

Full SAP Calculation Printout



Plot Reference	79596-02				Issued on Date	18/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	18 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.33		TER	15.12
Environmental	95 A		% DER < TER				51.52
CO ₂ Emissions (t/year)	0.31		DFEE	41.58		TFEE	46.10
Compliance Check	See BREL		% DFEE < TFEE				9.81
% DPER < TPER	5.26		DPER	75.46		TPER	79.65
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	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.7295 (5)

2. Ventilation rate

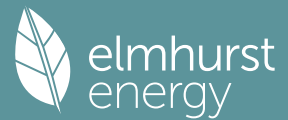
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.1500 (17)
Infiltration rate	0.1075 (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) = 0.0914 (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	0.1165	0.1142	0.1119	0.1005	0.0982	0.0868	0.0868	0.0845	0.0914	0.0982	0.1028	0.1074 (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			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	76.8600	11.8600	65.0000	0.1900	12.3500	110.0000	7150.0001 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.7400		9.7400	0.1300	1.2662	9.0000	87.6600 (30)
Total net area of external elements A _{um} (A, m ²)			130.5300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.7114		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			44.6700			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10505.7701 (34)

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

220.4316 (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	4.0200	0.0930	0.3739
E5 Ground floor (normal)	27.2500	0.0370	1.0082
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
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)	11.0500	0.0970	1.0719
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	4.0500	0.1010	0.4091
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.3946 (36)
Total fabric heat loss	(33) + (36) + (36a) =	39.1060 (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	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	(38)
Heat transfer coeff	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	(39)
Average = Sum(39)m / 12 =												58.2014	
HLP	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	(40)
HLP (average)												1.2212	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

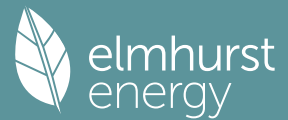
Assumed occupancy													1.6215 (42)
Hot water usage for mixer showers													
74.2134	73.0981	71.4729	68.3634	66.0687	63.5096	62.0551	63.6680	65.4360	68.1836	71.3599	73.9291	73.9291	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357	31.2357	(42c)
Average daily hot water use (litres/day)												96.8183	(43)
Daily hot water use													
105.4491	103.1980	100.4369	96.1916	92.7610	89.0661	87.6115	90.3602	93.2641	97.1476	101.4598	105.1647	105.1647	(44)
Energy conte	167.0056	146.9525	154.3678	131.6815	124.8741	109.5172	105.9585	111.8849	115.0040	131.8284	144.5480	164.6626	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.0508	22.0429	23.1552	19.7522	18.7311	16.4276	15.8938	16.7827	17.2506	19.7743	21.6822	24.6994	24.6994	(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													
193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	191.6140	(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													
193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	191.6140	(64)
12Total per year (kWh/year)												1925.6160	(64)
Electric shower(s)												1926	(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													
55.5293	48.8617	51.3273	43.7841	41.5207	36.4145	35.2312	37.2017	38.2388	43.8329	48.0622	54.7503	54.7503	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
71.5702	79.2384	71.5702	73.9558	71.5702	73.9558	71.5702	71.5702	73.9558	71.5702	73.9558	71.5702	71.5702	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
141.1597	142.6245	138.9333	131.0751	121.1555	111.8325	105.6041	104.1393	107.8306	115.6888	125.6084	134.9314	134.9314	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	(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)													
-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	(71)
Water heating gains (Table 5)													
74.6362	72.7109	68.9883	60.8112	55.8073	50.5756	47.3538	50.0023	53.1095	58.9152	66.7531	73.5891	73.5891	(72)
Total internal gains													
334.6884	341.8961	326.8141	313.1645	295.8553	283.6863	271.8504	273.0341	282.2182	293.4965	313.6396	327.4130	327.4130	(73)

6. Solar gains

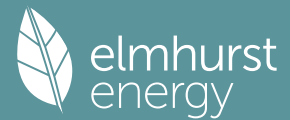
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[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
North	1.0800				10.6334	0.7300		0.7000		0.7700	4.0668 (74)	
East	1.6100				19.6403	0.7300		0.7000		0.7700	11.1977 (76)	
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	403.8799	473.2693	536.2917	612.4649	660.0809	656.0789	626.5254	578.9094	523.4232	447.3031	399.1257	384.8562 (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	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409
alpha	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427
util living area												
	0.9870	0.9738	0.9442	0.8648	0.7246	0.5457	0.4037	0.4536	0.6926	0.9124	0.9759	0.9894 (86)
MIT	19.5975	19.8352	20.1742	20.5730	20.8460	20.9646	20.9923	20.9874	20.9044	20.5177	19.9738	19.5396 (87)
Th 2	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031 (88)
util rest of house												
	0.9833	0.9667	0.9290	0.8305	0.6637	0.4608	0.3056	0.3497	0.6075	0.8814	0.9680	0.9863 (89)
MIT 2	18.2992	18.5983	19.0184	19.4895	19.7797	19.8833	19.9006	19.8986	19.8410	19.4410	18.7768	18.2258 (90)
Living area fraction									fLA = Living area /	(4) =		0.4629 (91)
MIT	18.9001	19.1708	19.5534	19.9910	20.2732	20.3838	20.4059	20.4026	20.3332	19.9394	19.3309	18.8339 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9001	19.1708	19.5534	19.9910	20.2732	20.3838	20.4059	20.4026	20.3332	19.9394	19.3309	18.8339 (93)
8. Space heating requirement												
Utilisation	0.9789	0.9607	0.9233	0.8335	0.6854	0.4989	0.3510	0.3978	0.6427	0.8826	0.9627	0.9823 (94)
Useful gains	395.3381	454.6474	495.1329	510.5158	452.3983	327.3249	219.9375	230.2634	336.4016	394.7896	384.2376	378.0603 (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	849.7470	830.5808	759.7241	645.5133	498.9734	336.6252	221.5104	232.9563	362.7829	543.5654	711.8539	851.7132 (97)
Space heating kWh	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (98a)
Space heating requirement - total per year (kWh/year)	1618.3840											
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	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1618.3840											
Space heating per m2	(98c) / (4) = 33.9569 (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	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (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)	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (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	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140 (64)
Water heating requirement	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)
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 (217)
Fuel for water heating, kWh/month	55.5098	49.0243	51.8930	45.1514	43.4520	38.8080	38.0384	39.7345	40.3783	45.4423	48.8338	54.8393 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	2.0043	1.8103	2.0043	1.9396	2.0043	1.9396	2.0043	2.0043	1.9396	2.0043	1.9396	2.0043 (231)
Pumps and Fa	13.7322	11.0165	9.9191	7.2672	5.6134	4.5862	5.1207	6.6561	8.6456	11.3435	12.8125	14.1139 (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)

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	
Pressure test		/ (5) =	0.1728 (8)
Pressure Test Method		Yes	
Measured/design AP50		Blower Door	
Infiltration rate			5.0000 (17)
Number of sides sheltered			0.4228 (18)
			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) = 0.3594 (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													
Effective ac	0.4582	0.4492	0.4403	0.3953	0.3863	0.3414	0.3414	0.3324	0.3594	0.3863	0.4043	0.4223	(22b)
	0.6050	0.6009	0.5969	0.5781	0.5746	0.5583	0.5583	0.5553	0.5646	0.5746	0.5817	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			2.9900	0.1300	0.3887			(28a)
Main	76.8600	11.8600	65.0000	0.1800	11.7000			(29a)
PIJ	40.9400		40.9400	0.1100	4.5034			(30)
PIR	9.7400		9.7400	0.1100	1.0714			(30)
Total net area of external elements Aum(A, m2)			130.5300					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	30.9318		(33)
Main dwelling								
Party Wall 1			21.1800	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							220.4316	(35)

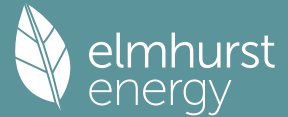
List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	8.0700	0.0500	0.4035	
E2 Other lintels (including other steel lintels)	8.0700	0.0500	0.4035	
E3 Sill	22.2000	0.0500	1.1100	
E4 Jamb	4.0200	0.1600	0.6432	
E5 Ground floor (normal)	27.2500	0.0700	1.9075	
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0900	1.5930	
E16 Corner (normal)	4.8000	-0.0900	-0.4320	
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0600	0.3420	
E18 Party wall between dwellings	4.0200	0.0800	0.3216	
P1 Party wall - Ground floor	4.8000	0.0600	0.2880	
E25 Staggered party wall between dwellings	14.7100	0.0600	0.8826	
E10 Eaves (insulation at ceiling level)	1.0100	0.0400	0.0404	
E11 Eaves (insulation at rafter level)	11.0500	0.0600	0.6630	
E12 Gable (insulation at ceiling level)	6.9600	0.0800	0.5568	
E13 Gable (insulation at rafter level)	4.0500	0.1200	0.4860	
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0800	0.3488	
P5 Party wall - Roof (insulation at rafter level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.5579	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	40.4897 (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	23.1049	22.9492	22.7966	22.0798	21.9456	21.3213	21.3213	21.2057	21.5618	21.9456	22.2170	22.5006	(38)
Heat transfer coeff	63.5946	63.4389	63.2863	62.5695	62.4354	61.8110	61.8110	61.6954	62.0515	62.4354	62.7067	62.9903	(39)
Average = Sum(39)m / 12 =												62.5688	
HLP	1.3343	1.3311	1.3279	1.3128	1.3100	1.2969	1.2969	1.2945	1.3020	1.3100	1.3157	1.3217	(40)
HLP (average)												1.3128	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6215 (42)
Hot water usage for mixer showers	65.9675	64.9761	63.5315	60.7675	58.7277	56.4530	55.1601	56.5937	58.1653	60.6077	63.4310	65.7147	(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	31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357	(42c)
Average daily hot water use (litres/day)												89.2159	(43)
Daily hot water use	97.2031	95.0759	92.4955	88.5956	85.4200	82.0095	80.7165	83.2860	85.9935	89.5717	93.5309	96.9504	(44)
Energy conte	153.9460	135.3869	142.1621	121.2830	114.9918	100.8402	97.6196	103.1255	106.0385	121.5479	133.2519	151.8009	(45)
Energy content (annual)										Total = Sum(45)m =		1481.9943	
Distribution loss (46)m = 0.15 x (45)m	23.0919	20.3080	21.3243	18.1925	17.2488	15.1260	14.6429	15.4688	15.9058	18.2322	19.9878	22.7701	(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	200.5409	177.4726	188.7570	166.3748	161.5867	145.9321	144.2145	149.7204	151.1304	168.1428	178.3437	198.3958	(62)
WWHRS	-30.1576	-26.6716	-27.9290	-23.1263	-21.5529	-18.4429	-17.2873	-18.3833	-19.0818	-22.4953	-25.4845	-29.5991	(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	170.3833	150.8010	160.8280	143.2486	140.0338	127.4891	126.9272	131.3371	132.0486	145.6475	152.8593	168.7967	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1750.4001	(64)
Electric shower(s)												1750	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													

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88.4630 78.6847 84.5448 76.4001 75.5107 69.6028 69.7344 71.5652 71.3313 77.6906 80.3797 87.7497 (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	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.5702	79.2384	71.5702	73.9558	71.5702	73.9558	71.5702	71.5702	73.9558	71.5702	73.9558	71.5702	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.1597	142.6245	138.9333	131.0751	121.1555	111.8325	105.6041	104.1393	107.8306	115.6888	125.6084	134.9314	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	(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)	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	(71)
Water heating gains (Table 5)	118.9018	117.0903	113.6355	106.1112	101.4929	96.6706	93.7291	96.1897	99.0712	104.4228	111.6385	117.9432	(72)
Total internal gains	381.9540	389.2756	374.4613	361.4644	344.5408	329.7813	318.2257	319.2215	328.1800	342.0041	361.5250	374.7670	(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	443.2295	505.7086	560.2763	627.1050	667.8682	660.3700	633.0822	590.7269	542.1967	478.3676	437.2487		425.6260 (84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil _m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	45.8886	46.0013	46.1122	46.6405	46.7406	47.2127	47.2127	47.3012	47.0298	46.7406	46.5384	46.3289	
alpha	4.0592	4.0668	4.0741	4.1094	4.1160	4.1475	4.1475	4.1534	4.1353	4.1160	4.1026	4.0886	
util living area	0.9830	0.9702	0.9432	0.8719	0.7446	0.5682	0.4221	0.4683	0.7006	0.9053	0.9697	0.9854	(86)
MIT	19.5015	19.7294	20.0676	20.4947	20.7996	20.9508	20.9886	20.9827	20.8838	20.4801	19.9251	19.4678	(87)
Th 2	19.8140	19.8166	19.8191	19.8308	19.8330	19.8432	19.8432	19.8452	19.8393	19.8330	19.8285	19.8239	(88)
util rest of house	0.9782	0.9620	0.9274	0.8375	0.6821	0.4774	0.3148	0.3565	0.6120	0.8716	0.9599	0.9813	(89)
MIT 2	18.1162	18.4040	18.8251	19.3415	19.6718	19.8159	19.8396	19.8391	19.7642	19.3409	18.6624	18.0804	(90)
Living area fraction	18.7574	19.0175	19.4002	19.8752	20.1938	20.3412	20.3715	20.3684	20.2824	19.8682	19.2469	18.7226	(91)
MIT	18.7574	19.0175	19.4002	19.8752	20.1938	20.3412	20.3715	20.3684	20.2824	19.8682	19.2469	18.7226	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7574	19.0175	19.4002	19.8752	20.1938	20.3412	20.3715	20.3684	20.2824	19.8682	19.2469	18.7226	(93)

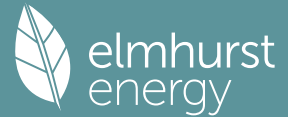
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9725	0.9549	0.9206	0.8390	0.7027	0.5177	0.3645	0.4081	0.6480	0.8728	0.9536	0.9761	(94)
Useful gains	431.0518	482.9054	515.7730	526.1321	469.2857	341.8459	230.7674	241.0975	351.3315	417.5079	416.9473	415.4518	(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	919.4101	895.5978	816.4076	686.7153	530.3136	354.8706	233.1178	244.8329	383.6290	578.6645	761.6898	914.7837	(97)
Space heating kWh	363.3385	277.3293	223.6721	115.6199	45.4047	0.0000	0.0000	0.0000	0.0000	119.9005	248.2146	371.5029	(98a)
Space heating requirement - total per year (kWh/year)												1764.9826	
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	363.3385	277.3293	223.6721	115.6199	45.4047	0.0000	0.0000	0.0000	0.0000	119.9005	248.2146	371.5029	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1764.9826	
Space heating per m ²										(98c) / (4) =		37.0328	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	363.3385	277.3293	223.6721	115.6199	45.4047	0.0000	0.0000	0.0000	0.0000	119.9005	248.2146	371.5029	(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)	393.6495	300.4651	242.3317	125.2653	49.1926	0.0000	0.0000	0.0000	0.0000	129.9030	268.9215	402.4950	(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)													

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	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	170.3833	150.8010	160.8280	143.2486	140.0338	127.4891	126.9272	131.3371	132.0486	145.6475	152.8593	168.7967	(64)
Efficiency of water heater	85.7139	85.4072	84.7996	83.5836	81.8307	79.8000	79.8000	79.8000	79.8000	83.6270	85.1403	85.7777	(216)
(217)m													(217)
Fuel for water heating, kWh/month	198.7814	176.5671	189.6565	171.3836	171.1262	159.7608	159.0567	164.5828	165.4744	174.1633	179.5380	196.7840	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	14.8709	11.9300	10.7416	7.8698	6.0788	4.9665	5.5453	7.2080	9.3625	12.2841	13.8749	15.2842	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-22.7676	-32.3466	-46.8767	-53.1936	-57.8288	-54.2079	-53.5930	-50.3894	-44.7675	-37.2595	-25.1390	-19.6594	(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	-12.1242	-25.5852	-50.9786	-76.7283	-101.5783	-102.0533	-100.7989	-85.2457	-62.3862	-36.5819	-16.1907	-9.5772	(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												1912.2238	(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												2106.8748	(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)												120.0164	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1177.8574	(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												3047.2576	(238)

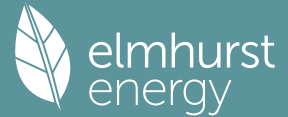
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1912.2238	0.2100	401.5670 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2106.8748	0.2100	442.4437 (264)
Space and water heating			844.0107 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	120.0164	0.1443	17.3221 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-498.0288	0.1344	-66.9256
PV Unit electricity exported	-679.8286	0.1258	-85.5545
Total			-152.4801 (269)
Total CO2, kg/year			720.7819 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.1200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1912.2238	1.1300	2160.8129 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2106.8748	1.1300	2380.7685 (278)
Space and water heating			4541.5814 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	120.0164	1.5338	184.0852 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-498.0288	1.4966	-745.3684
PV Unit electricity exported	-679.8286	0.4619	-314.0434
Total			-1059.4118 (283)
Total Primary energy kWh/year			3796.3556 (286)
Target Primary Energy Rate (TPER)			79.6500 (287)

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Plot Reference	79596-02			Issued on Date	18/03/2026	
Assessment Reference	001		Plot Type Ref	Top Flat		
Plot Address	18 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2	
SAP Rating	77 C	DER	7.33	TER	15.12	
Environmental	95 A	% DER < TER				51.52
CO ₂ Emissions (t/year)	0.31	DFEE	41.58	TFEE	46.10	
Compliance Check	See BREL	% DFEE < TFEE				9.81
% DPER < TPER	5.26	DPER	75.46	TPER	79.65	
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	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.7295 (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) =	Air changes per hour 20.0000 / (5) = 0.1728 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.1500 (17)
Infiltration rate	0.2803 (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) = 0.2383 (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	0.3038	0.2978	0.2919	0.2621	0.2561	0.2264	0.2264	0.2204	0.2383	0.2561	0.2681	0.2800 (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	0.5461	0.5444	0.5426	0.5343	0.5328	0.5256	0.5256	0.5243	0.5284	0.5328	0.5359	0.5392 (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			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	76.8600	11.8600	65.0000	0.1900	12.3500	110.0000	7150.0001 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.7400		9.7400	0.1300	1.2662	9.0000	87.6600 (30)
Total net area of external elements Aum(A, m ²)			130.5300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.7114		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			44.6700			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10505.7701 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							220.4316 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



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)	4.0200	0.0930	0.3739
E7 Party floor between dwellings (in blocks of flats)	27.2500	0.0370	1.0082
E16 Corner (normal)	17.7000	0.0510	0.9027
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368
E18 Party wall between dwellings	5.7000	0.0650	0.3705
P1 Party wall - Ground floor	4.0200	0.1080	0.4342
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)	11.0500	0.0970	1.0719
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246
P4 Party wall - Roof (insulation at ceiling level)	4.0500	0.1010	0.4091
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.3946 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	39.1060 (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	20.8577	20.7893	20.7222	20.4071	20.3482	20.0738	20.0738	20.0229	20.1795	20.3482	20.4674	20.5921	(38)
Heat transfer coeff	59.9637	59.8953	59.8282	59.5132	59.4542	59.1798	59.1798	59.1290	59.2855	59.4542	59.5735	59.6981	(39)
Average = Sum(39)m / 12 =												59.5129	
HLP	1.2582	1.2567	1.2553	1.2487	1.2475	1.2417	1.2417	1.2406	1.2439	1.2475	1.2500	1.2526	(40)
HLP (average)												1.2487	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6215 (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												
22.2297	21.8996	21.4347	20.5774	19.9356	19.2238	18.8394	19.3011	19.8037	20.5653	21.4402	22.1546	(42b)
Hot water usage for other uses												
31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357	(42c)
Average daily hot water use (litres/day)												49.0065 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
53.4654	51.9994	50.3986	48.4056	46.6279	44.7803	44.3959	45.9934	47.6319	49.5293	51.5400	53.3902	(44)
Energy conte	84.6761	74.0464	77.4608	66.2648	62.7701	55.0626	53.6930	56.9494	58.7349	67.2108	73.4282	83.5962 (45)
Energy content (annual)										Total = Sum(45)m =		813.8932
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												
71.9747	62.9395	65.8417	56.3251	53.3546	46.8032	45.6390	48.4070	49.9246	57.1292	62.4139	71.0568	(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	71.9747	62.9395	65.8417	56.3251	53.3546	46.8032	45.6390	48.4070	49.9246	57.1292	62.4139	71.0568 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		691.8092 (64)
Electric shower(s)	41.1680	36.6811	40.0543	38.2233	38.9406	37.1455	38.3837	38.9406	38.2233	40.0543	39.3011	41.1680 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												468.2841 (64a)
Heat gains from water heating, kWh/month	28.2857	24.9051	26.4740	23.6371	23.0738	20.9872	21.0057	21.8369	22.0370	24.2959	25.4288	28.0562 (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	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
71.5702	79.2384	71.5702	73.9558	71.5702	73.9558	71.5702	71.5702	73.9558	71.5702	73.9558	71.5702	71.5702 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
141.1597	142.6245	138.9333	131.0751	121.1555	111.8325	105.6041	104.1393	107.8306	115.6888	125.6084	134.9314	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074 (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)												
-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596 (71)
Water heating gains (Table 5)												
38.0184	37.0612	35.5833	32.8293	31.0132	29.1489	28.2334	29.3507	30.6069	32.6557	35.3177	37.7099	(72)
Total internal gains	298.0706	306.2464	293.4091	285.1825	271.0611	262.2595	252.7301	252.3825	259.7157	267.2370	282.2043	291.5338 (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	0.7300	0.7000	0.7700	4.0668	(74)
East	1.6100	19.6403	0.7300	0.7000	0.7700	11.1977	(76)

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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	367.2620	437.6197	502.8867	584.4830	635.2867	634.6522	607.4050	558.2578	500.9206	421.0436	367.6904	348.9770 (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	48.6672	48.7229	48.7775	49.0357	49.0843	49.3119	49.3119	49.3543	49.2240	49.0843	48.9861	48.8838
alpha	4.2445	4.2482	4.2518	4.2690	4.2723	4.2875	4.2875	4.2903	4.2816	4.2723	4.2657	4.2589
util living area	0.9910	0.9807	0.9561	0.8841	0.7502	0.5686	0.4221	0.4755	0.7209	0.9288	0.9823	0.9927 (86)
MIT	19.4520	19.7000	20.0604	20.5053	20.8143	20.9565	20.9903	20.9841	20.8832	20.4470	19.8644	19.4040 (87)
Th 2	19.8738	19.8749	19.8760	19.8812	19.8822	19.8868	19.8868	19.8876	19.8850	19.8822	19.8802	19.8782 (88)
util rest of house	0.9884	0.9751	0.9435	0.8525	0.6898	0.4806	0.3186	0.3661	0.6354	0.9018	0.9763	0.9906 (89)
MIT 2	18.4874	18.7328	19.0844	19.5035	19.7648	19.8677	19.8843	19.8832	19.8249	19.4632	18.9015	18.4432 (90)
Living area fraction	18.9339	19.1805	19.5362	19.9672	20.2506	20.3717	20.3962	20.3928	20.3147	19.9186	19.3472	18.8879 (92)
Temperature adjustment	18.9339	19.1805	19.5362	19.9672	20.2506	20.3717	20.3962	20.3928	20.3147	19.9186	19.3472	18.8879 (93)
adjusted MIT	18.9339	19.1805	19.5362	19.9672	20.2506	20.3717	20.3962	20.3928	20.3147	19.9186	19.3472	18.8879 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9854	0.9708	0.9389	0.8552	0.7110	0.5201	0.3666	0.4168	0.6705	0.9028	0.9726	0.9880 (94)
Useful gains	361.9107	424.8394	472.1770	499.8740	451.6641	330.0553	222.6597	232.6569	335.8512	380.1369	357.6114	344.7916 (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	877.5035	855.3332	779.9322	658.6438	508.3681	341.5651	224.6607	236.0876	368.4431	554.0288	729.6074	876.8395 (97)
Space heating kWh	383.6011	289.2919	228.9699	114.3142	42.1878	0.0000	0.0000	0.0000	0.0000	129.3756	267.8372	395.8436 (98a)
Space heating requirement - total per year (kWh/year)												1851.4212
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	383.6011	289.2919	228.9699	114.3142	42.1878	0.0000	0.0000	0.0000	0.0000	129.3756	267.8372	395.8436 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1851.4212
Space heating per m2										(98c) / (4) =		38.8464 (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	556.2901	437.9305	449.3802	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8975	0.9418	0.9191	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	499.2916	412.4316	413.0428	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	716.3695	685.9533	629.8745	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	156.2961	203.5002	161.3228	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	39.0740	50.8750	40.3307	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												130.2798 (107)
Energy for space heating												38.8464 (99)
Energy for space cooling												2.7335 (108)
Total												41.5800 (109)
Fabric Energy Efficiency (DFEE)												41.6 (109)

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

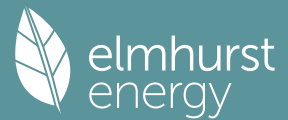
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	47.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	115.7295 (5)

2. Ventilation rate

m3 per hour

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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	Air changes per hour	0.1728 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)
Infiltration rate			0.4228	(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) =		0.3594	(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)
	0.4582	0.4492	0.4403	0.3953	0.3863	0.3414	0.3414	0.3324	0.3594	0.3863	0.4043	0.4223	(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	0.5781	0.5746	0.5583	0.5583	0.5553	0.5646	0.5746	0.5817	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			2.9900	0.1300	0.3887		(28a)
Main	76.8600	11.8600	65.0000	0.1800	11.7000		(29a)
PIJ	40.9400		40.9400	0.1100	4.5034		(30)
PIR	9.7400		9.7400	0.1100	1.0714		(30)
Total net area of external elements Aum(A, m2)			130.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.9318		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							220.4316 (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)							4.0200	0.1600		0.6432			
E7 Party floor between dwellings (in blocks of flats)							27.2500	0.0700		1.9075			
E16 Corner (normal)							17.7000	0.0900		1.5930			
E17 Corner (inverted - internal area greater than external area)							4.8000	-0.0900		-0.4320			
E18 Party wall between dwellings							5.7000	0.0600		0.3420			
P1 Party wall - Ground floor							4.0200	0.0800		0.3216			
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)							11.0500	0.0600		0.6630			
E13 Gable (insulation at rafter level)							6.9600	0.0800		0.5568			
P4 Party wall - Roof (insulation at ceiling level)							4.0500	0.1200		0.4860			
P5 Party wall - Roof (insulation at rafter level)							4.3600	0.0800		0.3488			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												9.5579	(36)
Point Thermal bridges												(36a) =	0.0000
Total fabric heat loss												(33) + (36) + (36a) =	40.4897 (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	23.1049	22.9492	22.7966	22.0798	21.9456	21.3213	21.3213	21.2057	21.5618	21.9456	22.2170	22.5006	(38)
Average = Sum(39)m / 12 =	63.5946	63.4389	63.2863	62.5695	62.4354	61.8110	61.8110	61.6954	62.0515	62.4354	62.7067	62.9903	(39)
												62.5688	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3343	1.3311	1.3279	1.3128	1.3100	1.2969	1.2969	1.2945	1.3020	1.3100	1.3157	1.3217	(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													1.6215 (42)
Hot water usage for mixer showers													0.0000 (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	
Hot water usage for other uses	22.2297	21.8996	21.4347	20.5774	19.9356	19.2238	18.8394	19.3011	19.8037	20.5653	21.4402	22.1546	(42b)
Average daily hot water use (litres/day)	31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357	(42c)
												49.0065	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	53.4654	51.9994	50.3986	48.4056	46.6279	44.7803	44.3959	45.9934	47.6319	49.5293	51.5400	53.3902	(44)
Energy content (annual)	84.6761	74.0464	77.4608	66.2648	62.7701	55.0626	53.6930	56.9494	58.7349	67.2108	73.4282	83.5962	(45)
Distribution loss (46)m = 0.15 x (45)m												813.8932	
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)

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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												
	71.9747	62.9395	65.8417	56.3251	53.3546	46.8032	45.6390	48.4070	49.9246	57.1292	62.4139	71.0568 (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	71.9747	62.9395	65.8417	56.3251	53.3546	46.8032	45.6390	48.4070	49.9246	57.1292	62.4139	71.0568 (64)
Total per year (kWh/year) = Sum(64)m =											691.8092 (64)	
												692 (64)
12Total per year (kWh/year)												
Electric shower(s)	41.1680	36.6811	40.0543	38.2233	38.9406	37.1455	38.3837	38.9406	38.2233	40.0543	39.3011	41.1680 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											468.2841 (64a)	
Heat gains from water heating, kWh/month												
	28.2857	24.9051	26.4740	23.6371	23.0738	20.9872	21.0057	21.8369	22.0370	24.2959	25.4288	28.0562 (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	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.5702	79.2384	71.5702	73.9558	71.5702	73.9558	71.5702	71.5702	73.9558	71.5702	73.9558	71.5702 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.1597	142.6245	138.9333	131.0751	121.1555	111.8325	105.6041	104.1393	107.8306	115.6888	125.6084	134.9314 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074 (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)	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596 (71)
Water heating gains (Table 5)	38.0184	37.0612	35.5833	32.8293	31.0132	29.1489	28.2334	29.3507	30.6069	32.6557	35.3177	37.7099 (72)
Total internal gains	298.0706	306.2464	293.4091	285.1825	271.0611	262.2595	252.7301	252.3825	259.7157	267.2370	282.2043	291.5338 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
North	1.0800		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	359.3460	422.6794	479.2241	550.8232	594.3885	592.8482	567.5865	523.8879	473.7324	403.6005	357.9279	342.3928 (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	45.8886	46.0013	46.1122	46.6405	46.7406	47.2127	47.2127	47.3012	47.0298	46.7406	46.5384	46.3289
alpha	4.0592	4.0668	4.0741	4.1094	4.1160	4.1475	4.1475	4.1534	4.1353	4.1160	4.1026	4.0886
util living area	0.9918	0.9836	0.9648	0.9082	0.7950	0.6199	0.4671	0.5214	0.7625	0.9414	0.9845	0.9933 (86)
MIT	19.3118	19.5501	19.9093	20.3829	20.7401	20.9323	20.9835	20.9743	20.8389	20.3524	19.7532	19.2775 (87)
Th 2	19.8140	19.8166	19.8191	19.8308	19.8330	19.8432	19.8432	19.8452	19.8393	19.8330	19.8285	19.8239 (88)
util rest of house	0.9894	0.9788	0.9542	0.8805	0.7366	0.5255	0.3501	0.4000	0.6772	0.9176	0.9791	0.9913 (89)
MIT 2	18.3041	18.5415	18.8952	19.3528	19.6649	19.8130	19.8391	19.8379	19.7542	19.3375	18.7535	18.2775 (90)
Living area fraction	18.7705	19.0083	19.3646	19.8296	20.1626	20.3311	20.3688	20.3639	20.2563	19.8073	19.2162	18.7404 (92)
Temperature adjustment	18.7705	19.0083	19.3646	19.8296	20.1626	20.3311	20.3688	20.3639	20.2563	19.8073	19.2162	18.7404 (93)
adjusted MIT	18.7705	19.0083	19.3646	19.8296	20.1626	20.3311	20.3688	20.3639	20.2563	19.8073	19.2162	18.7404 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9865	0.9745	0.9491	0.8805	0.7545	0.5670	0.4043	0.4561	0.7105	0.9169	0.9754	0.9887 (94)
Useful gains	354.4878	411.8846	454.8121	484.9733	448.4792	336.1187	229.4989	238.9354	336.5904	370.0706	349.1066	338.5293 (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	920.2473	895.0181	814.1529	683.8605	528.3630	354.2437	232.9515	244.5550	382.0069	574.8585	759.7673	915.9026 (97)
Space heating kWh	420.9251	324.6657	267.3496	143.1988	59.4336	0.0000	0.0000	0.0000	0.0000	152.3622	295.6757	429.5657 (98a)
Space heating requirement - total per year (kWh/year)												2093.1763
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	420.9251	324.6657	267.3496	143.1988	59.4336	0.0000	0.0000	0.0000	0.0000	152.3622	295.6757	429.5657 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2093.1763
Space heating per m2												43.9189 (99)

8c. Space cooling requirement

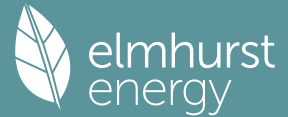
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	581.0239	457.4018	468.8853	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8572	0.9137	0.8859	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	498.0804	417.9106	415.4065	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	667.5077	639.4122	589.7019	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	121.9877	164.7972	129.6758	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									FC = cooled area / (4) =			1.0000 (105)
Space cooling kWh	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 requirement	0.0000	0.0000	0.0000	0.0000	0.0000	30.4969	41.1993	32.4189	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												104.1152 (107)
Energy for space cooling												43.9189 (99)
Total												2.1845 (108)
Fabric Energy Efficiency (TFEE)												46.1035 (109)
												46.1 (109)

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Plot Reference	79596-02				Issued on Date	18/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	18 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.33		TER	15.12
Environmental	95 A		% DER < TER				51.52
CO ₂ Emissions (t/year)	0.31		DFEE	41.58		TFEE	46.10
Compliance Check	See BREL		% DFEE < TFEE				9.81
% DPER < TPER	5.26		DPER	75.46		TPER	79.65
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	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.7295 (5)

2. Ventilation rate

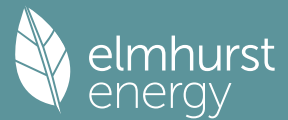
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.1500 (17)
Infiltration rate	0.1075 (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) = 0.0914 (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	0.1165	0.1142	0.1119	0.1005	0.0982	0.0868	0.0868	0.0845	0.0914	0.0982	0.1028	0.1074 (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			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	76.8600	11.8600	65.0000	0.1900	12.3500	110.0000	7150.0001 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.7400		9.7400	0.1300	1.2662	9.0000	87.6600 (30)
Total net area of external elements A _{um} (A, m ²)			130.5300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.7114		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			44.6700			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10505.7701 (34)

Full SAP Calculation Printout



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

220.4316 (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	4.0200	0.0930	0.3739
E5 Ground floor (normal)	27.2500	0.0370	1.0082
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
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)	11.0500	0.0970	1.0719
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	4.0500	0.1010	0.4091
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges

7.3946 (36)

Total fabric heat loss

(33) + (36) + (36a) = 39.1060 (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	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954 (38)
Heat transfer coeff	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014 (39)
Average = Sum(39)m / 12 =												58.2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212 (40)
HLP (average)												1.2212
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy

1.6215 (42)

Hot water usage for mixer showers

74.2134 73.0981 71.4729 68.3634 66.0687 63.5096 62.0551 63.6680 65.4360 68.1836 71.3599 73.9291 (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

31.2357 30.0998 28.9640 27.8281 26.6923 25.5565 25.5565 26.6923 27.8281 28.9640 30.0998 31.2357 (42c)

Average daily hot water use (litres/day)

96.8183 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	105.4491	103.1980	100.4369	96.1916	92.7610	89.0661	87.6115	90.3602	93.2641	97.1476	101.4598	105.1647 (44)
Energy conte	167.0056	146.9525	154.3678	131.6815	124.8741	109.5172	105.9585	111.8849	115.0040	131.8284	144.5480	164.6626 (45)
Energy content (annual)												Total = Sum(45)m = 1608.2850

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

25.0508 22.0429 23.1552 19.7522 18.7311 16.4276 15.8938 16.7827 17.2506 19.7743 21.6822 24.6994 (46)

Water storage loss (or HIU loss):

Store volume 201.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b 1.6100 (48)

Enter (49) or (54) in (55)

0.5400 (49)

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

193.9570 171.2957 181.3192 157.7635 151.8255 135.5992 132.9099 138.8363 141.0860 158.7798 170.6300 191.6140 (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 193.9570 171.2957 181.3192 157.7635 151.8255 135.5992 132.9099 138.8363 141.0860 158.7798 170.6300 191.6140 (64)

Total per year (kWh/year) = Sum(64)m = 1925.6160 (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)

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

Heat gains from water heating, kWh/month 55.5293 48.8617 51.3273 43.7841 41.5207 36.4145 35.2312 37.2017 38.2388 43.8329 48.0622 54.7503 (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	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

71.5702 79.2384 71.5702 73.9558 71.5702 73.9558 71.5702 71.5702 73.9558 71.5702 73.9558 71.5702 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

141.1597 142.6245 138.9333 131.0751 121.1555 111.8325 105.6041 104.1393 107.8306 115.6888 125.6084 134.9314 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

31.1074 31.1074 31.1074 31.1074 31.1074 31.1074 31.1074 31.1074 31.1074 31.1074 31.1074 31.1074 (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)

-64.8596 -64.8596 -64.8596 -64.8596 -64.8596 -64.8596 -64.8596 -64.8596 -64.8596 -64.8596 -64.8596 -64.8596 (71)

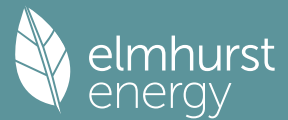
Water heating gains (Table 5)

74.6362 72.7109 68.9883 60.8112 55.8073 50.5756 47.3538 50.0023 53.1095 58.9152 66.7531 73.5891 (72)

Total internal gains 334.6884 341.8961 326.8141 313.1645 295.8553 283.6863 271.8504 273.0341 282.2182 293.4965 313.6396 327.4130 (73)

6. Solar gains

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[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	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	403.8799	473.2693	536.2917	612.4649	660.0809	656.0789	626.5254	578.9094	523.4232	447.3031	399.1257	384.8562 (84)
7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409
alpha	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427
util living area												
	0.9870	0.9738	0.9442	0.8648	0.7246	0.5457	0.4037	0.4536	0.6926	0.9124	0.9759	0.9894 (86)
MIT	19.5975	19.8352	20.1742	20.5730	20.8460	20.9646	20.9923	20.9874	20.9044	20.5177	19.9738	19.5396 (87)
Th 2	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031 (88)
util rest of house												
	0.9833	0.9667	0.9290	0.8305	0.6637	0.4608	0.3056	0.3497	0.6075	0.8814	0.9680	0.9863 (89)
MIT 2	18.2992	18.5983	19.0184	19.4895	19.7797	19.8833	19.9006	19.8986	19.8410	19.4410	18.7768	18.2258 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.9001	19.1708	19.5534	19.9910	20.2732	20.3838	20.4059	20.4026	20.3332	19.9394	19.3309	18.8339 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.9001	19.1708	19.5534	19.9910	20.2732	20.3838	20.4059	20.4026	20.3332	19.9394	19.3309	18.8339 (93)
8. Space heating requirement												
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9789	0.9607	0.9233	0.8335	0.6854	0.4989	0.3510	0.3978	0.6427	0.8826	0.9627	0.9823 (94)
Useful gains	395.3381	454.6474	495.1329	510.5158	452.3983	327.3249	219.9375	230.2634	336.4016	394.7896	384.2376	378.0603 (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	849.7470	830.5808	759.7241	645.5133	498.9734	336.6252	221.5104	232.9563	362.7829	543.5654	711.8539	851.7132 (97)
Space heating kWh	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (98a)
Space heating requirement - total per year (kWh/year)	1618.3840											
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	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1618.3840											
Space heating per m2	(98c) / (4) = 33.9569 (99)											
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												
Fraction of space heat from main system(s)												
Fraction of main heating from main system 2												
Fraction of total heating from main system 1												
Fraction of total heating from main system 2												
Efficiency of main space heating system 1 (in %)												
Efficiency of main space heating system 2 (in %)												
Efficiency of secondary/supplementary heating system, %												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (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)	338.0802	252.6272	196.8558	97.1982	34.6518	0.0000	0.0000	0.0000	0.0000	110.6892	235.8837	352.3978 (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	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140 (64)
Water heating requirement	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)
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 (217)
Fuel for water heating, kWh/month	55.5098	49.0243	51.8930	45.1514	43.4520	38.8080	38.0384	39.7345	40.3783	45.4423	48.8338	54.8393 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	2.0043	1.8103	2.0043	1.9396	2.0043	1.9396	2.0043	2.0043	1.9396	2.0043	1.9396	2.0043 (231)
Pumps and Fa	13.7322	11.0165	9.9191	7.2672	5.6134	4.5862	5.1207	6.6561	8.6456	11.3435	12.8125	14.1139 (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)

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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													1618.3840	(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													551.1050	(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)													23.5989	(230a)
Total electricity for the above, kWh/year													23.5989	(231)
Electricity for lighting (calculated in Appendix L)													110.8268	(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													2303.9147	(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	1618.3840	0.1559	252.2328	(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)	551.1050	0.1411	77.7724	(264)
Space and water heating			330.0052	(265)
Pumps, fans and electric keep-hot	23.5989	0.1387	3.2735	(267)
Energy for lighting	110.8268	0.1443	15.9957	(268)
Total CO2, kg/year			349.2744	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.3300	(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	1618.3840	1.5770	2552.1795	(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)	551.1050	1.5218	838.6852	(278)
Space and water heating			3390.8647	(279)
Pumps, fans and electric keep-hot	23.5989	1.5128	35.7004	(281)
Energy for lighting	110.8268	1.5338	169.9898	(282)
Total Primary energy kWh/year			3596.5550	(286)
Dwelling Primary energy Rate (DPER)			75.4600	(287)

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

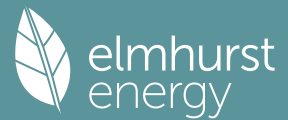
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215	(1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.7295	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1728 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4228 (18)
Number of sides sheltered		2 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3594 (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													
Effective ac	0.4582	0.4492	0.4403	0.3953	0.3863	0.3414	0.3414	0.3324	0.3594	0.3863	0.4043	0.4223	(22b)
	0.6050	0.6009	0.5969	0.5781	0.5746	0.5583	0.5583	0.5553	0.5646	0.5746	0.5817	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			2.9900	0.1300	0.3887			(28a)
Main	76.8600	11.8600	65.0000	0.1800	11.7000			(29a)
PIJ	40.9400		40.9400	0.1100	4.5034			(30)
PIR	9.7400		9.7400	0.1100	1.0714			(30)
Total net area of external elements Aum(A, m2)			130.5300					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	30.9318		(33)
Main dwelling								
Party Wall 1			21.1800	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							220.4316	(35)

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

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)	4.0200	0.1600	0.6432	
E7 Party floor between dwellings (in blocks of flats)	27.2500	0.0700	1.9075	
E16 Corner (normal)	17.7000	0.0900	1.5930	
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0900	-0.4320	
E18 Party wall between dwellings	5.7000	0.0600	0.3420	
P1 Party wall - Ground floor	4.0200	0.0800	0.3216	
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)	11.0500	0.0600	0.6630	
E13 Gable (insulation at rafter level)	6.9600	0.0800	0.5568	
P4 Party wall - Roof (insulation at ceiling level)	4.0500	0.1200	0.4860	
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0800	0.3488	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.5579	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	40.4897 (37)

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

Point Thermal bridges

Total fabric heat loss

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

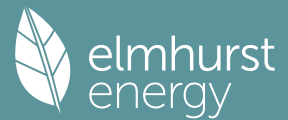
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.1049	22.9492	22.7966	22.0798	21.9456	21.3213	21.3213	21.2057	21.5618	21.9456	22.2170	22.5006	(38)
Heat transfer coeff	63.5946	63.4389	63.2863	62.5695	62.4354	61.8110	61.8110	61.6954	62.0515	62.4354	62.7067	62.9903	(39)
Average = Sum(39)m / 12 =												62.5688	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3343	1.3311	1.3279	1.3128	1.3100	1.2969	1.2969	1.2945	1.3020	1.3100	1.3157	1.3217	(40)
HLP (average)												1.3128	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6215 (42)
Hot water usage for mixer showers	65.9675	64.9761	63.5315	60.7675	58.7277	56.4530	55.1601	56.5937	58.1653	60.6077	63.4310	65.7147	(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	31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357	(42c)
Average daily hot water use (litres/day)												89.2159	(43)
Daily hot water use	97.2031	95.0759	92.4955	88.5956	85.4200	82.0095	80.7165	83.2860	85.9935	89.5717	93.5309	96.9504	(44)
Energy conte	153.9460	135.3869	142.1621	121.2830	114.9918	100.8402	97.6196	103.1255	106.0385	121.5479	133.2519	151.8009	(45)
Energy content (annual)										Total = Sum(45)m =		1481.9943	
Distribution loss (46)m = 0.15 x (45)m	23.0919	20.3080	21.3243	18.1925	17.2488	15.1260	14.6429	15.4688	15.9058	18.2322	19.9878	22.7701	(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	200.5409	177.4726	188.7570	166.3748	161.5867	145.9321	144.2145	149.7204	151.1304	168.1428	178.3437	198.3958	(62)
WWHRS	-30.1576	-26.6716	-27.9290	-23.1263	-21.5529	-18.4429	-17.2873	-18.3833	-19.0818	-22.4953	-25.4845	-29.5991	(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	170.3833	150.8010	160.8280	143.2486	140.0338	127.4891	126.9272	131.3371	132.0486	145.6475	152.8593	168.7967	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1750.4001	(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													

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88.4630 78.6847 84.5448 76.4001 75.5107 69.6028 69.7344 71.5652 71.3313 77.6906 80.3797 87.7497 (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	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	81.0744	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.5702	79.2384	71.5702	73.9558	71.5702	73.9558	71.5702	71.5702	73.9558	71.5702	73.9558	71.5702	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.1597	142.6245	138.9333	131.0751	121.1555	111.8325	105.6041	104.1393	107.8306	115.6888	125.6084	134.9314	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	31.1074	(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)	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	(71)
Water heating gains (Table 5)	118.9018	117.0903	113.6355	106.1112	101.4929	96.6706	93.7291	96.1897	99.0712	104.4228	111.6385	117.9432	(72)
Total internal gains	381.9540	389.2756	374.4613	361.4644	344.5408	329.7813	318.2257	319.2215	328.1800	342.0041	361.5250	374.7670	(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 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	443.2295	505.7086	560.2763	627.1050	667.8682	660.3700	633.0822	590.7269	542.1967	478.3676	437.2487	425.6260 (84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil _m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	45.8886	46.0013	46.1122	46.6405	46.7406	47.2127	47.2127	47.3012	47.0298	46.7406	46.5384	46.3289	
alpha	4.0592	4.0668	4.0741	4.1094	4.1160	4.1475	4.1475	4.1534	4.1353	4.1160	4.1026	4.0886	
util living area	0.9830	0.9702	0.9432	0.8719	0.7446	0.5682	0.4221	0.4683	0.7006	0.9053	0.9697	0.9854	(86)
MIT	19.5015	19.7294	20.0676	20.4947	20.7996	20.9508	20.9886	20.9827	20.8838	20.4801	19.9251	19.4678	(87)
Th 2	19.8140	19.8166	19.8191	19.8308	19.8330	19.8432	19.8432	19.8452	19.8393	19.8330	19.8285	19.8239	(88)
util rest of house	0.9782	0.9620	0.9274	0.8375	0.6821	0.4774	0.3148	0.3565	0.6120	0.8716	0.9599	0.9813	(89)
MIT 2	18.1162	18.4040	18.8251	19.3415	19.6718	19.8159	19.8396	19.8391	19.7642	19.3409	18.6624	18.0804	(90)
Living area fraction	18.7574	19.0175	19.4002	19.8752	20.1938	20.3412	20.3715	20.3684	20.2824	19.8682	19.2469	18.7226	(91)
MIT	18.7574	19.0175	19.4002	19.8752	20.1938	20.3412	20.3715	20.3684	20.2824	19.8682	19.2469	18.7226	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7574	19.0175	19.4002	19.8752	20.1938	20.3412	20.3715	20.3684	20.2824	19.8682	19.2469	18.7226	(93)

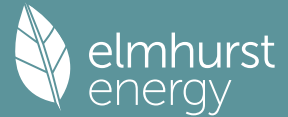
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9725	0.9549	0.9206	0.8390	0.7027	0.5177	0.3645	0.4081	0.6480	0.8728	0.9536	0.9761	(94)
Useful gains	431.0518	482.9054	515.7730	526.1321	469.2857	341.8459	230.7674	241.0975	351.3315	417.5079	416.9473	415.4518	(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	919.4101	895.5978	816.4076	686.7153	530.3136	354.8706	233.1178	244.8329	383.6290	578.6645	761.6898	914.7837	(97)
Space heating kWh	363.3385	277.3293	223.6721	115.6199	45.4047	0.0000	0.0000	0.0000	0.0000	119.9005	248.2146	371.5029	(98a)
Space heating requirement - total per year (kWh/year)												1764.9826	
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	363.3385	277.3293	223.6721	115.6199	45.4047	0.0000	0.0000	0.0000	0.0000	119.9005	248.2146	371.5029	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1764.9826	
Space heating per m ²										(98c) / (4) =		37.0328	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	363.3385	277.3293	223.6721	115.6199	45.4047	0.0000	0.0000	0.0000	0.0000	119.9005	248.2146	371.5029	(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)	393.6495	300.4651	242.3317	125.2653	49.1926	0.0000	0.0000	0.0000	0.0000	129.9030	268.9215	402.4950	(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)													

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	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	170.3833	150.8010	160.8280	143.2486	140.0338	127.4891	126.9272	131.3371	132.0486	145.6475	152.8593	168.7967	(64)
Efficiency of water heater	85.7139	85.4072	84.7996	83.5836	81.8307	79.8000	79.8000	79.8000	79.8000	83.6270	85.1403	85.7777	(216)
(217)m	85.7139	85.4072	84.7996	83.5836	81.8307	79.8000	79.8000	79.8000	79.8000	83.6270	85.1403	85.7777	(217)
Fuel for water heating, kWh/month	198.7814	176.5671	189.6565	171.3836	171.1262	159.7608	159.0567	164.5828	165.4744	174.1633	179.5380	196.7840	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	14.8709	11.9300	10.7416	7.8698	6.0788	4.9665	5.5453	7.2080	9.3625	12.2841	13.8749	15.2842	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-22.7676	-32.3466	-46.8767	-53.1936	-57.8288	-54.2079	-53.5930	-50.3894	-44.7675	-37.2595	-25.1390	-19.6594	(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	-12.1242	-25.5852	-50.9786	-76.7283	-101.5783	-102.0533	-100.7989	-85.2457	-62.3862	-36.5819	-16.1907	-9.5772	(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												1912.2238	(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												2106.8748	(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)												120.0164	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1177.8574	(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												3047.2576	(238)

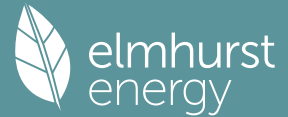
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1912.2238	0.2100	401.5670 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2106.8748	0.2100	442.4437 (264)
Space and water heating			844.0107 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	120.0164	0.1443	17.3221 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-498.0288	0.1344	-66.9256
PV Unit electricity exported	-679.8286	0.1258	-85.5545
Total			-152.4801 (269)
Total CO2, kg/year			720.7819 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.1200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1912.2238	1.1300	2160.8129 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2106.8748	1.1300	2380.7685 (278)
Space and water heating			4541.5814 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	120.0164	1.5338	184.0852 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-498.0288	1.4966	-745.3684
PV Unit electricity exported	-679.8286	0.4619	-314.0434
Total			-1059.4118 (283)
Total Primary energy kWh/year			3796.3556 (286)
Target Primary Energy Rate (TPER)			79.6500 (287)

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Plot Reference	79596-02				Issued on Date	18/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	18 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.33		TER	15.12
Environmental	95 A		% DER < TER				51.52
CO ₂ Emissions (t/year)	0.31		DFEE	41.58		TFEE	46.10
Compliance Check	See BREL		% DFEE < TFEE				9.81
% DPER < TPER	5.26		DPER	75.46		TPER	79.65
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	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.7295 (5)

2. Ventilation rate

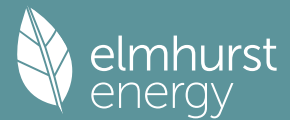
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.1500 (17)
Infiltration rate	0.1075 (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) = 0.0914 (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	0.1165	0.1142	0.1119	0.1005	0.0982	0.0868	0.0868	0.0845	0.0914	0.0982	0.1028	0.1074 (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			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	76.8600	11.8600	65.0000	0.1900	12.3500	110.0000	7150.0001 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.7400		9.7400	0.1300	1.2662	9.0000	87.6600 (30)
Total net area of external elements Aum(A, m ²)			130.5300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.7114		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			44.6700			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10505.7701 (34)

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

220.4316 (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	4.0200	0.0930	0.3739
E5 Ground floor (normal)	27.2500	0.0370	1.0082
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
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)	11.0500	0.0970	1.0719
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	4.0500	0.1010	0.4091
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.3946 (36)
Total fabric heat loss	(33) + (36) + (36a) =	39.1060 (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	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	(38)
Heat transfer coeff	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	(39)
Average = Sum(39)m / 12 =												58.2014	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	(40)
HLP (average)												1.2212	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6215 (42)
Hot water usage for mixer showers													
74.2134	73.0981	71.4729	68.3634	66.0687	63.5096	62.0551	63.6680	65.4360	68.1836	71.3599	73.9291	73.9291	(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													
31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357	31.2357	(42c)
Average daily hot water use (litres/day)												96.8183	(43)
Daily hot water use													
105.4491	103.1980	100.4369	96.1916	92.7610	89.0661	87.6115	90.3602	93.2641	97.1476	101.4598	105.1647	105.1647	(44)
Energy conte	167.0056	146.9525	154.3678	131.6815	124.8741	109.5172	105.9585	111.8849	115.0040	131.8284	144.5480	164.6626	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.0508	22.0429	23.1552	19.7522	18.7311	16.4276	15.8938	16.7827	17.2506	19.7743	21.6822	24.6994	24.6994	(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													
193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	191.6140	(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													
193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	191.6140	(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													
55.5293	48.8617	51.3273	43.7841	41.5207	36.4145	35.2312	37.2017	38.2388	43.8329	48.0622	54.7503	54.7503	(65)

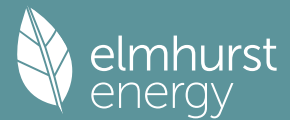
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
15.6887	13.9345	11.3323	8.5793	6.4131	5.4142	5.8503	7.6044	10.2066	12.9596	15.1258	16.1247	16.1247	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
210.6861	212.8724	207.3631	195.6344	180.8291	166.9141	157.6181	155.4318	160.9411	172.6698	187.4752	201.3901	201.3901	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	(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)													
-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	(71)
Water heating gains (Table 5)													
74.6362	72.7109	68.9883	60.8112	55.8073	50.5756	47.3538	50.0023	53.1095	58.9152	66.7531	73.5891	73.5891	(72)
Total internal gains													
379.7912	378.2980	366.4639	343.8051	321.8297	301.6842	289.6024	291.8188	303.0374	323.3249	348.1343	369.8841	369.8841	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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			m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		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	448.9827	509.6713	575.9415	643.1056	686.0553	674.0769	644.2773	597.6940	544.2424	477.1315	433.6204	427.3273	(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	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	
alpha	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	
util living area	0.9809	0.9663	0.9306	0.8478	0.7061	0.5330	0.3931	0.4403	0.6735	0.8953	0.9679	0.9843	(86)	
MIT	19.6997	19.9125	20.2466	20.6110	20.8610	20.9676	20.9931	20.9888	20.9143	20.5643	20.0477	19.6371	(87)	
Th 2	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	(88)	
util rest of house	0.9757	0.9574	0.9127	0.8111	0.6447	0.4494	0.2973	0.3390	0.5884	0.8604	0.9578	0.9800	(89)	
MIT 2	18.4276	18.6939	19.1044	19.5303	19.7928	19.8852	19.9009	19.8991	19.8481	19.4920	18.8678	18.3489	(90)	
Living area fraction	fLA = Living area / (4) =													
MIT	19.0164	19.2580	19.6331	20.0305	20.2872	20.3862	20.4064	20.4035	20.3416	19.9883	19.4139	18.9451	(92)	
Temperature adjustment	0.0000													
adjusted MIT	19.0164	19.2580	19.6331	20.0305	20.2872	20.3862	20.4064	20.4035	20.3416	19.9883	19.4139	18.9451	(93)	
8. Space heating requirement														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9703	0.9509	0.9075	0.8158	0.6672	0.4870	0.3417	0.3858	0.6241	0.8635	0.9522	0.9751	(94)	
Useful gains	435.6323	484.6669	522.6649	524.6327	457.7676	328.2799	220.1245	230.6156	339.6745	411.9843	412.8857	416.6849	(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	856.5167	835.6530	764.3646	647.8107	499.7890	336.7641	221.5387	233.0090	363.2721	546.4140	716.6891	858.1883	(97)	
Space heating kWh	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785	(98a)	
Space heating requirement - total per year (kWh/year)													1496.0100	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)													0.0000	
Space heating kWh	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													1496.0100	
Space heating per m2	(98c) / (4) =												31.3892 (99)	
9a. Energy requirements - Individual heating systems, including micro-CHP														
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)	
Fraction of space heat from main system(s)													1.0000 (202)	
Fraction of main heating from main system 2													0.0000 (203)	
Fraction of total heating from main system 1													1.0000 (204)	
Fraction of total heating from main system 2													0.0000 (205)	
Efficiency of main space heating system 1 (in %)													100.0000 (206)	
Efficiency of main space heating system 2 (in %)													0.0000 (207)	
Efficiency of secondary/supplementary heating system, %													0.0000 (208)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785	(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	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	(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	55.5098	49.0243	51.8930	45.1514	43.4520	38.8080	38.0384	39.7345	40.3783	45.4423	48.8338	54.8393	(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	2.0043	1.8103	2.0043	1.9396	2.0043	1.9396	2.0043	2.0043	1.9396	2.0043	1.9396	2.0043	(231)	
Lighting	13.7322	11.0165	9.9191	7.2672	5.6134	4.5862	5.1207	6.6561	8.6456	11.3435	12.8125	14.1139	(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)														

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(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												1496.0100	(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												551.1050	(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)												23.5989	(230a)
Total electricity for the above, kWh/year												23.5989	(231)
Electricity for lighting (calculated in Appendix L)												110.8268	(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												2181.5407	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1496.0100	16.4900	246.6920	(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)	551.1050	16.4900	90.8772	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	23.5989	16.4900	3.8915	(249)
Energy for lighting	110.8268	16.4900	18.2753	(250)
Additional standing charges			0.0000	(251)
Total energy cost			359.7361	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.3976	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	77.3443	
SAP rating (Section 12)		77	(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	1496.0100	0.1559	233.2756	(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)	551.1050	0.1411	77.7724	(264)
Space and water heating			311.0480	(265)
Pumps, fans and electric keep-hot	23.5989	0.1387	3.2735	(267)
Energy for lighting	110.8268	0.1443	15.9957	(268)
Total CO2, kg/year			330.3172	(272)
CO2 emissions per m2			6.9300	(273)
EI value			95.2231	
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

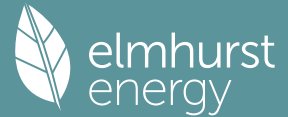
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215	(1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.7295 (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)

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Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
Number of blocked chimneys 0 * 20 = 0.0000 (6f)
Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.1500 (17)
Infiltration rate 0.1075 (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) = 0.0914 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.0982	0.0959	0.0959	0.0891	0.0914	0.0777	0.0754	0.0754	0.0777	0.0868	0.0868	0.0891	(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			2.9900	0.1100	0.3289	75.0000	224.2500	(28a)
Main	76.8600	11.8600	65.0000	0.1900	12.3500	110.0000	7150.0001	(29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600	(30)
PIR	9.7400		9.7400	0.1300	1.2662	9.0000	87.6600	(30)
Total net area of external elements Aum(A, m2)			130.5300					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.7114		(33)
Main dwelling								
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000	(32)
Party Floor 1			44.6700			0.0000	0.0000	(32a)
Timber			38.4000			9.0000	345.6000	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 10505.7701 (34)
List of Thermal Bridges 220.4316 (35)

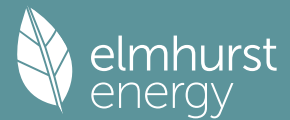
	Length	Psi-value	Total	
K1 Element	8.0700	0.0200	0.1614	
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421	
E3 Sill	22.2000	0.0260	0.5772	
E4 Jamb	4.0200	0.0930	0.3739	
E5 Ground floor (normal)	27.2500	0.0370	1.0082	
E6 Corner (normal)	17.7000	0.0510	0.9027	
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368	
E18 Party wall between dwellings	5.7000	0.0650	0.3705	
P1 Party wall - Ground floor	4.0200	0.1080	0.4342	
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)	11.0500	0.0970	1.0719	
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246	
P4 Party wall - Roof (insulation at ceiling level)	4.0500	0.1010	0.4091	
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.3946	(36)
Point Thermal bridges			0.0000	(36a)
Total fabric heat loss			39.1060	(33) + (36) + (36a) = (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 19.0954 Feb 19.0954 Mar 19.0954 Apr 19.0954 May 19.0954 Jun 19.0954 Jul 19.0954 Aug 19.0954 Sep 19.0954 Oct 19.0954 Nov 19.0954 Dec 19.0954 (38)
Heat transfer coeff 58.2014 58.2014 58.2014 58.2014 58.2014 58.2014 58.2014 58.2014 58.2014 58.2014 58.2014 58.2014 (39)
Average = Sum(39)m / 12 = 58.2014
HLP Jan 1.2212 Feb 1.2212 Mar 1.2212 Apr 1.2212 May 1.2212 Jun 1.2212 Jul 1.2212 Aug 1.2212 Sep 1.2212 Oct 1.2212 Nov 1.2212 Dec 1.2212 (40)
HLP (average) 1.2212
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6215 (42)
Hot water usage for mixer showers													
74.2134	73.0981	71.4729	68.3634	66.0687	63.5096	62.0551	63.6680	65.4360	68.1836	71.3599	73.9291		(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													
31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357		(42c)
Average daily hot water use (litres/day)													96.8183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
105.4491	103.1980	100.4369	96.1916	92.7610	89.0661	87.6115	90.3602	93.2641	97.1476	101.4598	105.1647		(44)
Energy conte	167.0056	146.9525	154.3678	131.6815	124.8741	109.5172	105.9585	111.8849	115.0040	131.8284	144.5480	164.6626	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.0508	22.0429	23.1552	19.7522	18.7311	16.4276	15.8938	16.7827	17.2506	19.7743	21.6822	24.6994	(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)

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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	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	(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	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	(64)
													(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)
													(64a)
Heat gains from water heating, kWh/month	55.5293	48.8617	51.3273	43.7841	41.5207	36.4145	35.2312	37.2017	38.2388	43.8329	48.0622	54.7503	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6887	13.9345	11.3323	8.5793	6.4131	5.4142	5.8503	7.6044	10.2066	12.9596	15.1258	16.1247	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.6861	212.8724	207.3631	195.6344	180.8291	166.9141	157.6181	155.4318	160.9411	172.6698	187.4752	201.3901	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	(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)	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	(71)
Water heating gains (Table 5)	74.6362	72.7109	68.9883	60.8112	55.8073	50.5756	47.3538	50.0023	53.1095	58.9152	66.7531	73.5891	(72)
Total internal gains	379.7912	378.2980	366.4639	343.8051	321.8297	301.6842	289.6024	291.8188	303.0374	323.3249	348.1343	369.8841	(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	440.9267	497.3783	564.8551	632.9406	665.0260	659.0404	623.4919	576.1007	537.7639	469.9914	425.7590		421.7939 (84)

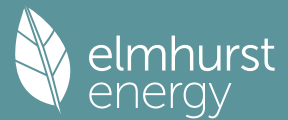
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	
alpha	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	
util living area	0.9787	0.9632	0.9225	0.8246	0.6599	0.4667	0.3522	0.3994	0.6424	0.8822	0.9641	0.9822	(86)
MIT	19.7919	19.9936	20.3241	20.6822	20.9060	20.9835	20.9961	20.9933	20.9339	20.6190	20.1248	19.7355	(87)
Th 2	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	(88)
util rest of house	0.9726	0.9530	0.9017	0.7817	0.5892	0.3765	0.2518	0.2923	0.5508	0.8419	0.9523	0.9771	(89)
MIT 2	18.5448	18.7962	19.1995	19.6105	19.8355	19.8958	19.9022	19.9013	19.8641	19.5552	18.9647	18.4741	(90)
Living area fraction	19.1220	19.3504	19.7200	20.1065	20.3310	20.3993	20.4085	20.4067	20.3592	20.0476	19.5017	19.0579	(91)
MIT	19.1220	19.3504	19.7200	20.1065	20.3310	20.3993	20.4085	20.4067	20.3592	20.0476	19.5017	19.0579	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1220	19.3504	19.7200	20.1065	20.3310	20.3993	20.4085	20.4067	20.3592	20.0476	19.5017	19.0579	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	426.3987	470.8727	507.0853	500.2639	410.9164	275.4138	186.0422	197.0066	317.5769	398.5349	403.1725	409.9492	(94)
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	(95)
Heat loss rate W	816.1025	794.4743	722.8620	599.8541	438.3131	279.3233	186.7397	198.2768	335.1951	514.9423	681.0537	818.1905	(97)
Space heating kWh	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316	(98a)
Space heating requirement - total per year (kWh/year)												1350.4390	
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	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1350.4390	
Space heating per m ²												28.3349	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316	(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)	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	(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	55.5098	49.0243	51.8930	45.1514	43.4520	38.8080	38.0384	39.7345	40.3783	45.4423	48.8338	54.8393	(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	2.0043	1.8103	2.0043	1.9396	2.0043	1.9396	2.0043	2.0043	1.9396	2.0043	1.9396	2.0043	(231)
Lighting	13.7322	11.0165	9.9191	7.2672	5.6134	4.5862	5.1207	6.6561	8.6456	11.3435	12.8125	14.1139	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1350.4390	(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												551.1050	(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)												23.5989	(230a)
Total electricity for the above, kWh/year												23.5989	(231)
Electricity for lighting (calculated in Appendix L)												110.8268	(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												2035.9697	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1350.4390	28.4300	383.9298 (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)	551.1050	28.4300	156.6792 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	23.5989	28.4300	6.7092 (249)
Energy for lighting	110.8268	28.4300	31.5081 (250)
Additional standing charges			0.0000 (251)
Total energy cost			578.8262 (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	1350.4390	0.1563	211.0585 (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)	551.1050	0.1411	77.7724 (264)
Space and water heating			288.8310 (265)
Pumps, fans and electric keep-hot	23.5989	0.1387	3.2735 (267)
Energy for lighting	110.8268	0.1443	15.9957 (268)
Total CO2, kg/year			308.1001 (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	1350.4390	1.5786	2131.7978 (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)	551.1050	1.5218	838.6852 (278)
Space and water heating			2970.4830 (279)
Pumps, fans and electric keep-hot	23.5989	1.5128	35.7004 (281)
Energy for lighting	110.8268	1.5338	169.9898 (282)
Total Primary energy kWh/year			3176.1733 (286)

SAP 10 EPC IMPROVEMENTS

001

Current energy efficiency rating: C 77
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 77
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	£579	£579	£0
Space heating	£391	£391	£0
Water heating	£157	£157	£0
Lighting	£32	£32	£0
Total cost of fuels	£579	£579	£0
Total cost of uses	£580	£580	£0
Delivered energy	43 kWh/m²	43 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	67 kWh/m²	67 kWh/m²	0 kWh/m²

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

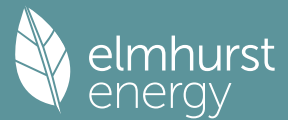
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.7295 (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

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Pressure Test Method													Blower Door
Measured/design AP50													2.1500 (17)
Infiltration rate													0.1075 (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) = 0.0914 (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)
	0.1165	0.1142	0.1119	0.1005	0.0982	0.0868	0.0868	0.0845	0.0914	0.0982	0.1028	0.1074	(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			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	76.8600	11.8600	65.0000	0.1900	12.3500	110.0000	7150.0001 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.7400		9.7400	0.1300	1.2662	9.0000	87.6600 (30)
Total net area of external elements Aum(A, m2)			130.5300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 31.7114		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			44.6700			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 10505.7701 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							220.4316 (35)
List of Thermal Bridges							
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)				4.0200	0.0930	0.3739	
E7 Party floor between dwellings (in blocks of flats)				27.2500	0.0370	1.0082	
E16 Corner (normal)				17.7000	0.0510	0.9027	
E17 Corner (inverted - internal area greater than external area)				4.8000	-0.0910	-0.4368	
E18 Party wall between dwellings				5.7000	0.0650	0.3705	
P1 Party wall - Ground floor				4.0200	0.1080	0.4342	
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)				11.0500	0.0970	1.0719	
E13 Gable (insulation at rafter level)				6.9600	0.0610	0.4246	
P4 Party wall - Roof (insulation at ceiling level)				4.0500	0.1010	0.4091	
P5 Party wall - Roof (insulation at rafter level)				4.3600	0.0460	0.2006	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.3946 (36)
Point Thermal Bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 39.1060 (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	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	19.0954	(38)
Average = Sum(39)m / 12 =	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	58.2014	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	(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													1.6215 (42)
Hot water usage for mixer showers													
	74.2134	73.0981	71.4729	68.3634	66.0687	63.5096	62.0551	63.6680	65.4360	68.1836	71.3599	73.9291	(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													
	31.2357	30.0998	28.9640	27.8281	26.6923	25.5565	25.5565	26.6923	27.8281	28.9640	30.0998	31.2357	(42c)
Average daily hot water use (litres/day)													96.8183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	105.4491	103.1980	100.4369	96.1916	92.7610	89.0661	87.6115	90.3602	93.2641	97.1476	101.4598	105.1647	(44)
Energy conte	167.0056	146.9525	154.3678	131.6815	124.8741	109.5172	105.9585	111.8849	115.0040	131.8284	144.5480	164.6626	(45)
Energy content (annual)													Total = Sum(45)m = 1608.2850
Distribution loss (46)m = 0.15 x (45)m													
	25.0508	22.0429	23.1552	19.7522	18.7311	16.4276	15.8938	16.7827	17.2506	19.7743	21.6822	24.6994	(46)
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													

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WWHRS	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	55.5293	48.8617	51.3273	43.7841	41.5207	36.4145	35.2312	37.2017	38.2388	43.8329	48.0622	54.7503 (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	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893	97.2893 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6887	13.9345	11.3323	8.5793	6.4131	5.4142	5.8503	7.6044	10.2066	12.9596	15.1258	16.1247 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.6861	212.8724	207.3631	195.6344	180.8291	166.9141	157.6181	155.4318	160.9411	172.6698	187.4752	201.3901 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504	46.3504 (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)	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596	-64.8596 (71)
Water heating gains (Table 5)	74.6362	72.7109	68.9883	60.8112	55.8073	50.5756	47.3538	50.0023	53.1095	58.9152	66.7531	73.5891 (72)
Total internal gains	379.7912	378.2980	366.4639	343.8051	321.8297	301.6842	289.6024	291.8188	303.0374	323.3249	348.1343	369.8841 (73)

6. Solar gains

[Jan]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409
alpha	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427
util living area	0.9809	0.9663	0.9306	0.8478	0.7061	0.5330	0.3931	0.4403	0.6735	0.8953	0.9679	0.9843 (86)
MIT	19.6997	19.9125	20.2466	20.6110	20.8610	20.9676	20.9931	20.9888	20.9143	20.5643	20.0477	19.6371 (87)
Th 2	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031 (88)
util rest of house	0.9757	0.9574	0.9127	0.8111	0.6447	0.4494	0.2973	0.3390	0.5884	0.8604	0.9578	0.9800 (89)
MIT 2	18.4276	18.6939	19.1044	19.5303	19.7928	19.8852	19.9009	19.8991	19.8481	19.4920	18.8678	18.3489 (90)
Living area fraction									fLA = Living area / (4) =			0.4629 (91)
MIT	19.0164	19.2580	19.6331	20.0305	20.2872	20.3862	20.4064	20.4035	20.3416	19.9883	19.4139	18.9451 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0164	19.2580	19.6331	20.0305	20.2872	20.3862	20.4064	20.4035	20.3416	19.9883	19.4139	18.9451 (93)

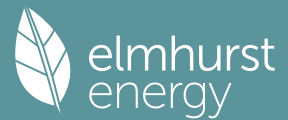
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9703	0.9509	0.9075	0.8158	0.6672	0.4870	0.3417	0.3858	0.6241	0.8635	0.9522	0.9751 (94)
Useful gains	435.6323	484.6669	522.6649	524.6327	457.7676	328.2799	220.1245	230.6156	339.6745	411.9843	412.8857	416.6849 (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	856.5167	835.6530	764.3646	647.8107	499.7890	336.7641	221.5387	233.0090	363.2721	546.4140	716.6891	858.1883 (97)
Space heating kWh	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785 (98a)
Space heating requirement - total per year (kWh/year)												1496.0100
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1496.0100
Space heating per m2										(98c) / (4) =		31.3892 (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)

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Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	313.1380	235.8627	179.8246	88.6881	31.2640	0.0000	0.0000	0.0000	0.0000	100.0157	218.7385	328.4785	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140	(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	55.5098	49.0243	51.8930	45.1514	43.4520	38.8080	38.0384	39.7345	40.3783	45.4423	48.8338	54.8393	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m	2.0043	1.8103	2.0043	1.9396	2.0043	1.9396	2.0043	2.0043	2.0043	2.0043	1.9396	2.0043	(231)
Pumps and Fa	13.7322	11.0165	9.9191	7.2672	5.6134	4.5862	5.1207	6.6561	8.6456	11.3435	12.8125	14.1139	(232)
Lighting	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 PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1496.0100	(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												551.1050	(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)												23.5989	(230a)
Total electricity for the above, kWh/year												23.5989	(231)
Electricity for lighting (calculated in Appendix L)												110.8268	(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												2181.5407	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1496.0100	16.4900	246.6920	(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)	551.1050	16.4900	90.8772	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	23.5989	16.4900	3.8915	(249)
Energy for lighting	110.8268	16.4900	18.2753	(250)
Additional standing charges			0.0000	(251)
Total energy cost			359.7361	(255)

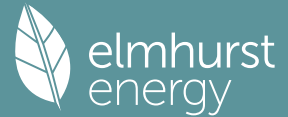
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.3976	(257)
SAP value		77.3443	
SAP rating (Section 12)		77	(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	1496.0100	0.1559	233.2756	(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)	551.1050	0.1411	77.7724	(264)
Space and water heating			311.0480	(265)
Pumps, fans and electric keep-hot	23.5989	0.1387	3.2735	(267)

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Energy for lighting 110.8268 0.1443 15.9957 (268)
Total CO2, kg/year 330.3172 (272)
CO2 emissions per m2 6.9300 (273)
EI value 95.2231
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 FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.6700 (1c)	x 2.4000 (2c)	= 107.2080 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.7295 (5)

2. Ventilation rate

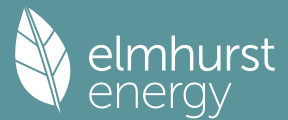
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.1500	(17)
Infiltration rate	0.1075	(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) =	0.0914 (21)
Wind speed	Jan 4.3000 Feb 4.2000 Mar 4.2000 Apr 3.9000 May 4.0000 Jun 3.4000 Jul 3.3000 Aug 3.3000 Sep 3.4000 Oct 3.8000 Nov 3.8000 Dec 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	0.0982 0.0959 0.0959 0.0891 0.0914 0.0777 0.0754 0.0754 0.0777 0.0868 0.0868 0.0891	(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			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	76.8600	11.8600	65.0000	0.1900	12.3500	110.0000	7150.0001 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.7400		9.7400	0.1300	1.2662	9.0000	87.6600 (30)
Total net area of external elements Aum(A, m2)			130.5300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.7114		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			44.6700			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10505.7701 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							220.4316 (35)
List of Thermal Bridges							
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)				4.0200	0.0930	0.3739	
E7 Party floor between dwellings (in blocks of flats)				27.2500	0.0370	1.0082	
E16 Corner (normal)				17.7000	0.0510	0.9027	
E17 Corner (inverted - internal area greater than external area)				4.8000	-0.0910	-0.4368	
E18 Party wall between dwellings				5.7000	0.0650	0.3705	
P1 Party wall - Ground floor				4.0200	0.1080	0.4342	
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)				11.0500	0.0970	1.0719	
E13 Gable (insulation at rafter level)				6.9600	0.0610	0.4246	

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409	50.1409
alpha	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427	4.3427
util living area	0.9787	0.9632	0.9225	0.8246	0.6599	0.4667	0.3522	0.3994	0.6424	0.8822	0.9641	0.9822 (86)
MIT	19.7919	19.9936	20.3241	20.6822	20.9060	20.9835	20.9961	20.9933	20.9339	20.6190	20.1248	19.7355 (87)
Th 2	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031	19.9031 (88)
util rest of house	0.9726	0.9530	0.9017	0.7817	0.5892	0.3765	0.2518	0.2923	0.5508	0.8419	0.9523	0.9771 (89)
MIT 2	18.5448	18.7962	19.1995	19.6105	19.8355	19.8958	19.9022	19.9013	19.8641	19.5552	18.9647	18.4741 (90)
Living area fraction									fLA = Living area /	(4) =		0.4629 (91)
MIT	19.1220	19.3504	19.7200	20.1065	20.3310	20.3993	20.4085	20.4067	20.3592	20.0476	19.5017	19.0579 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1220	19.3504	19.7200	20.1065	20.3310	20.3993	20.4085	20.4067	20.3592	20.0476	19.5017	19.0579 (93)

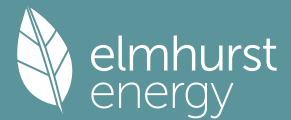
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9671	0.9467	0.8977	0.7904	0.6179	0.4179	0.2984	0.3420	0.5906	0.8480	0.9469	0.9719 (94)
Useful gains	426.3987	470.8727	507.0853	500.2639	410.9164	275.4138	186.0422	197.0066	317.5769	398.5349	403.1725	409.9492 (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	816.1025	794.4743	722.8620	599.8541	438.3131	279.3233	186.7397	198.2768	335.1951	514.9423	681.0537	818.1905 (97)
Space heating kWh	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316 (98a)
Space heating requirement - total per year (kWh/year)												1350.4390
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	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1350.4390
Space heating per m2										(98c) / (4) =		28.3349 (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	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316 (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)	289.9396	217.4603	160.5378	71.7049	20.3831	0.0000	0.0000	0.0000	0.0000	86.6072	200.0745	303.7316 (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	193.9570	171.2957	181.3192	157.7635	151.8255	135.5992	132.9099	138.8363	141.0860	158.7798	170.6300	191.6140 (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	55.5098	49.0243	51.8930	45.1514	43.4520	38.8080	38.0384	39.7345	40.3783	45.4423	48.8338	54.8393 (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	2.0043	1.8103	2.0043	1.9396	2.0043	1.9396	2.0043	2.0043	1.9396	2.0043	1.9396	2.0043 (231)	
Lighting	13.7322	11.0165	9.9191	7.2672	5.6134	4.5862	5.1207	6.6561	8.6456	11.3435	12.8125	14.1139 (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													1350.4390 (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													551.1050 (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)													23.5989 (230a)
mechanical ventilation fans (SFP = 0.1671)													23.5989 (231)
Total electricity for the above, kWh/year													110.8268 (232)
Electricity for lighting (calculated in Appendix L)													

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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	2035.9697 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1350.4390	28.4300	383.9298 (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)	551.1050	28.4300	156.6792 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	23.5989	28.4300	6.7092 (249)
Energy for lighting	110.8268	28.4300	31.5081 (250)
Additional standing charges			0.0000 (251)
Total energy cost			578.8262 (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	1350.4390	0.1563	211.0585 (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)	551.1050	0.1411	77.7724 (264)
Space and water heating			288.8310 (265)
Pumps, fans and electric keep-hot	23.5989	0.1387	3.2735 (267)
Energy for lighting	110.8268	0.1443	15.9957 (268)
Total CO2, kg/year			308.1001 (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	1350.4390	1.5786	2131.7978 (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)	551.1050	1.5218	838.6852 (278)
Space and water heating			2970.4830 (279)
Pumps, fans and electric keep-hot	23.5989	1.5128	35.7004 (281)
Energy for lighting	110.8268	1.5338	169.9898 (282)
Total Primary energy kWh/year			3176.1733 (286)