700	3.5928 (74)			
East				1.6100	17.3606	0.7300	0.7000	0.7700	9.8979 (76)			
South				0.7200	41.2355	0.7300	0.7000	0.7700	10.5138 (78)			
West				2.5000	17.3606	0.7300	0.7000	0.7700	15.3695 (80)			
East				3.8000	17.3606	0.6800	0.7000	0.7700	21.7615 (76)			
Solar gains	61.1354	119.0803	198.3912	289.1354	343.1963	357.3562	333.8896	284.2819	234.7264	146.6665	77.6248	51.9098 (83)
Total gains	440.7560	497.2080	564.6906	632.7865	664.8829	658.9070	623.3643	575.9725	537.6301	469.8479	425.6038	421.6284 (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	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	51.9230	
alpha	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	4.4615	
util living area	0.9783	0.9622	0.9194	0.8170	0.6480	0.4550	0.3425	0.3888	0.6303	0.8772	0.9632	0.9820	(86)

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MIT	19.8535	20.0525	20.3743	20.7155	20.9201	20.9868	20.9970	20.9948	20.9440	20.6524	20.1756	19.7975 (87)
Th 2	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308	19.9308 (88)
util rest of house	0.9722	0.9518	0.8983	0.7738	0.5787	0.3686	0.2472	0.2868	0.5409	0.8363	0.9512	0.9768 (89)
MIT 2	18.6414	18.8890	19.2806	19.6700	19.8736	19.9250	19.9301	19.9294	19.8980	19.6146	19.0472	18.5712 (90)
Living area fraction									fLA = Living area / (4) =			0.4422 (91)
MIT	19.1773	19.4034	19.7642	20.1323	20.3363	20.3945	20.4018	20.4005	20.3605	20.0734	19.5461	19.1134 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1773	19.4034	19.7642	20.1323	20.3363	20.3945	20.4018	20.4005	20.3605	20.0734	19.5461	19.1134 (93)

8. Space heating requirement

Utilisation	Jan 0.9667	Feb 0.9456	Mar 0.8945	Apr 0.7826	May 0.6060	Jun 0.4066	Jul 0.2894	Aug 0.3320	Sep 0.5783	Oct 0.8425	Nov 0.9458	Dec 0.9717 (94)
Useful gains	426.0705	470.1523	505.1008	495.2344	402.8904	267.8968	180.4282	191.2096	310.8991	395.8276	402.5462	409.6967 (95)
Ext temp.	5.1000	5.7000	7.3000	9.8000	12.8000	15.6000	17.2000	17.0000	14.6000	11.2000	7.8000	5.0000 (96)
Heat loss rate W	795.5427	774.4129	704.3819	583.9027	425.8936	270.9473	180.9439	192.1681	325.5395	501.4592	663.8003	797.5816 (97)
Space heating kWh	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864 (98a)
Space heating requirement - total per year (kWh/year)												1263.8503
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	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1263.8503
Space heating per m2										(98c) / (4) =		26.5348 (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	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864 (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)	274.8873	204.4631	148.2651	63.8412	17.1144	0.0000	0.0000	0.0000	0.0000	78.5899	188.1029	288.5864 (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	193.9091	171.2536	181.2750	157.7257	151.7897	135.5678	132.8796	138.8042	141.0530	158.7420	170.5886	191.5668 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	55.4961	49.0122	51.8803	45.1406	43.4417	38.7991	38.0297	39.7253	40.3689	45.4314	48.8219	54.8258 (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	2.0034	1.8096	2.0034	1.9388	2.0034	1.9388	2.0034	2.0034	1.9388	2.0034	1.9388	2.0034 (231)
Lighting	13.7238	11.0098	9.9131	7.2628	5.6100	4.5834	5.1176	6.6520	8.6403	11.3366	12.8047	14.1053 (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)

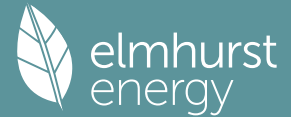
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Annual totals kWh/year												
Space heating fuel - main system 1												1263.8503 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												349.4100
Water heating fuel used												550.9731 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
(MEVDecentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)												
mechanical ventilation fans (SFP = 0.1671)												23.5888 (230a)
Total electricity for the above, kWh/year												23.5888 (231)
Electricity for lighting (calculated in Appendix L)												110.7593 (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)

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Total delivered energy for all uses

1949.1715 (238)

10a. Fuel costs - using BEDF prices (591)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1263.8503	28.4300	359.3126 (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)	550.9731	28.4300	156.6416 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	23.5888	28.4300	6.7063 (249)
Energy for lighting	110.7593	28.4300	31.4889 (250)
Additional standing charges			0.0000 (251)
Total energy cost			554.1494 (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	1263.8503	0.1564	197.7250 (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)	550.9731	0.1411	77.7537 (264)
Space and water heating			275.4788 (265)
Pumps, fans and electric keep-hot	23.5888	0.1387	3.2721 (267)
Energy for lighting	110.7593	0.1443	15.9860 (268)
Total CO2, kg/year			294.7368 (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	1263.8503	1.5792	1995.8410 (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)	550.9731	1.5218	838.4842 (278)
Space and water heating			2834.3253 (279)
Pumps, fans and electric keep-hot	23.5888	1.5128	35.6851 (281)
Energy for lighting	110.7593	1.5338	169.8863 (282)
Total Primary energy kWh/year			3039.8968 (286)