

Full SAP Calculation Printout



Plot Reference	79596-05			Issued on Date	05/03/2026
Assessment Reference	001	Plot Type Ref	GF Flat		
Plot Address	28 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2
SAP Rating	82 B	DER	6.49	TER	15.41
Environmental	96 A	% DER < TER			57.88
CO ₂ Emissions (t/year)	0.22	DFEE	35.98	TFEE	41.66
Compliance Check	See BREL	% DFEE < TFEE			13.63
% DPER < TPER	17.67	DPER	66.95	TPER	81.32
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	38.9500 (1b)	2.3500 (2b)	91.5325 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	91.5325 (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	2.5500	(17)
Infiltration rate	0.1275	(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) =	0.1084 (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	0.1382	0.1355	0.1328	0.1192	0.1165	0.1030	0.1030	0.1002	0.1084	0.1165	0.1219	0.1273 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			38.9500	0.1100	4.2845	75.0000	2921.2500 (28a)
Main	46.5400	10.2000	36.3400	0.1900	6.9046	110.0000	3997.4001 (29a)
Total net area of external elements Aum(A, m ²)			85.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.6289		(33)
Main dwelling							
Party Wall 1			25.8300	0.0000	0.0000	110.0000	2841.3000 (32)
Party Ceiling 1			38.9500			20.0000	779.0000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12042.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							309.1720 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	18.1100	0.0930	1.6842
E7 Party floor between dwellings (in blocks of flats)	18.1100	0.0370	0.6701
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.0500	0.1080	1.0854
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7725 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.4014 (37)

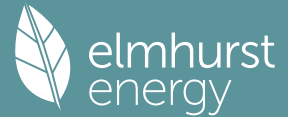
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	(38)
Heat transfer coeff	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	(39)
Average = Sum(39)m / 12 =													43.5043
HLP	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	(40)
HLP (average)													1.1169
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.3787 (42)
Hot water usage for mixer showers	68.3111	67.2845	65.7886	62.9264	60.8141	58.4586	57.1197	58.6043	60.2317	62.7609	65.6845	68.0494	(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	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494	(42c)
Average daily hot water use (litres/day)													89.1164 (43)
Daily hot water use	97.0605	94.9885	92.4471	88.5395	85.3818	81.9809	80.6420	83.1720	85.8449	89.4194	93.3885	96.7988	(44)
Energy conte	153.7201	135.2624	142.0878	121.2062	114.9404	100.8050	97.5295	102.9843	105.8553	121.3413	133.0491	151.5635	(45)
Energy content (annual)										Total = Sum(45)m =			1480.3450
Distribution loss (46)m = 0.15 x (45)m	23.0580	20.2894	21.3132	18.1809	17.2411	15.1208	14.6294	15.4477	15.8783	18.2012	19.9574	22.7345	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =					1797.6760 (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	51.1119	44.9747	47.2442	40.3010	38.2177	33.5177	32.4286	34.2423	35.1969	40.3460	44.2388	50.3949	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.2100	66.6611	60.2100	62.2170	60.2100	62.2170	60.2100	60.2100	62.2170	60.2100	62.2170	60.2100	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	118.9020	120.1358	117.0266	110.4075	102.0520	94.1990	88.9527	87.7189	90.8281	97.4473	105.8028	113.6557	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	(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)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	(71)
Water heating gains (Table 5)	68.6989	66.9267	63.5003	55.9737	51.3678	46.5523	43.5868	46.0246	48.8846	54.2285	61.4428	67.7350	(72)
Total internal gains	291.4916	297.4044	284.4176	272.2789	257.3106	246.6491	236.4303	237.6342	245.6104	255.5665	273.1433	285.2815	(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	0.7700	19.6403	0.7300	0.7000	0.7700	5.3554	(76)
South	0.7200	46.7521	0.7300	0.7000	0.7700	11.9203	(78)
West	1.6800	19.6403	0.7300	0.7000	0.7700	11.6845	(80)

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East			3.8000			19.6403			0.6800			0.7000			0.7700			24.6190 (76)		
Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488	(83)							
Total gains	349.1376	406.1923	456.7005	517.3330	555.0553	550.9867	526.3141	487.8549	443.5564	382.5738	344.2337	333.2303	(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	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	
alpha	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	
util living area	0.9941	0.9848	0.9576	0.8670	0.6971	0.5015	0.3632	0.4092	0.6554	0.9208	0.9861	0.9956	(86)
MIT	20.1158	20.3000	20.5492	20.8186	20.9588	20.9951	20.9994	20.9988	20.9780	20.7665	20.3819	20.0700	(87)
Th 2	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	(88)
util rest of house	0.9919	0.9792	0.9426	0.8278	0.6326	0.4240	0.2799	0.3197	0.5688	0.8861	0.9799	0.9938	(89)
MIT 2	18.9819	19.2137	19.5198	19.8254	19.9589	19.9849	19.9869	19.9867	19.9756	19.7796	19.3193	18.9237	(90)
Living area fraction	fLA = Living area / (4) = 0.5664 (91)												
MIT	19.6241	19.8289	20.1028	20.3879	20.5252	20.5570	20.5604	20.5600	20.5433	20.3386	19.9211	19.5729	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.6241	19.8289	20.1028	20.3879	20.5252	20.5570	20.5604	20.5600	20.5433	20.3386	19.9211	19.5729	(93)

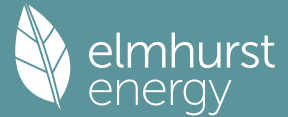
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9909	0.9781	0.9446	0.8444	0.6677	0.4679	0.3271	0.3704	0.6174	0.8995	0.9794	0.9929	(94)
Useful gains	345.9436	397.2960	431.3906	436.8346	370.5941	257.7980	172.1687	180.7137	273.8640	344.1321	337.1543	330.8705	(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	666.6656	649.4729	591.7804	499.7723	383.9347	259.1556	172.2926	180.9757	280.3115	423.6694	557.7732	668.7867	(97)
Space heating kWh	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(98a)
Space heating requirement - total per year (kWh/year)	1052.0816												
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	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1052.0816												
Space heating per m2	(98c) / (4) = 27.0111 (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	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(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)	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	51.7076	45.6786	48.3785	42.1534	40.6090	36.3147	35.6260	37.1872	37.7600	42.4409	45.5428	51.0904	(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	1.0568	0.9545	1.0568	1.0227	1.0568	1.0227	1.0568	1.0568	1.0227	1.0568	1.0227	1.0568	(231)
Lighting	11.5462	9.2628	8.3401	6.1103	4.7198	3.8561	4.3055	5.5965	7.2693	9.5377	10.7728	11.8671	(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	1052.0816 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												

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Efficiency of water heater	349.4100	
Water heating fuel used	514.4890 (219)	
Space cooling fuel	0.0000 (221)	
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)		
mechanical ventilation fans (SFP = 0.1114)	12.4432 (230a)	
Total electricity for the above, kWh/year	12.4432 (231)	
Electricity for lighting (calculated in Appendix L)	93.1841 (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	1672.1979 (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	1052.0816	0.1569	165.0697 (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)	514.4890	0.1411	72.5877 (264)	
Space and water heating			237.6575 (265)	
Pumps, fans and electric keep-hot	12.4432	0.1387	1.7260 (267)	
Energy for lighting	93.1841	0.1443	13.4493 (268)	
Total CO2, kg/year			252.8328 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4900 (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	1052.0816	1.5808	1663.1627 (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)	514.4890	1.5217	782.8969 (278)	
Space and water heating			2446.0596 (279)	
Pumps, fans and electric keep-hot	12.4432	1.5128	18.8241 (281)	
Energy for lighting	93.1841	1.5338	142.9288 (282)	
Total Primary energy kWh/year			2607.8124 (286)	
Dwelling Primary energy Rate (DPER)			66.9500 (287)	

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

1. Overall dwelling characteristics

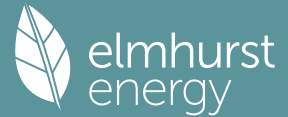
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	38.9500 (1b)	x 2.3500 (2b)	= 91.5325 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	91.5325 (5)	

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) =	0.2185 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4685	(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) =	0.3982 (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	0.5077	0.4978	0.4878	0.4380	0.4281	0.3783	0.3783	0.3684	0.3982	0.4281	0.4480	0.4679 (22b)

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Effective ac 0.6289 0.6239 0.6190 0.5959 0.5916 0.5716 0.5716 0.5678 0.5793 0.5916 0.6004 0.6095 (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			7.5900	1.1450	8.6908		(27)
GF			38.9500	0.1300	5.0635		(28a)
Main	46.5400	9.7400	36.8000	0.1800	6.6240		(29a)
Total net area of external elements Aum (A, m2)			85.4900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		22.5283		(33)
Main dwelling							
Party Wall 1			25.8300	0.0000	0.0000		(32)

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

309.1720 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0500	0.3245
E3 Sill	6.4900	0.0500	0.3245
E4 Jamb	20.1000	0.0500	1.0050
E5 Ground floor (normal)	18.1100	0.1600	2.8976
E7 Party floor between dwellings (in blocks of flats)	18.1100	0.0700	1.2677
E16 Corner (normal)	7.7100	0.0900	0.6939
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0900	-0.4626
E18 Party wall between dwellings	5.1400	0.0600	0.3084
P1 Party wall - Ground floor	10.0500	0.0800	0.8040
E25 Staggered party wall between dwellings	5.1400	0.0600	0.3084
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4714 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	29.9997 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	18.9964	18.8452	18.6970	18.0009	17.8707	17.2644	17.2644	17.1521	17.4979	17.8707	18.1341	18.4096 (38)
Heat transfer coeff	48.9961	48.8449	48.6967	48.0006	47.8704	47.2642	47.2642	47.1519	47.4977	47.8704	48.1339	48.4093 (39)
Average = Sum(39)m / 12 =												48.0000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2579	1.2540	1.2502	1.2324	1.2290	1.2135	1.2135	1.2106	1.2195	1.2290	1.2358	1.2429 (40)
HLP (average)												1.2323
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

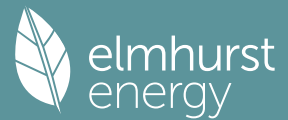
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3787 (42)
Hot water usage for mixer showers	60.7210	59.8084	58.4787	55.9346	54.0570	51.9632	50.7731	52.0927	53.5393	55.7874	58.3863	60.4883 (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	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494 (42c)
Average daily hot water use (litres/day)												82.1185 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	89.4704	87.5125	85.1373	81.5477	78.6247	75.4855	74.2953	76.6604	79.1525	82.4460	86.0903	89.2378 (44)
Energy content (annual)	141.6992	124.6166	130.8529	111.6347	105.8440	92.8182	89.8538	94.9216	97.6029	111.8785	122.6514	139.7248 (45)
Distribution loss (46)m = 0.15 x (45)m	21.2549	18.6925	19.6279	16.7452	15.8766	13.9227	13.4781	14.2382	14.6404	16.7818	18.3977	20.9587 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	188.2941	166.7023	177.4478	156.7266	152.4389	137.9100	136.4487	141.5165	142.6947	158.4734	167.7432	186.3197 (62)
PV diverter	-27.7591	-24.5504	-25.7077	-21.2870	-19.8387	-16.9761	-15.9124	-16.9213	-17.5642	-20.7062	-23.4576	-27.2450 (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												
	160.5351	142.1519	151.7400	135.4395	132.6001	120.9339	120.5363	124.5953	125.1306	137.7671	144.2856	159.0746 (64)
12Total per year (kWh/year)												1654.7900 (64)
Electric shower(s)												1655 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	84.3909	75.1036	80.7845	73.1920	72.4690	66.9355	67.1523	68.8374	68.5264	74.4755	76.8551	83.7344 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
60.5717	67.0615	60.5717	62.5907	60.5717	62.5907	60.5717	60.5717	60.5717	62.5907	60.5717	62.5907	60.5717 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
118.9020	120.1358	117.0266	110.4075	102.0520	94.1990	88.9527	87.7189	90.8281	97.4473	105.8028	113.6557	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)

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Losses e.g. evaporation (negative values) (Table 5)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487 (71)
Water heating gains (Table 5)	113.4287	111.7613	108.5813	101.6556	97.4046	92.9660	90.2585	92.5233	95.1756	100.1015	106.7431	112.5462 (72)
Total internal gains	339.5831	345.6394	332.8604	321.3345	306.7090	293.4365	283.4636	284.4947	292.2752	304.8012	321.8174	333.4544 (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					1.0200	10.6334	0.6300	0.7000			0.7700	3.3147 (74)
East					4.3100	19.6403	0.6300	0.7000			0.7700	25.8700 (76)
South					0.6800	46.7521	0.6300	0.7000			0.7700	9.7159 (78)
West					1.5800	19.6403	0.6300	0.7000			0.7700	9.4837 (80)
Solar gains	48.3842	91.4059	144.9286	206.3080	250.7366	256.3011	244.1248	210.6897	166.5804	106.7664	59.6876	40.2318 (83)
Total gains	387.9673	437.0453	477.7889	527.6425	557.4457	549.7376	527.5884	495.1844	458.8556	411.5676	381.5049	373.6862 (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	68.2722	68.4835	68.6919	69.6880	69.8776	70.7739	70.7739	70.9424	70.4260	69.8776	69.4951	69.0997
alpha	5.5515	5.5656	5.5795	5.6459	5.6585	5.7183	5.7183	5.7295	5.6951	5.6585	5.6330	5.6066
util living area	0.9916	0.9827	0.9604	0.8871	0.7406	0.5420	0.3930	0.4358	0.6807	0.9178	0.9814	0.9931 (86)
MIT	20.0113	20.1856	20.4355	20.7419	20.9259	20.9896	20.9986	20.9975	20.9647	20.7249	20.3258	19.9892 (87)
Th 2	19.8739	19.8770	19.8800	19.8942	19.8969	19.9092	19.9092	19.9115	19.9045	19.8969	19.8915	19.8859 (88)
util rest of house	0.9884	0.9763	0.9457	0.8496	0.6723	0.4537	0.2963	0.3340	0.5872	0.8809	0.9732	0.9904 (89)
MIT 2	18.7630	18.9843	19.2949	19.6608	19.8450	19.9047	19.9089	19.9109	19.8861	19.6544	19.1738	18.7441 (90)
Living area fraction	19.4700	19.6647	19.9409	20.2731	20.4572	20.5191	20.5261	20.5263	20.4970	20.2607	19.8262	19.4493 (92)
MIT	19.4700	19.6647	19.9409	20.2731	20.4572	20.5191	20.5261	20.5263	20.4970	20.2607	19.8262	19.4493 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4700	19.6647	19.9409	20.2731	20.4572	20.5191	20.5261	20.5263	20.4970	20.2607	19.8262	19.4493 (93)

8. Space heating requirement

Utilisation	0.9869	0.9748	0.9466	0.8636	0.7083	0.5036	0.3511	0.3918	0.6393	0.8946	0.9726	Dec
Useful gains	382.8745	426.0319	452.2912	455.6744	394.8300	276.8443	185.2569	194.0042	293.3657	368.1965	371.0616	369.5825 (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	743.2707	721.1789	654.5269	545.9172	419.2100	279.7623	185.5629	194.5648	303.8406	462.4618	612.5630	738.2094 (97)
Space heating kWh	268.1348	198.3388	150.4634	64.9748	18.1387	0.0000	0.0000	0.0000	0.0000	70.1334	173.8810	274.2585 (98a)
Space heating requirement - total per year (kWh/year)												1218.3232
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	268.1348	198.3388	150.4634	64.9748	18.1387	0.0000	0.0000	0.0000	0.0000	70.1334	173.8810	274.2585 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1218.3232
Space heating per m ²										(98c) / (4) =		31.2792 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	268.1348	198.3388	150.4634	64.9748	18.1387	0.0000	0.0000	0.0000	0.0000	70.1334	173.8810	274.2585 (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)	290.5036	214.8849	163.0156	70.3952	19.6519	0.0000	0.0000	0.0000	0.0000	75.9842	188.3867	297.1381 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	160.5351	142.1519	151.7400	135.4395	132.6001	120.9339	120.5363	124.5953	125.1306	137.7671	144.2856	159.0746 (64)
Efficiency of water heater (217)m	85.2014	84.8068	84.0408	82.5112	80.7852	79.8000	79.8000	79.8000	79.8000	82.6249	84.4793	79.8000 (216)
Fuel for water heating, kWh/month	188.4183	167.6185	180.5551	164.1469	164.1391	151.5462	151.0479	156.1344	156.8052	166.7379	170.7941	186.5547 (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	12.5856	10.0966	9.0909	6.6604	5.1447	4.2032	4.6931	6.1003	7.9237	10.3963	11.7426	12.9354 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.8039	-26.8178	-39.0199	-44.4748	-48.5378	-45.5901	-45.0971	-42.3230	-37.4634	-31.0047	-20.8079	-16.2268 (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)

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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	(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	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-9.7114	-20.5268	-40.9520	-61.7035	-81.7372	-82.1139	-81.0793	-68.5244	-50.1076	-29.3420	-12.9687	-7.6667 (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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1319.9601 (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												2004.4984 (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)												101.5730 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-962.6007 (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												2549.4308 (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	1319.9601	0.2100	277.1916 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2004.4984	0.2100	420.9447 (264)
Space and water heating			698.1363 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	101.5730	0.1443	14.6601 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-416.1671	0.1343	-55.8837
PV Unit electricity exported	-546.4336	0.1258	-68.7541
Total			-124.6378 (269)
Total CO2, kg/year			600.0879 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.4100 (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	1319.9601	1.1300	1491.5550 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2004.4984	1.1300	2265.0832 (278)
Space and water heating			3756.6382 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	101.5730	1.5338	155.7960 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-416.1671	1.4963	-622.6965
PV Unit electricity exported	-546.4336	0.4619	-252.3740
Total			-875.0706 (283)
Total Primary energy kWh/year			3167.4644 (286)
Target Primary Energy Rate (TPER)			81.3200 (287)

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Plot Reference	79596-05			Issued on Date	05/03/2026		
Assessment Reference	001		Plot Type Ref	GF Flat			
Plot Address	28 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2		
SAP Rating	82 B		DER	6.49		TER	15.41
Environmental	96 A		% DER < TER				57.88
CO ₂ Emissions (t/year)	0.22		DFEE	35.98		TFEE	41.66
Compliance Check	See BREL		% DFEE < TFEE				13.63
% DPER < TPER	17.67		DPER	66.95		TPER	81.32
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	38.9500 (1b)	2.3500 (2b)	91.5325 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	91.5325 (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) =	20.0000 / (5) =	0.2185 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.5500	(17)
Infiltration rate	0.3460	(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) =	0.2941 (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	0.3750	0.3676	0.3603	0.3235	0.3162	0.2794	0.2794	0.2720	0.2941	0.3162	0.3309	0.3456 (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	0.5703	0.5676	0.5649	0.5523	0.5500	0.5390	0.5390	0.5370	0.5432	0.5500	0.5547	0.5597 (25)

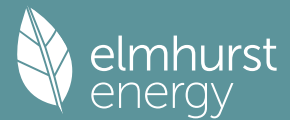
3. Heat losses and heat loss parameter

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			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			38.9500	0.1100	4.2845	75.0000	2921.2500 (28a)
Main	46.5400	10.2000	36.3400	0.1900	6.9046	110.0000	3997.4001 (29a)
Total net area of external elements Aum(A, m ²)			85.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.6289		(33)
Main dwelling							
Party Wall 1			25.8300	0.0000	0.0000	110.0000	2841.3000 (32)
Party Ceiling 1			38.9500			20.0000	779.0000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12042.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		309.1720 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	6.4900	0.0200	0.1298
E2 Other lintels (including other steel lintels)			

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E3 Sill									6.4900	0.0300	0.1947	
E4 Jamb									20.1000	0.0260	0.5226	
E5 Ground floor (normal)									18.1100	0.0930	1.6842	
E7 Party floor between dwellings (in blocks of flats)									18.1100	0.0370	0.6701	
E16 Corner (normal)									7.7100	0.0510	0.3932	
E17 Corner (inverted - internal area greater than external area)									5.1400	-0.0910	-0.4677	
E18 Party wall between dwellings									5.1400	0.0650	0.3341	
P1 Party wall - Ground floor									10.0500	0.1080	1.0854	
E25 Staggered party wall between dwellings									5.1400	0.0440	0.2262	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												4.7725 (36)
Point Thermal Bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 28.4014 (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	17.2265	17.1440	17.0632	16.6835	16.6125	16.2818	16.2818	16.2206	16.4092	16.6125	16.7562	16.9064 (38)
Average = Sum(39)m / 12 =	45.6279	45.5454	45.4646	45.0849	45.0139	44.6832	44.6832	44.6220	44.8106	45.0139	45.1576	45.3078 (39)
												45.0846
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1714	1.1693	1.1673	1.1575	1.1557	1.1472	1.1472	1.1456	1.1505	1.1557	1.1594	1.1632 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.1575
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												1.3787 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												20.4792 (42b)
Hot water usage for other uses												28.7494 (42c)
Average daily hot water use (litres/day)												45.1233 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	49.2287	47.8791	46.4054	44.5702	42.9335	41.2323	40.8782	42.3489	43.8574	45.6045	47.4559	49.1594 (44)
Energy conte	77.9662	68.1792	71.3233	61.0144	57.7967	50.7000	49.4386	52.4368	54.0806	61.8848	67.6096	76.9718 (45)
Energy content (annual)										Total = Sum(45)m =		749.4019
Distribution loss (46)m = 0.15 x (45)m												0.0000 (46)
Water storage loss (or HIU loss):												0.0000 (46)
Total storage loss												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												66.2713 (62)
WWHRS												66.2713 (63a)
PV diverter												66.2713 (63b)
Solar input												66.2713 (63c)
FGHRS												66.2713 (63d)
Output from w/h												66.2713 (64)
	66.2713	57.9523	60.6248	51.8622	49.1272	43.0950	42.0228	44.5713	45.9685	52.6021	57.4681	65.4260 (64)
										Total per year (kWh/year) = Sum(64)m =		636.9916 (64)
												637 (64)
12Total per year (kWh/year)												37.9082 (64a)
Electric shower(s)												37.9082 (64a)
	37.9082	33.7765	36.8827	35.1967	35.8571	34.2042	35.3444	35.8571	35.1967	36.8827	36.1891	37.9082 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 431.2035 (64a)
Heat gains from water heating, kWh/month												26.0449 (65)
	26.0449	22.9322	24.3769	21.7647	21.2461	19.3248	19.3418	20.1071	20.2913	22.3712	23.4143	25.8336 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	60.2100	66.6611	60.2100	62.2170	60.2100	62.2170	60.2100	60.2100	62.2170	60.2100	62.2170	60.2100 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	118.9020	120.1358	117.0266	110.4075	102.0520	94.1990	88.9527	87.7189	90.8281	97.4473	105.8028	113.6557 (68)
Pumps, fans	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487 (71)
Total internal gains	35.0065	34.1253	32.7646	30.2288	28.5566	26.8400	25.9970	27.0257	28.1823	30.0688	32.5199	34.7225 (72)
	257.7993	264.6030	253.6820	246.5340	234.4993	226.9368	218.8405	218.6353	224.9082	231.4068	244.2204	252.2690 (73)

6. Solar gains												

[Jan]												
		Area		Solar flux		g		FF		Access		Gains
		m2		Table 6a		Specific data		Specific data		factor		W
				W/m2		or Table 6b		or Table 6c		Table 6d		
North		1.0800		10.6334		0.7300		0.7000		0.7700		4.0668 (74)
East		0.7700		19.6403		0.7300		0.7000		0.7700		5.3554 (76)
South		0.7200		46.7521		0.7300		0.7000		0.7700		11.9203 (78)
West		1.6800		19.6403		0.7300		0.7000		0.7700		11.6845 (80)
East		3.8000		19.6403		0.6800		0.7000		0.7700		24.6190 (76)

Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488 (83)
Total gains	315.4453	373.3909	425.9649	491.5881	532.2440	531.2744	508.7243	468.8560	422.8542	358.4141	315.3107	300.2178 (84)

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7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	73.3120	73.4447	73.5753	74.1948	74.3119	74.8618	74.8618	74.9646	74.6491	74.3119	74.0755	73.8298
alpha	5.8875	5.8963	5.9050	5.9463	5.9541	5.9908	5.9908	5.9976	5.9766	5.9541	5.9384	5.9220
util living area	0.9967	0.9907	0.9718	0.8966	0.7370	0.5321	0.3857	0.4360	0.6971	0.9434	0.9916	0.9975 (86)
MIT	19.9658	20.1601	20.4328	20.7574	20.9390	20.9924	20.9991	20.9981	20.9666	20.6988	20.2707	19.9318 (87)
Th 2	19.9429	19.9446	19.9463	19.9541	19.9556	19.9625	19.9625	19.9637	19.9598	19.9556	19.9526	19.9495 (88)
util rest of house	0.9954	0.9871	0.9609	0.8618	0.6712	0.4489	0.2952	0.3388	0.6068	0.9154	0.9876	0.9966 (89)
MIT 2	19.0192	19.2127	19.4791	19.7812	19.9223	19.9599	19.9623	19.9634	19.9460	19.7401	19.3299	18.9908 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5553	19.7493	20.0193	20.3340	20.4981	20.5447	20.5495	20.5494	20.5240	20.2831	19.8627	19.5237 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5553	19.7493	20.0193	20.3340	20.4981	20.5447	20.5495	20.5494	20.5240	20.2831	19.8627	19.5237 (93)

8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9948	0.9863	0.9617	0.8756	0.7065	0.4960	0.3465	0.3940	0.6573	0.9254	0.9872	0.9960 (94)
Useful gains	313.8049	368.2686	409.6694	430.4119	376.0400	263.5224	176.2731	184.7286	277.9564	331.6929	311.2749	299.0250 (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	696.0667	676.3169	614.6476	515.5032	396.0364	265.6271	176.4760	185.1551	287.8633	435.8740	576.3347	694.2848 (97)
Space heating kWh	284.4028	207.0084	152.5038	61.2657	14.8773	0.0000	0.0000	0.0000	0.0000	77.5107	190.8431	294.0733 (98a)
Space heating requirement - total per year (kWh/year)	1282.4852											
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	284.4028	207.0084	152.5038	61.2657	14.8773	0.0000	0.0000	0.0000	0.0000	77.5107	190.8431	294.0733 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1282.4852											
Space heating per m2	(98c) / (4) = 32.9264 (99)											

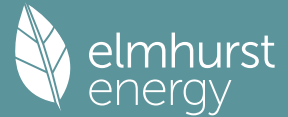
8c. Space cooling requirement												
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	420.0224	330.6559	339.1272	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9616	0.9843	0.9741	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	403.8807	325.4617	330.3535	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	600.6484	575.5053	530.0397	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	141.6727	186.0324	148.5665	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
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 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	35.4182	46.5081	37.1416	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	119.0679 (107)											
Energy for space heating	32.9264 (99)											
Energy for space cooling	3.0569 (108)											
Total	35.9834 (109)											
Fabric Energy Efficiency (DFEE)	36.0 (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	38.9500 (1b)	x	2.3500 (2b)	=	91.5325 (1b) - (3b)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500											
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	91.5325 (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)

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =										Air changes per hour		
Pressure test											20.0000 / (5) =		0.2185 (8)
Pressure Test Method											Blower Door		Yes
Measured/design AP50													5.0000 (17)
Infiltration rate													0.4685 (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) =		0.3982 (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	0.5077	0.4978	0.4878	0.4380	0.4281	0.3783	0.3783	0.3684	0.3982	0.4281	0.4480	0.4679	(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	0.6289	0.6239	0.6190	0.5959	0.5916	0.5716	0.5716	0.5678	0.5793	0.5916	0.6004	0.6095	(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			7.5900	1.1450	8.6908			(27)
GF			38.9500	0.1300	5.0635			(28a)
Main	46.5400	9.7400	36.8000	0.1800	6.6240			(29a)
Total net area of external elements Aum (A, m2)			85.4900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.5283			(33)
Main dwelling								
Party Wall 1			25.8300	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							309.1720	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)				6.4900	0.0500	0.3245		
E3 Sill				6.4900	0.0500	0.3245		
E4 Jamb				20.1000	0.0500	1.0050		
E5 Ground floor (normal)				18.1100	0.1600	2.8976		
E7 Party floor between dwellings (in blocks of flats)				18.1100	0.0700	1.2677		
E16 Corner (normal)				7.7100	0.0900	0.6939		
E17 Corner (inverted - internal area greater than external area)				5.1400	-0.0900	-0.4626		
E18 Party wall between dwellings				5.1400	0.0600	0.3084		
P1 Party wall - Ground floor				10.0500	0.0800	0.8040		
E25 Staggered party wall between dwellings				5.1400	0.0600	0.3084		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.4714	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	29.9997	(37)

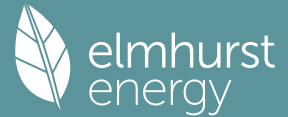
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	18.9964	18.8452	18.6970	18.0009	17.8707	17.2644	17.2644	17.1521	17.4979	17.8707	18.1341	18.4096	(38)
Average = Sum(39)m / 12 =	48.9961	48.8449	48.6967	48.0006	47.8704	47.2642	47.2642	47.1519	47.4977	47.8704	48.1339	48.4093	(39)
												48.0000	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2579	1.2540	1.2502	1.2324	1.2290	1.2135	1.2135	1.2106	1.2195	1.2290	1.2358	1.2429	(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													1.3787	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	20.4792	20.1751	19.7468	18.9571	18.3658	17.7101	17.3559	17.7812	18.2443	18.9459	19.7519	20.4100	(42b)	
Hot water usage for other uses	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494	(42c)	
Average daily hot water use (litres/day)													45.1233	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	49.2287	47.8791	46.4054	44.5702	42.9335	41.2323	40.8782	42.3489	43.8574	45.6045	47.4559	49.1594	(44)	
Energy content (annual)	77.9662	68.1792	71.3233	61.0144	57.7967	50.7000	49.4386	52.4368	54.0806	61.8848	67.6096	76.9718	(45)	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)	
Water storage loss (or HIU loss):														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	66.2713	57.9523	60.6248	51.8622	49.1272	43.0950	42.0228	44.5713	45.9685	52.6021	57.4681	65.4260	(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	66.2713	57.9523	60.6248	51.8622	49.1272	43.0950	42.0228	44.5713	45.9685	52.6021	57.4681	65.4260	(64)	
12Total per year (kWh/year)													637	(64)
Electric shower(s)	37.9082	33.7765	36.8827	35.1967	35.8571	34.2042	35.3444	35.8571	35.1967	36.8827	36.1891	37.9082	(64a)	
													431.2035	(64a)
Heat gains from water heating, kWh/month	26.0449	22.9322	24.3769	21.7647	21.2461	19.3248	19.3418	20.1071	20.2913	22.3712	23.4143	25.8336	(65)	

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.5717	67.0615	60.5717	62.5907	60.5717	62.5907	60.5717	60.5717	62.5907	60.5717	62.5907	60.5717 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	118.9020	120.1358	117.0266	110.4075	102.0520	94.1990	88.9527	87.7189	90.8281	97.4473	105.8028	113.6557 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936 (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)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487 (71)
Water heating gains (Table 5)	35.0065	34.1253	32.7646	30.2288	28.5566	26.8400	25.9970	27.0257	28.1823	30.0688	32.5199	34.7225 (72)
Total internal gains	258.1610	265.0034	254.0436	246.9077	234.8610	227.3105	219.2022	218.9970	225.2819	231.7685	244.5941	252.6307 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	g Specific data or Table 6b	FF Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Access factor Table 6d	Gains W
North				1.0200	10.6334	0.6300		0.7000		0.7700		3.3147 (74)
East				4.3100	19.6403	0.6300		0.7000		0.7700		25.8700 (76)
South				0.6800	46.7521	0.6300		0.7000		0.7700		9.7159 (78)
West				1.5800	19.6403	0.6300		0.7000		0.7700		9.4837 (80)
Solar gains	48.3842	91.4059	144.9286	206.3080	250.7366	256.3011	244.1248	210.6897	166.5804	106.7664	59.6876	40.2318 (83)
Total gains	306.5452	356.4093	398.9722	453.2157	485.5976	483.6116	463.3270	429.6867	391.8624	338.5349	304.2817	292.8625 (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	68.2722	68.4835	68.6919	69.6880	69.8776	70.7739	70.7739	70.9424	70.4260	69.8776	69.4951	69.0997
alpha	5.5515	5.5656	5.5795	5.6459	5.6585	5.7183	5.7183	5.7295	5.6951	5.6585	5.6330	5.6066
util living area	0.9973	0.9933	0.9816	0.9330	0.8106	0.6088	0.4463	0.4998	0.7655	0.9609	0.9935	0.9979 (86)
MIT	19.8312	20.0133	20.2820	20.6383	20.8818	20.9814	20.9973	20.9950	20.9363	20.6048	20.1608	19.8090 (87)
Th 2	19.8739	19.8770	19.8800	19.8942	19.8969	19.9092	19.9092	19.9115	19.9045	19.8969	19.8915	19.8859 (88)
util rest of house	0.9962	0.9905	0.9738	0.9061	0.7468	0.5129	0.3371	0.3843	0.6724	0.9393	0.9904	0.9971 (89)
MIT 2	18.8301	19.0133	19.2795	19.6261	19.8287	19.9027	19.9088	19.9106	19.8765	19.6058	19.1722	18.8176 (90)
Living area fraction	19.3971	19.5797	19.8472	20.1994	20.4252	20.5136	20.5253	20.5248	20.4767	20.1716	19.7321	19.3791 (92)
MIT	19.3971	19.5797	19.8472	20.1994	20.4252	20.5136	20.5253	20.5248	20.4767	20.1716	19.7321	19.3791 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3971	19.5797	19.8472	20.1994	20.4252	20.5136	20.5253	20.5248	20.4767	20.1716	19.7321	19.3791 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9956	0.9896	0.9736	0.9144	0.7791	0.5671	0.3991	0.4500	0.7237	0.9456	0.9898	0.9965 (94)
Useful gains	305.1910	352.7088	388.4276	414.4297	378.3516	274.2402	184.9301	193.3509	283.5758	320.1344	301.1719	291.8464 (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	739.6982	717.0266	649.9669	542.3784	417.6774	279.5032	185.5247	194.4908	302.8795	458.1951	608.0310	734.8107 (97)
Space heating kWh	323.2734	244.8216	194.5852	92.1231	29.2585	0.0000	0.0000	0.0000	0.0000	102.7171	220.9385	329.5654 (98a)
Space heating requirement - total per year (kWh/year)												1537.2826
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	323.2734	244.8216	194.5852	92.1231	29.2585	0.0000	0.0000	0.0000	0.0000	102.7171	220.9385	329.5654 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1537.2826
Space heating per m2										(98c) / (4) =		39.4681 (99)

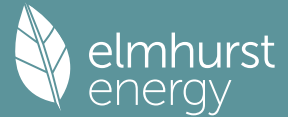
8c. Space cooling requirement

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	444.2831	349.7548	358.3544	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9228	0.9642	0.9465	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	409.9902	337.2197	339.1771	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	544.5334	522.0549	483.8791	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	96.8711	137.5174	107.6583	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	24.2178	34.3793	26.9146	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												85.5117 (107)
Energy for space heating												39.4681 (99)
Energy for space cooling												2.1954 (108)
Total												41.6635 (109)

Fabric Energy Efficiency (TFEE)

41.7 (109)

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Plot Reference	79596-05			Issued on Date	05/03/2026
Assessment Reference	001	Plot Type Ref	GF Flat		
Plot Address	28 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2
SAP Rating	82 B	DER	6.49	TER	15.41
Environmental	96 A	% DER < TER			57.88
CO ₂ Emissions (t/year)	0.22	DFEE	35.98	TFEE	41.66
Compliance Check	See BREL	% DFEE < TFEE			13.63
% DPER < TPER	17.67	DPER	66.95	TPER	81.32
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	38.9500 (1b)	2.3500 (2b)	91.5325 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	91.5325 (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	2.5500 (17)
Infiltration rate	0.1275 (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) = 0.1084 (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	0.1382	0.1355	0.1328	0.1192	0.1165	0.1030	0.1030	0.1002	0.1084	0.1165	0.1219	0.1273 (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			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			38.9500	0.1100	4.2845	75.0000	2921.2500 (28a)
Main	46.5400	10.2000	36.3400	0.1900	6.9046	110.0000	3997.4001 (29a)
Total net area of external elements Aum(A, m ²)			85.4900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 23.6289		(33)
Main dwelling							
Party Wall 1			25.8300	0.0000	0.0000	110.0000	2841.3000 (32)
Party Ceiling 1			38.9500			20.0000	779.0000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12042.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							309.1720 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	18.1100	0.0930	1.6842
E7 Party floor between dwellings (in blocks of flats)	18.1100	0.0370	0.6701
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.0500	0.1080	1.0854
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7725 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.4014 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	(38)
Heat transfer coeff	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	(39)
Average = Sum(39)m / 12 =													43.5043
HLP	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	(40)
HLP (average)													1.1169
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.3787 (42)
Hot water usage for mixer showers	68.3111	67.2845	65.7886	62.9264	60.8141	58.4586	57.1197	58.6043	60.2317	62.7609	65.6845	68.0494	(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	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494	(42c)
Average daily hot water use (litres/day)													89.1164 (43)
Daily hot water use	97.0605	94.9885	92.4471	88.5395	85.3818	81.9809	80.6420	83.1720	85.8449	89.4194	93.3885	96.7988	(44)
Energy conte	153.7201	135.2624	142.0878	121.2062	114.9404	100.8050	97.5295	102.9843	105.8553	121.3413	133.0491	151.5635	(45)
Energy content (annual)										Total = Sum(45)m =			1480.3450
Distribution loss (46)m = 0.15 x (45)m	23.0580	20.2894	21.3132	18.1809	17.2411	15.1208	14.6294	15.4477	15.8783	18.2012	19.9574	22.7345	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =					1797.6760 (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	51.1119	44.9747	47.2442	40.3010	38.2177	33.5177	32.4286	34.2423	35.1969	40.3460	44.2388	50.3949	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.2100	66.6611	60.2100	62.2170	60.2100	62.2170	60.2100	60.2100	62.2170	60.2100	62.2170	60.2100	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	118.9020	120.1358	117.0266	110.4075	102.0520	94.1990	88.9527	87.7189	90.8281	97.4473	105.8028	113.6557	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	(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)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	(71)
Water heating gains (Table 5)	68.6989	66.9267	63.5003	55.9737	51.3678	46.5523	43.5868	46.0246	48.8846	54.2285	61.4428	67.7350	(72)
Total internal gains	291.4916	297.4044	284.4176	272.2789	257.3106	246.6491	236.4303	237.6342	245.6104	255.5665	273.1433	285.2815	(73)

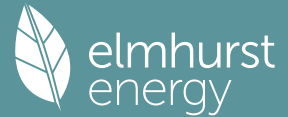
6. Solar gains							
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.0800	10.6334	0.7300	0.7000	0.7700	4.0668	(74)
East	0.7700	19.6403	0.7300	0.7000	0.7700	5.3554	(76)
South	0.7200	46.7521	0.7300	0.7000	0.7700	11.9203	(78)
West	1.6800	19.6403	0.7300	0.7000	0.7700	11.6845	(80)

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			3.8000		19.6403		0.6800		0.7000		0.7700		24.6190 (76)	
Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488	(83)	
Total gains	349.1376	406.1923	456.7005	517.3330	555.0553	550.9867	526.3141	487.8549	443.5564	382.5738	344.2337	333.2303	(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	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906		
alpha	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260		
util living area	0.9941	0.9848	0.9576	0.8670	0.6971	0.5015	0.3632	0.4092	0.6554	0.9208	0.9861	0.9956	(86)	
MIT	20.1158	20.3000	20.5492	20.8186	20.9588	20.9951	20.9994	20.9988	20.9780	20.7665	20.3819	20.0700	(87)	
Th 2	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	(88)	
util rest of house	0.9919	0.9792	0.9426	0.8278	0.6326	0.4240	0.2799	0.3197	0.5688	0.8861	0.9799	0.9938	(89)	
MIT 2	18.9819	19.2137	19.5198	19.8254	19.9589	19.9849	19.9869	19.9867	19.9756	19.7796	19.3193	18.9237	(90)	
Living area fraction	fLA = Living area / (4) =												0.5664 (91)	
MIT	19.6241	19.8289	20.1028	20.3879	20.5252	20.5570	20.5604	20.5600	20.5433	20.3386	19.9211	19.5729	(92)	
Temperature adjustment													0.0000	
adjusted MIT	19.6241	19.8289	20.1028	20.3879	20.5252	20.5570	20.5604	20.5600	20.5433	20.3386	19.9211	19.5729	(93)	
8. Space heating requirement														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9909	0.9781	0.9446	0.8444	0.6677	0.4679	0.3271	0.3704	0.6174	0.8995	0.9794	0.9929	(94)	
Useful gains	345.9436	397.2960	431.3906	436.8346	370.5941	257.7980	172.1687	180.7137	273.8640	344.1321	337.1543	330.8705	(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	666.6656	649.4729	591.7804	499.7723	383.9347	259.1556	172.2926	180.9757	280.3115	423.6694	557.7732	668.7867	(97)	
Space heating kWh	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(98a)	
Space heating requirement - total per year (kWh/year)													1052.0816	
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	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													1052.0816	
Space heating per m2											(98c) / (4) =		27.0111 (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	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(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)	238.6172	169.4629	119.3300	45.3152	9.9254	0.0000	0.0000	0.0000	0.0000	59.1758	158.8456	251.4096	(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														
Efficiency of water heater	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(64)	
(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	51.7076	45.6786	48.3785	42.1534	40.6090	36.3147	35.6260	37.1872	37.7600	42.4409	45.5428	51.0904	(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	1.0568	0.9545	1.0568	1.0227	1.0568	1.0227	1.0568	1.0568	1.0227	1.0568	1.0227	1.0568	(231)	
Lighting	11.5462	9.2628	8.3401	6.1103	4.7198	3.8561	4.3055	5.5965	7.2693	9.5377	10.7728	11.8671	(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													1052.0816 (211)	
Space heating fuel - main system 2													0.0000 (213)	
Space heating fuel - secondary													0.0000 (215)	

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Efficiency of water heater	349.4100	
Water heating fuel used	514.4890 (219)	
Space cooling fuel	0.0000 (221)	
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)		
mechanical ventilation fans (SFP = 0.1114)	12.4432 (230a)	
Total electricity for the above, kWh/year	12.4432 (231)	
Electricity for lighting (calculated in Appendix L)	93.1841 (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	1672.1979 (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	1052.0816	0.1569	165.0697	(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)	514.4890	0.1411	72.5877	(264)
Space and water heating			237.6575	(265)
Pumps, fans and electric keep-hot	12.4432	0.1387	1.7260	(267)
Energy for lighting	93.1841	0.1443	13.4493	(268)
Total CO2, kg/year			252.8328	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4900	(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	1052.0816	1.5808	1663.1627	(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)	514.4890	1.5217	782.8969	(278)
Space and water heating			2446.0596	(279)
Pumps, fans and electric keep-hot	12.4432	1.5128	18.8241	(281)
Energy for lighting	93.1841	1.5338	142.9288	(282)
Total Primary energy kWh/year			2607.8124	(286)
Dwelling Primary energy Rate (DPER)			66.9500	(287)

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

1. Overall dwelling characteristics

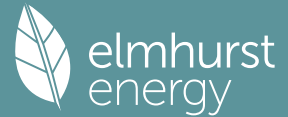
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	38.9500 (1b)	x 2.3500 (2b)	= 91.5325 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	91.5325 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.2185 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4685	(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) =	0.3982 (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	0.5077	0.4978	0.4878	0.4380	0.4281	0.3783	0.3783	0.3684	0.3982	0.4281	0.4480	0.4679 (22b)

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Effective ac 0.6289 0.6239 0.6190 0.5959 0.5916 0.5716 0.5716 0.5678 0.5793 0.5916 0.6004 0.6095 (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			7.5900	1.1450	8.6908		(27)
GF			38.9500	0.1300	5.0635		(28a)
Main	46.5400	9.7400	36.8000	0.1800	6.6240		(29a)
Total net area of external elements Aum (A, m2)			85.4900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		22.5283		(33)
Main dwelling							
Party Wall 1			25.8300	0.0000	0.0000		(32)

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

309.1720 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0500	0.3245
E3 Sill	6.4900	0.0500	0.3245
E4 Jamb	20.1000	0.0500	1.0050
E5 Ground floor (normal)	18.1100	0.1600	2.8976
E7 Party floor between dwellings (in blocks of flats)	18.1100	0.0700	1.2677
E16 Corner (normal)	7.7100	0.0900	0.6939
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0900	-0.4626
E18 Party wall between dwellings	5.1400	0.0600	0.3084
P1 Party wall - Ground floor	10.0500	0.0800	0.8040
E25 Staggered party wall between dwellings	5.1400	0.0600	0.3084
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4714 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	29.9997 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	18.9964	18.8452	18.6970	18.0009	17.8707	17.2644	17.2644	17.1521	17.4979	17.8707	18.1341	18.4096 (38)
Heat transfer coeff	48.9961	48.8449	48.6967	48.0006	47.8704	47.2642	47.2642	47.1519	47.4977	47.8704	48.1339	48.4093 (39)
Average = Sum(39)m / 12 =												48.0000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2579	1.2540	1.2502	1.2324	1.2290	1.2135	1.2135	1.2106	1.2195	1.2290	1.2358	1.2429 (40)
HLP (average)												1.2323
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3787 (42)
Hot water usage for mixer showers	60.7210	59.8084	58.4787	55.9346	54.0570	51.9632	50.7731	52.0927	53.5393	55.7874	58.3863	60.4883 (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	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494 (42c)	
Average daily hot water use (litres/day)												82.1185 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	89.4704	87.5125	85.1373	81.5477	78.6247	75.4855	74.2953	76.6604	79.1525	82.4460	86.0903	89.2378 (44)	
Energy content (annual)	141.6992	124.6166	130.8529	111.6347	105.8440	92.8182	89.8538	94.9216	97.6029	111.8785	122.6514	139.7248 (45)	
Distribution loss (46)m = 0.15 x (45)m	21.2549	18.6925	19.6279	16.7452	15.8766	13.9227	13.4781	14.2382	14.6404	16.7818	18.3977	20.9587 (46)	
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
WWHRS	188.2941	166.7023	177.4478	156.7266	152.4389	137.9100	136.4487	141.5165	142.6947	158.4734	167.7432	186.3197 (62)	
PV diverter	-27.7591	-24.5504	-25.7077	-21.2870	-19.8387	-16.9761	-15.9124	-16.9213	-17.5642	-20.7062	-23.4576	-27.2450 (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													
	160.5351	142.1519	151.7400	135.4395	132.6001	120.9339	120.5363	124.5953	125.1306	137.7671	144.2856	159.0746 (64)	
12Total per year (kWh/year)													1654.7900 (64)
Electric shower(s)													1655 (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)	
													0.0000 (64a)
Heat gains from water heating, kWh/month													
	84.3909	75.1036	80.7845	73.1920	72.4690	66.9355	67.1523	68.8374	68.5264	74.4755	76.8551	83.7344 (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	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358	68.9358 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.5717	67.0615	60.5717	62.5907	60.5717	62.5907	60.5717	60.5717	62.5907	60.5717	62.5907	60.5717 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	118.9020	120.1358	117.0266	110.4075	102.0520	94.1990	88.9527	87.7189	90.8281	97.4473	105.8028	113.6557 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936	29.8936 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)

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Losses e.g. evaporation (negative values) (Table 5)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487 (71)
Water heating gains (Table 5)	113.4287	111.7613	108.5813	101.6556	97.4046	92.9660	90.2585	92.5233	95.1756	100.1015	106.7431	112.5462 (72)
Total internal gains	339.5831	345.6394	332.8604	321.3345	306.7090	293.4365	283.4636	284.4947	292.2752	304.8012	321.8174	333.4544 (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					1.0200	10.6334		0.6300	0.7000	0.7700		3.3147 (74)
East					4.3100	19.6403		0.6300	0.7000	0.7700		25.8700 (76)
South					0.6800	46.7521		0.6300	0.7000	0.7700		9.7159 (78)
West					1.5800	19.6403		0.6300	0.7000	0.7700		9.4837 (80)
Solar gains	48.3842	91.4059	144.9286	206.3080	250.7366	256.3011	244.1248	210.6897	166.5804	106.7664	59.6876	40.2318 (83)
Total gains	387.9673	437.0453	477.7889	527.6425	557.4457	549.7376	527.5884	495.1844	458.8556	411.5676	381.5049	373.6862 (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	68.2722	68.4835	68.6919	69.6880	69.8776	70.7739	70.7739	70.9424	70.4260	69.8776	69.4951	69.0997
alpha	5.5515	5.5656	5.5795	5.6459	5.6585	5.7183	5.7183	5.7295	5.6951	5.6585	5.6330	5.6066
util living area	0.9916	0.9827	0.9604	0.8871	0.7406	0.5420	0.3930	0.4358	0.6807	0.9178	0.9814	0.9931 (86)
MIT	20.0113	20.1856	20.4355	20.7419	20.9259	20.9896	20.9986	20.9975	20.9647	20.7249	20.3258	19.9892 (87)
Th 2	19.8739	19.8770	19.8800	19.8942	19.8969	19.9092	19.9092	19.9115	19.9045	19.8969	19.8915	19.8859 (88)
util rest of house	0.9884	0.9763	0.9457	0.8496	0.6723	0.4537	0.2963	0.3340	0.5872	0.8809	0.9732	0.9904 (89)
MIT 2	18.7630	18.9843	19.2949	19.6608	19.8450	19.9047	19.9089	19.9109	19.8861	19.6544	19.1738	18.7441 (90)
Living area fraction	19.4700	19.6647	19.9409	20.2731	20.4572	20.5191	20.5261	20.5263	20.4970	20.2607	19.8262	19.4493 (92)
MIT	19.4700	19.6647	19.9409	20.2731	20.4572	20.5191	20.5261	20.5263	20.4970	20.2607	19.8262	19.4493 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4700	19.6647	19.9409	20.2731	20.4572	20.5191	20.5261	20.5263	20.4970	20.2607	19.8262	19.4493 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9869	0.9748	0.9466	0.8636	0.7083	0.5036	0.3511	0.3918	0.6393	0.8946	0.9726	0.9890 (94)
Useful gains	382.8745	426.0319	452.2912	455.6744	394.8300	276.8443	185.2569	194.0042	293.3657	368.1965	371.0616	369.5825 (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	743.2707	721.1789	654.5269	545.9172	419.2100	279.7623	185.5629	194.5648	303.8406	462.4618	612.5630	738.2094 (97)
Space heating kWh	268.1348	198.3388	150.4634	64.9748	18.1387	0.0000	0.0000	0.0000	0.0000	70.1334	173.8810	274.2585 (98a)
Space heating requirement - total per year (kWh/year)												1218.3232
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	268.1348	198.3388	150.4634	64.9748	18.1387	0.0000	0.0000	0.0000	0.0000	70.1334	173.8810	274.2585 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1218.3232
Space heating per m ²										(98c) / (4) =		31.2792 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	268.1348	198.3388	150.4634	64.9748	18.1387	0.0000	0.0000	0.0000	0.0000	70.1334	173.8810	274.2585 (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)	290.5036	214.8849	163.0156	70.3952	19.6519	0.0000	0.0000	0.0000	0.0000	75.9842	188.3867	297.1381 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	160.5351	142.1519	151.7400	135.4395	132.6001	120.9339	120.5363	124.5953	125.1306	137.7671	144.2856	159.0746 (64)
Efficiency of water heater (217)m	85.2014	84.8068	84.0408	82.5112	80.7852	79.8000	79.8000	79.8000	79.8000	82.6249	84.4793	79.8000 (216)
Fuel for water heating, kWh/month	188.4183	167.6185	180.5551	164.1469	164.1391	151.5462	151.0479	156.1344	156.8052	166.7379	170.7941	186.5547 (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	12.5856	10.0966	9.0909	6.6604	5.1447	4.2032	4.6931	6.1003	7.9237	10.3963	11.7426	12.9354 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.8039	-26.8178	-39.0199	-44.4748	-48.5378	-45.5901	-45.0971	-42.3230	-37.4634	-31.0047	-20.8079	-16.2268 (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)

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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	(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	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-9.7114	-20.5268	-40.9520	-61.7035	-81.7372	-82.1139	-81.0793	-68.5244	-50.1076	-29.3420	-12.9687	-7.6667 (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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1319.9601 (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												2004.4984 (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)												101.5730 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-962.6007 (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												2549.4308 (238)

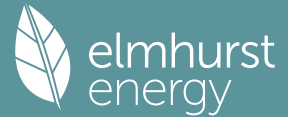
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1319.9601	0.2100	277.1916 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2004.4984	0.2100	420.9447 (264)
Space and water heating			698.1363 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	101.5730	0.1443	14.6601 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-416.1671	0.1343	-55.8837
PV Unit electricity exported	-546.4336	0.1258	-68.7541
Total			-124.6378 (269)
Total CO2, kg/year			600.0879 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.4100 (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	1319.9601	1.1300	1491.5550 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2004.4984	1.1300	2265.0832 (278)
Space and water heating			3756.6382 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	101.5730	1.5338	155.7960 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-416.1671	1.4963	-622.6965
PV Unit electricity exported	-546.4336	0.4619	-252.3740
Total			-875.0706 (283)
Total Primary energy kWh/year			3167.4644 (286)
Target Primary Energy Rate (TPER)			81.3200 (287)

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Plot Reference	79596-05			Issued on Date	05/03/2026
Assessment Reference	001	Plot Type Ref	GF Flat		
Plot Address	28 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2
SAP Rating	82 B	DER	6.49	TER	15.41
Environmental	96 A	% DER < TER			57.88
CO ₂ Emissions (t/year)	0.22	DFEE	35.98	TFEE	41.66
Compliance Check	See BREL	% DFEE < TFEE			13.63
% DPER < TPER	17.67	DPER	66.95	TPER	81.32
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	38.9500 (1b)	2.3500 (2b)	91.5325 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	91.5325 (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)

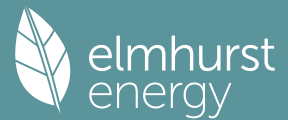
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.5500	(17)
Infiltration rate	0.1275	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1084 (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	0.1382	0.1355	0.1328	0.1192	0.1165	0.1030	0.1030	0.1002	0.1084	0.1165	0.1219	0.1273 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			38.9500	0.1100	4.2845	75.0000	2921.2500 (28a)
Main	46.5400	10.2000	36.3400	0.1900	6.9046	110.0000	3997.4001 (29a)
Total net area of external elements Aum(A, m ²)			85.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.6289		(33)
Main dwelling							
Party Wall 1			25.8300	0.0000	0.0000	110.0000	2841.3000 (32)
Party Ceiling 1			38.9500			20.0000	779.0000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12042.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							309.1720 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	18.1100	0.0930	1.6842
E7 Party floor between dwellings (in blocks of flats)	18.1100	0.0370	0.6701
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.0500	0.1080	1.0854
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7725 (36)
Point Thermal Bridges			0.0000 (36a) =
Total fabric heat loss			28.4014 (37) (33) + (36) + (36a) =

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	(38)
Heat transfer coeff	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	(39)
Average = Sum(39)m / 12 =													43.5043
HLP	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	(40)
HLP (average)													1.1169
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3787 (42)
Hot water usage for mixer showers	68.3111	67.2845	65.7886	62.9264	60.8141	58.4586	57.1197	58.6043	60.2317	62.7609	65.6845	68.0494	(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	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494	(42c)
Average daily hot water use (litres/day)													89.1164 (43)
Daily hot water use	97.0605	94.9885	92.4471	88.5395	85.3818	81.9809	80.6420	83.1720	85.8449	89.4194	93.3885	96.7988	(44)
Energy conte	153.7201	135.2624	142.0878	121.2062	114.9404	100.8050	97.5295	102.9843	105.8553	121.3413	133.0491	151.5635	(45)
Energy content (annual)													Total = Sum(45)m = 1480.3450
Distribution loss (46)m = 0.15 x (45)m	23.0580	20.2894	21.3132	18.1809	17.2411	15.1208	14.6294	15.4477	15.8783	18.2012	19.9574	22.7345	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	51.1119	44.9747	47.2442	40.3010	38.2177	33.5177	32.4286	34.2423	35.1969	40.3460	44.2388	50.3949	(65)

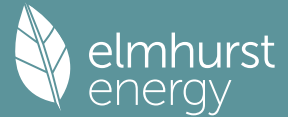
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1912	11.7163	9.5283	7.2135	5.3922	4.5523	4.9190	6.3938	8.5818	10.8966	12.7179	13.5578	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.4657	179.3072	174.6666	164.7873	152.3164	140.5955	132.7653	130.9237	135.5644	145.4437	157.9146	169.6354	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	(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)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	(71)
Water heating gains (Table 5)	68.6989	66.9267	63.5003	55.9737	51.3678	46.5523	43.5868	46.0246	48.8846	54.2285	61.4428	67.7350	(72)
Total internal gains	331.5811	330.1755	319.9205	300.1999	281.3018	263.9256	253.4964	255.5675	265.2561	282.7941	304.3006	323.1536	(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	0.7700	19.6403	0.7300	0.7000	0.7700	5.3554	(76)
South	0.7200	46.7521	0.7300	0.7000	0.7700	11.9203	(78)
West	1.6800	19.6403	0.7300	0.7000	0.7700	11.6845	(80)
East	3.8000	19.6403	0.6800	0.7000	0.7700	24.6190	(76)

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Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488 (83)
Total gains	389.2271	438.9635	492.2034	545.2540	579.0465	568.2632	543.3802	505.7882	463.2020	409.8014	375.3910	371.1024 (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	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906
alpha	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260
util living area	0.9897	0.9779	0.9421	0.8441	0.6733	0.4868	0.3519	0.3948	0.6313	0.8985	0.9789	0.9922 (86)
MIT	20.2047	20.3681	20.6106	20.8459	20.9657	20.9958	20.9995	20.9990	20.9819	20.8037	20.4471	20.1549 (87)
Th 2	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870 (88)
util rest of house	0.9860	0.9701	0.9231	0.8019	0.6093	0.4113	0.2711	0.3084	0.5463	0.8582	0.9700	0.9893 (89)
MIT 2	19.0939	19.2978	19.5912	19.8523	19.9639	19.9852	19.9869	19.9868	19.9778	19.8175	19.3994	19.0312 (90)
Living area fraction	19.7230	19.9040	20.1685	20.4150	20.5313	20.5576	20.5604	20.5601	20.5465	20.3760	19.9928	0.5664 (91)
MIT	19.7230	19.9040	20.1685	20.4150	20.5313	20.5576	20.5604	20.5601	20.5465	20.3760	19.9928	19.6676 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7230	19.9040	20.1685	20.4150	20.5313	20.5576	20.5604	20.5601	20.5465	20.3760	19.9928	19.6676 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9847	0.9694	0.9269	0.8208	0.6444	0.4541	0.3169	0.3574	0.5941	0.8751	0.9700	0.9881 (94)
Useful gains	383.2896	425.5188	456.2218	447.5234	373.1303	258.0262	172.1918	180.7675	275.1864	358.6207	364.1406	366.6947 (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	670.9685	652.7386	594.6386	500.9515	384.2002	259.1799	172.2953	180.9819	280.4505	425.2991	560.8925	672.9076 (97)
Space heating kWh	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (98a)
Space heating requirement - total per year (kWh/year)												935.5037
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	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												935.5037
Space heating per m2										(98c) / (4) =		24.0181 (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	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (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)	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149 (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	51.7076	45.6786	48.3785	42.1534	40.6090	36.3147	35.6260	37.1872	37.7600	42.4409	45.5428	51.0904 (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	1.0568	0.9545	1.0568	1.0227	1.0568	1.0227	1.0568	1.0568	1.0227	1.0568	1.0227	1.0568 (231)
Lighting	11.5462	9.2628	8.3401	6.1103	4.7198	3.8561	4.3055	5.5965	7.2693	9.5377	10.7728	11.8671 (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												935.5037 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												349.4100

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Water heating fuel used	514.4890 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114) mechanical ventilation fans (SFP = 0.1114)	12.4432 (230a)
Total electricity for the above, kWh/year	12.4432 (231)
Electricity for lighting (calculated in Appendix L)	93.1841 (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	1555.6199 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	935.5037	16.4900	154.2646 (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)	514.4890	16.4900	84.8392 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	12.4432	16.4900	2.0519 (249)
Energy for lighting	93.1841	16.4900	15.3661 (250)
Additional standing charges			0.0000 (251)
Total energy cost			256.5217 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.1000 (257)
SAP value	82.1685
SAP rating (Section 12)	82 (258)
SAP band	B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	935.5037	0.1571	146.9351 (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)	514.4890	0.1411	72.5877 (264)
Space and water heating			219.5229 (265)
Pumps, fans and electric keep-hot	12.4432	0.1387	1.7260 (267)
Energy for lighting	93.1841	0.1443	13.4493 (268)
Total CO2, kg/year			234.6982 (272)
CO2 emissions per m2			6.0300 (273)
EI value			96.2538
EI rating			96 (274)
EI band			A

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

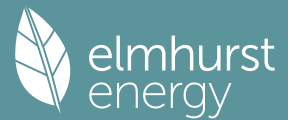
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	38.9500 (1b)	x 2.3500 (2b)	= 91.5325 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 91.5325 (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

Full SAP Calculation Printout



Pressure Test Method												Blower Door
Measured/design AP50												2.5500 (17)
Infiltration rate												0.1275 (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) = 0.1084 (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 infiltr 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)
	0.1165	0.1138	0.1138	0.1057	0.1084	0.0921	0.0894	0.0894	0.0921	0.1030	0.1030	0.1057 (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)

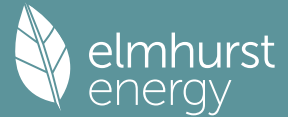
3. Heat losses and heat loss parameter

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			4.2500	1.2357	5.2519		(27)					
Glazed Door			3.8000	1.3258	5.0379		(27)					
GF			38.9500	0.1100	4.2845	75.0000	2921.2500 (28a)					
Main	46.5400	10.2000	36.3400	0.1900	6.9046	110.0000	3997.4001 (29a)					
Total net area of external elements Aum(A, m2)			85.4900				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.6289		(33)					
Main dwelling												
Party Wall 1			25.8300	0.0000	0.0000	110.0000	2841.3000 (32)					
Party Ceiling 1			38.9500			20.0000	779.0000 (32b)					
Timber			25.7000			9.0000	231.3000 (32c)					
Solid			16.9600			75.0000	1271.9999 (32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12042.2500 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							309.1720 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				6.4900	0.0200	0.1298						
E3 Sill				6.4900	0.0300	0.1947						
E4 Jamb				20.1000	0.0260	0.5226						
E5 Ground floor (normal)				18.1100	0.0930	1.6842						
E7 Party floor between dwellings (in blocks of flats)				18.1100	0.0370	0.6701						
E16 Corner (normal)				7.7100	0.0510	0.3932						
E17 Corner (inverted - internal area greater than external area)				5.1400	-0.0910	-0.4677						
E18 Party wall between dwellings				5.1400	0.0650	0.3341						
P1 Party wall - Ground floor				10.0500	0.1080	1.0854						
E25 Staggered party wall between dwellings				5.1400	0.0440	0.2262						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7725 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	28.4014 (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	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029 (38)
Average = Sum(39)m / 12 =	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043 (39)
												43.5043
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169 (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												1.3787 (42)
Hot water usage for mixer showers												
Hot water usage for baths	68.3111	67.2845	65.7886	62.9264	60.8141	58.4586	57.1197	58.6043	60.2317	62.7609	65.6845	68.0494 (42a)
Hot water usage for other uses	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Average daily hot water use (litres/day)	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494 (42c)
												89.1164 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	97.0605	94.9885	92.4471	88.5395	85.3818	81.9809	80.6420	83.1720	85.8449	89.4194	93.3885	96.7988 (44)
Energy content (annual)	153.7201	135.2624	142.0878	121.2062	114.9404	100.8050	97.5295	102.9843	105.8553	121.3413	133.0491	151.5635 (45)
Distribution loss (46)m = 0.15 x (45)m	23.0580	20.2894	21.3132	18.1809	17.2411	15.1208	14.6294	15.4477	15.8783	18.2012	19.9574	22.7345 (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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149 (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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149 (64)

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Total per year (kWh/year) = Sum(64)m = 1797.6760 (64)										
Electric shower(s)	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	51.1119	44.9747	47.2442	40.3010	38.2177	33.5177	32.4286	34.2423	35.1969	40.3460 44.2388 50.3949 (65)

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

Metabolic gains (Table 5), Watts											
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5											
	13.1912	11.7163	9.5283	7.2135	5.3922	4.5523	4.9190	6.3938	8.5818	10.8966	12.7179 13.5578 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5											
	177.4657	179.3072	174.6666	164.7873	152.3164	140.5955	132.7653	130.9237	135.5644	145.4437	157.9146 169.6354 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5											
	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510 (69)
Pumps, fans											
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)											
	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487 (71)
Water heating gains (Table 5)											
	68.6989	66.9267	63.5003	55.9737	51.3678	46.5523	43.5868	46.0246	48.8846	54.2285	61.4428 67.7350 (72)
Total internal gains											
	331.5811	330.1755	319.9205	300.1999	281.3018	263.9256	253.4964	255.5675	265.2561	282.7941	304.3006 323.1536 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
North	1.0800	9.3942	0.7300	0.7000	0.7700	3.5928 (74)
East	0.7700	17.3606	0.7300	0.7000	0.7700	4.7338 (76)
South	0.7200	41.2355	0.7300	0.7000	0.7700	10.5138 (78)
West	1.6800	17.3606	0.7300	0.7000	0.7700	10.3283 (80)
East	3.8000	17.3606	0.6800	0.7000	0.7700	21.7615 (76)
Solar gains	50.9301	98.6013	163.1566	236.7253	280.5512	292.0481 272.8938 232.5520 192.6214 121.1034 64.5477 43.3264 (83)
Total gains	382.5112	428.7768	483.0771	536.9252	561.8530	555.9736 526.3902 488.1195 457.8775 403.8975 368.8484 366.4800 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906
alpha	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260
util living area	0.9880	0.9748	0.9326	0.8147	0.6200	0.4213	0.3139	0.3561	0.5964	0.8818	0.9752 0.9906 (86)
MIT	20.2688	20.4230	20.6610	20.8839	20.9805	20.9984	20.9998	20.9995	20.9876	20.8365	20.5000 20.2240 (87)
Th 2	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870 (88)
util rest of house	0.9833	0.9657	0.9100	0.7657	0.5496	0.3430	0.2303	0.2662	0.5077	0.8349	0.9644 0.9869 (89)
MIT 2	19.1752	19.3666	19.6512	19.8912	19.9754	19.9865	19.9870	19.9869	19.9813	19.8524	19.4653 19.1190 (90)
Living area fraction									FLA = Living area / (4) =		
MIT	19.7946	19.9649	20.2231	20.4535	20.5446	20.5596	20.5606	20.5604	20.5512	20.4097	20.0513 19.7448 (92)
Temperature adjustment											0.0000
adjusted MIT	19.7946	19.9649	20.2231	20.4535	20.5446	20.5596	20.5606	20.5604	20.5512	20.4097	20.0513 19.7448 (93)

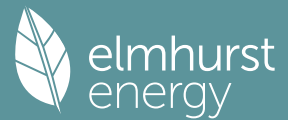
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9823	0.9654	0.9159	0.7894	0.5889	0.3874	0.2777	0.3171	0.5578	0.8562	0.9652	0.9858 (94)
Useful gains	375.7279	413.9526	442.4476	423.8287	330.8864	215.3628	146.1595	154.8009	255.4218	345.8127	356.0042	361.2928 (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	639.2759	620.5846	562.2102	463.4708	336.9249	215.7636	146.2007	154.8944	258.9040	400.6623	532.9856	641.4624 (97)
Space heating kWh	196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462 (98a)
Space heating requirement - total per year (kWh/year)												833.7557
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	196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												833.7557
Space heating per m2	(98c) / (4) =											21.4058 (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	196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462 (98)

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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)	196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	51.7076	45.6786	48.3785	42.1534	40.6090	36.3147	35.6260	37.1872	37.7600	42.4409	45.5428	51.0904	(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	1.0568	0.9545	1.0568	1.0227	1.0568	1.0227	1.0568	1.0568	1.0227	1.0568	1.0227	1.0568	(231)
Lighting	11.5462	9.2628	8.3401	6.1103	4.7198	3.8561	4.3055	5.5965	7.2693	9.5377	10.7728	11.8671	(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												833.7557	(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												514.4890	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)													
mechanical ventilation fans (SFP = 0.1114)												12.4432	(230a)
Total electricity for the above, kWh/year												12.4432	(231)
Electricity for lighting (calculated in Appendix L)												93.1841	(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												1453.8719	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	833.7557	28.4300	237.0367	(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)	514.4890	28.4300	146.2692	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	12.4432	28.4300	3.5376	(249)
Energy for lighting	93.1841	28.4300	26.4922	(250)
Additional standing charges			0.0000	(251)
Total energy cost			413.3358	(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	833.7557	0.1574	131.2535	(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)	514.4890	0.1411	72.5877	(264)
Space and water heating			203.8412	(265)
Pumps, fans and electric keep-hot	12.4432	0.1387	1.7260	(267)
Energy for lighting	93.1841	0.1443	13.4493	(268)
Total CO2, kg/year			219.0166	(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	833.7557	1.5828	1319.6366	(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)	514.4890	1.5217	782.8969	(278)
Space and water heating			2102.5335	(279)
Pumps, fans and electric keep-hot	12.4432	1.5128	18.8241	(281)
Energy for lighting	93.1841	1.5338	142.9288	(282)
Total Primary energy kWh/year			2264.2864	(286)

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SAP 10 EPC IMPROVEMENTS

001

Current energy efficiency rating: B 82
Current environmental impact rating: A 96

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

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

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

Potential energy efficiency rating: B 82
Potential environmental impact rating: A 96

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)):

Electricity	Current £413	Potential £413	Saving £0
Space heating	£241	£241	£0
Water heating	£146	£146	£0
Lighting	£26	£26	£0
Total cost of fuels	£413	£413	£0
Total cost of uses	£413	£413	£0
Delivered energy	37 kWh/m²	37 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	6 kg/m²	6 kg/m²	0 kg/m²
Primary energy	58 kWh/m²	58 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

Main dwelling	Area (m²)	Storey height (m)	Volume (m³)
Ground floor	38.9500 (1b)	x 2.3500 (2b)	= 91.5325 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 91.5325 (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)

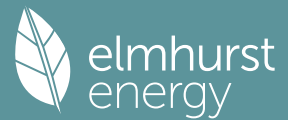
Pressure Test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)

Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1084 (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	0.1382	0.1355	0.1328	0.1192	0.1165	0.1030	0.1030	0.1002	0.1084	0.1165	0.1219	0.1273 (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)

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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			4.2500	1.2357	5.2519			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			38.9500	0.1100	4.2845	75.0000	2921.2500	(28a)
Main	46.5400	10.2000	36.3400	0.1900	6.9046	110.0000	3997.4001	(29a)
Total net area of external elements Aum(A, m2)			85.4900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.6289			(33)
Main dwelling								
Party Wall 1			25.8300	0.0000	0.0000	110.0000	2841.3000	(32)
Party Ceiling 1			38.9500			20.0000	779.0000	(32b)
Timber			25.7000			9.0000	231.3000	(32c)
Solid			16.9600			75.0000	1271.9999	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
(28)...(30) + (32) + (32a)...(32e) = 12042.2500 (34)
309.1720 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	18.1100	0.0930	1.6842
E7 Party floor between dwellings (in blocks of flats)	18.1100	0.0370	0.6701
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.0500	0.1080	1.0854
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges (36a) = 4.7725 (36)
Total fabric heat loss (33) + (36) + (36a) = 28.4014 (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
15.1029 15.1029 15.1029 15.1029 15.1029 15.1029 15.1029 15.1029 15.1029 15.1029 15.1029 15.1029 (38)
Heat transfer coeff 43.5043 43.5043 43.5043 43.5043 43.5043 43.5043 43.5043 43.5043 43.5043 43.5043 43.5043 43.5043 (39)
Average = Sum(39)m / 12 = 43.5043

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1.1169 1.1169 1.1169 1.1169 1.1169 1.1169 1.1169 1.1169 1.1169 1.1169 1.1169 1.1169 (40)
HLP (average) 31 28 31 30 31 30 31 31 30 31 30 31
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3787 (42)
Hot water usage for mixer showers 68.3111 67.2845 65.7886 62.9264 60.8141 58.4586 57.1197 58.6043 60.2317 62.7609 65.6845 68.0494 (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 28.7494 27.7040 26.6586 25.6131 24.5677 23.5223 23.5223 24.5677 25.6131 26.6586 27.7040 28.7494 (42c)
Average daily hot water use (litres/day) 89.1164 (43)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Daily hot water use 97.0605 94.9885 92.4471 88.5395 85.3818 81.9809 80.6420 83.1720 85.8449 89.4194 93.3885 96.7988 (44)
Energy conte 153.7201 135.2624 142.0878 121.2062 114.9404 100.8050 97.5295 102.9843 105.8553 121.3413 133.0491 151.5635 (45)
Energy content (annual) Total = Sum(45)m = 1480.3450
Distribution loss (46)m = 0.15 x (45)m 23.0580 20.2894 21.3132 18.1809 17.2411 15.1208 14.6294 15.4477 15.8783 18.2012 19.9574 22.7345 (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

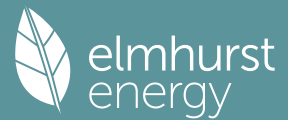
26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (56)
If cylinder contains dedicated solar storage 26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 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
180.6715 159.6056 169.0392 147.2882 141.8918 126.8870 124.4809 129.9357 131.9373 148.2927 159.1311 178.5149 (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 180.6715 159.6056 169.0392 147.2882 141.8918 126.8870 124.4809 129.9357 131.9373 148.2927 159.1311 178.5149 (64)
Total per year (kWh/year) = Sum(64)m = 1797.6760 (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 51.1119 44.9747 47.2442 40.3010 38.2177 33.5177 32.4286 34.2423 35.1969 40.3460 44.2388 50.3949 (65)

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

Metabolic gains (Table 5), Watts
(66)m Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
82.7230 82.7230 82.7230 82.7230 82.7230 82.7230 82.7230 82.7230 82.7230 82.7230 82.7230 82.7230 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
13.1912 11.7163 9.5283 7.2135 5.3922 4.5523 4.9190 6.3938 8.5818 10.8966 12.7179 13.5578 (67)

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.4657	179.3072	174.6666	164.7873	152.3164	140.5955	132.7653	130.9237	135.5644	145.4437	157.9146	169.6354 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510 (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)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487 (71)
Water heating gains (Table 5)	68.6989	66.9267	63.5003	55.9737	51.3678	46.5523	43.5868	46.0246	48.8846	54.2285	61.4428	67.7350 (72)
Total internal gains	331.5811	330.1755	319.9205	300.1999	281.3018	263.9256	253.4964	255.5675	265.2561	282.7941	304.3006	323.1536 (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						0.7700	19.6403	0.7300	0.7000	0.7700	5.3554 (76)	
South						0.7200	46.7521	0.7300	0.7000	0.7700	11.9203 (78)	
West						1.6800	19.6403	0.7300	0.7000	0.7700	11.6845 (80)	
East						3.8000	19.6403	0.6800	0.7000	0.7700	24.6190 (76)	
Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488 (83)
Total gains	389.2271	438.9635	492.2034	545.2540	579.0465	568.2632	543.3802	505.7882	463.2020	409.8014	375.3910	371.1024 (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	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906
alpha	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260
util living area	0.9897	0.9779	0.9421	0.8441	0.6733	0.4868	0.3519	0.3948	0.6313	0.8985	0.9789	0.9922 (86)
MIT	20.2047	20.3681	20.6106	20.8459	20.9657	20.9958	20.9995	20.9990	20.9819	20.8037	20.4471	20.1549 (87)
Th 2	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870 (88)
util rest of house	0.9860	0.9701	0.9231	0.8019	0.6093	0.4113	0.2711	0.3084	0.5463	0.8582	0.9700	0.9893 (89)
MIT 2	19.0939	19.2978	19.5912	19.8523	19.9639	19.9852	19.9869	19.9868	19.9778	19.8175	19.3994	19.0312 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7230	19.9040	20.1685	20.4150	20.5313	20.5576	20.5604	20.5601	20.5465	20.3760	19.9928	19.6676 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7230	19.9040	20.1685	20.4150	20.5313	20.5576	20.5604	20.5601	20.5465	20.3760	19.9928	19.6676 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9847	0.9694	0.9269	0.8208	0.6444	0.4541	0.3169	0.3574	0.5941	0.8751	0.9700	0.9881 (94)
Ext temp.	383.2896	425.5188	456.2218	447.5234	373.1303	258.0262	172.1918	180.7675	275.1864	358.6207	364.1406	366.6947 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	670.9685	652.7386	594.6386	500.9515	384.2002	259.1799	172.2953	180.9819	280.4505	425.2991	560.8925	672.9076 (97)
Space heating requirement - total per year (kWh/year)	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (98c)
Space heating per m2	(98c) / (4) =											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (98)
Space heating fuel (main heating system)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating efficiency (main heating system 2)	214.0331	152.6917	102.9821	38.4682	8.2360	0.0000	0.0000	0.0000	0.0000	49.6087	141.6614	227.8224 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149 (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)
(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 (217)

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Fuel for water heating, kWh/month	51.7076	45.6786	48.3785	42.1534	40.6090	36.3147	35.6260	37.1872	37.7600	42.4409	45.5428	51.0904	(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	1.0568	0.9545	1.0568	1.0227	1.0568	1.0227	1.0568	1.0568	1.0227	1.0568	1.0227	1.0568	(231)
Lighting	11.5462	9.2628	8.3401	6.1103	4.7198	3.8561	4.3055	5.5965	7.2693	9.5377	10.7728	11.8671	(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												935.5037	(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												514.4890	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)													
mechanical ventilation fans (SFP = 0.1114)												12.4432	(230a)
Total electricity for the above, kWh/year												12.4432	(231)
Electricity for lighting (calculated in Appendix L)												93.1841	(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												1555.6199	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	935.5037	16.4900	154.2646	(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)	514.4890	16.4900	84.8392	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	12.4432	16.4900	2.0519	(249)
Energy for lighting	93.1841	16.4900	15.3661	(250)
Additional standing charges			0.0000	(251)
Total energy cost			256.5217	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1000	(257)
SAP value		82.1685	
SAP rating (Section 12)		82	(258)
SAP band		B	

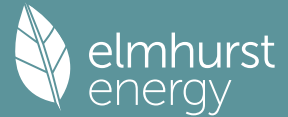
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	935.5037	0.1571	146.9351	(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)	514.4890	0.1411	72.5877	(264)
Space and water heating			219.5229	(265)
Pumps, fans and electric keep-hot	12.4432	0.1387	1.7260	(267)
Energy for lighting	93.1841	0.1443	13.4493	(268)
Total CO2, kg/year			234.6982	(272)
CO2 emissions per m2			6.0300	(273)
EI value			96.2538	
EI rating			96	(274)
EI band			A	

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

1. Overall dwelling characteristics

Full SAP Calculation Printout



Main dwelling		Area (m ²)	Storey height (m)	Volume (m ³)	
Ground floor		38.9500 (1b)	x 2.3500 (2b)	= 91.5325 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	38.9500				(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	91.5325 (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) =								Air changes per hour		
Pressure test									0.0000 / (5) =	0.0000 (8)	
Pressure Test Method										Yes	
Measured/design AP50										Blower Door	
Infiltration rate										2.5500 (17)	
Number of sides sheltered										0.1275 (18)	
										2 (19)	
Shelter factor									(20) = 1 - [0.075 x (19)] =	0.8500 (20)	
Infiltration rate adjusted to include shelter factor									(21) = (18) x (20) =	0.1084 (21)	

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1165	0.1138	0.1138	0.1057	0.1084	0.0921	0.0894	0.0894	0.0921	0.1030	0.1030	0.1057	(22b)
Mechanical extract ventilation - decentralised													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

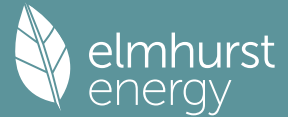
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
Door			2.1500	1.0000	2.1500			(26)
Window			4.2500	1.2357	5.2519			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			38.9500	0.1100	4.2845	75.0000	2921.2500	(28a)
Main	46.5400	10.2000	36.3400	0.1900	6.9046	110.0000	3997.4001	(29a)
Total net area of external elements Aum(A, m ²)			85.4900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.6289			(33)
Main dwelling								
Party Wall 1			25.8300	0.0000	0.0000	110.0000	2841.3000	(32)
Party Ceiling 1			38.9500			20.0000	779.0000	(32b)
Timber			25.7000			9.0000	231.3000	(32c)
Solid			16.9600			75.0000	1271.9999	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12042.2500	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							309.1720	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)				6.4900	0.0200	0.1298		
E3 Sill				6.4900	0.0300	0.1947		
E4 Jamb				20.1000	0.0260	0.5226		
E5 Ground floor (normal)				18.1100	0.0930	1.6842		
E7 Party floor between dwellings (in blocks of flats)				18.1100	0.0370	0.6701		
E16 Corner (normal)				7.7100	0.0510	0.3932		
E17 Corner (inverted - internal area greater than external area)				5.1400	-0.0910	-0.4677		
E18 Party wall between dwellings				5.1400	0.0650	0.3341		
P1 Party wall - Ground floor				10.0500	0.1080	1.0854		
E25 Staggered party wall between dwellings				5.1400	0.0440	0.2262		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7725	(36)
Point Thermal bridges							0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	28.4014	(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	
	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	15.1029	(38)
Heat transfer coeff	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	43.5043	(39)
Average = Sum(39)m / 12 =												43.5043	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	1.1169	(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													1.3787 (42)
Hot water usage for mixer showers													
	68.3111	67.2845	65.7886	62.9264	60.8141	58.4586	57.1197	58.6043	60.2317	62.7609	65.6845	68.0494	(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													
	28.7494	27.7040	26.6586	25.6131	24.5677	23.5223	23.5223	24.5677	25.6131	26.6586	27.7040	28.7494	(42c)
Average daily hot water use (litres/day)												89.1164	(43)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.0605	94.9885	92.4471	88.5395	85.3818	81.9809	80.6420	83.1720	85.8449	89.4194	93.3885	96.7988	(44)
Energy conte	153.7201	135.2624	142.0878	121.2062	114.9404	100.8050	97.5295	102.9843	105.8553	121.3413	133.0491	151.5635	(45)
Energy content (annual)	Total = Sum(45)m = 1480.3450												
Distribution loss	(46)m = 0.15 x (45)m												
Water storage loss (or HIU loss):	23.0580	20.2894	21.3132	18.1809	17.2411	15.1208	14.6294	15.4477	15.8783	18.2012	19.9574	22.7345	(46)
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149	(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	51.1119	44.9747	47.2442	40.3010	38.2177	33.5177	32.4286	34.2423	35.1969	40.3460	44.2388	50.3949	(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	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	82.7230	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1912	11.7163	9.5283	7.2135	5.3922	4.5523	4.9190	6.3938	8.5818	10.8966	12.7179	13.5578	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.4657	179.3072	174.6666	164.7873	152.3164	140.5955	132.7653	130.9237	135.5644	145.4437	157.9146	169.6354	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	44.6510	(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)	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	-55.1487	(71)
Water heating gains (Table 5)	68.6989	66.9267	63.5003	55.9737	51.3678	46.5523	43.5868	46.0246	48.8846	54.2285	61.4428	67.7350	(72)
Total internal gains	331.5811	330.1755	319.9205	300.1999	281.3018	263.9256	253.4964	255.5675	265.2561	282.7941	304.3006	323.1536	(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				0.7700	17.3606	0.7300	0.7000	0.7700	4.7338 (76)			
South				0.7200	41.2355	0.7300	0.7000	0.7700	10.5138 (78)			
West				1.6800	17.3606	0.7300	0.7000	0.7700	10.3283 (80)			
East				3.8000	17.3606	0.6800	0.7000	0.7700	21.7615 (76)			
Solar gains	50.9301	98.6013	163.1566	236.7253	280.5512	292.0481	272.8938	232.5520	192.6214	121.1034	64.5477	43.3264 (83)
Total gains	382.5112	428.7768	483.0771	536.9252	561.8530	555.9736	526.3902	488.1195	457.8775	403.8975	368.8484	366.4800 (84)

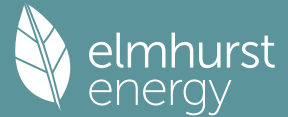
7. Mean internal temperature (heating season)

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	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	76.8906	
alpha	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	6.1260	
util living area	0.9880	0.9748	0.9326	0.8147	0.6200	0.4213	0.3139	0.3561	0.5964	0.8818	0.9752	0.9906 (86)	
MIT	20.2688	20.4230	20.6610	20.8839	20.9805	20.9984	20.9998	20.9995	20.9876	20.8365	20.5000	20.2240 (87)	
Th 2	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870	19.9870 (88)	
util rest of house	0.9833	0.9657	0.9100	0.7657	0.5496	0.3430	0.2303	0.2662	0.5077	0.8349	0.9644	0.9869 (89)	
MIT 2	19.1752	19.3666	19.6512	19.8912	19.9754	19.9865	19.9870	19.9869	19.9813	19.8524	19.4653	19.1190 (90)	
Living area fraction	19.7946	19.9649	20.2231	20.4535	20.5446	20.5596	20.5606	20.5604	fLA = Living area / (4) =				0.5664 (91)
MIT	19.7946	19.9649	20.2231	20.4535	20.5446	20.5596	20.5606	20.5604	20.5512	20.4097	20.0513	19.7448 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.7946	19.9649	20.2231	20.4535	20.5446	20.5596	20.5606	20.5604	20.5512	20.4097	20.0513	19.7448 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9823	0.9654	0.9159	0.7894	0.5889	0.3874	0.2777	0.3171	0.5578	0.8562	0.9652	0.9858	(94)
Useful gains	375.7279	413.9526	442.4476	423.8287	330.8864	215.3628	146.1595	154.8009	255.4218	345.8127	356.0042	361.2928	(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	639.2759	620.5846	562.2102	463.4708	336.9249	215.7636	146.2007	154.8944	258.9040	400.6623	532.9856	641.4624	(97)
Space heating kWh													

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Space heating requirement - total per year (kWh/year)	196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	833.7557 (98b)
Solar heating contribution - total per year (kWh/year)	196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												833.7557 (98c) / (4) =
Space heating per m2												21.4058 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462 (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)	196.0797	138.8567	89.1034	28.5423	4.4927	0.0000	0.0000	0.0000	0.0000	40.8081	127.4266	208.4462 (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	180.6715	159.6056	169.0392	147.2882	141.8918	126.8870	124.4809	129.9357	131.9373	148.2927	159.1311	178.5149 (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	51.7076	45.6786	48.3785	42.1534	40.6090	36.3147	35.6260	37.1872	37.7600	42.4409	45.5428	51.0904 (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	1.0568	0.9545	1.0568	1.0227	1.0568	1.0227	1.0568	1.0568	1.0227	1.0568	1.0227	1.0568 (231)
Lighting	11.5462	9.2628	8.3401	6.1103	4.7198	3.8561	4.3055	5.5965	7.2693	9.5377	10.7728	11.8671 (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												833.7557 (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												514.4890 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)												
mechanical ventilation fans (SFP = 0.1114)												12.4432 (230a)
Total electricity for the above, kWh/year												12.4432 (231)
Electricity for lighting (calculated in Appendix L)												93.1841 (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												1453.8719 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	833.7557	28.4300	237.0367 (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)	514.4890	28.4300	146.2692 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	12.4432	28.4300	3.5376 (249)
Energy for lighting	93.1841	28.4300	26.4922 (250)
Additional standing charges			0.0000 (251)
Total energy cost			413.3358 (255)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	833.7557	0.1574	131.2535 (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)	514.4890	0.1411	72.5877 (264)
Space and water heating			203.8412 (265)
Pumps, fans and electric keep-hot	12.4432	0.1387	1.7260 (267)
Energy for lighting	93.1841	0.1443	13.4493 (268)
Total CO2, kg/year			219.0166 (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	833.7557	1.5828	1319.6366 (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)	514.4890	1.5217	782.8969 (278)
Space and water heating			2102.5335 (279)
Pumps, fans and electric keep-hot	12.4432	1.5128	18.8241 (281)
Energy for lighting	93.1841	1.5338	142.9288 (282)
Total Primary energy kWh/year			2264.2864 (286)