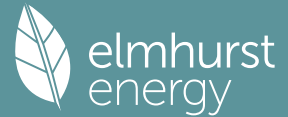


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Plot Reference	79596-03				Issued on Date	18/03/2026	
Assessment Reference	001		Plot Type Ref	GF Flat			
Plot Address	22 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	82 B	DER	6.24	TER	14.71		
Environmental	96 A	% DER < TER				57.58	
CO ₂ Emissions (t/year)	0.22	DFEE	35.42	TFEE	40.09		
Compliance Check	See BREL	% DFEE < TFEE				11.66	
% DPER < TPER	16.95	DPER	64.41	TPER	77.55		
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	40.9700	2.3500	96.2795
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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		3.7900	(17)
Infiltration rate		0.1895	(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) =	0.1611	(21)

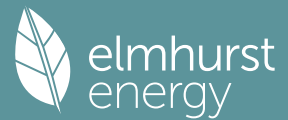
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2054	0.2013	0.1973	0.1772	0.1732	0.1530	0.1530	0.1490	0.1611	0.1732	0.1812	0.1893 (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			40.9700	0.1100	4.5067	75.0000	3072.7500 (28a)
Main	45.2100	10.2000	35.0100	0.1900	6.6519	110.0000	3851.0999 (29a)
Total net area of external elements Aum(A, m ²)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.5984	(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000	110.0000	2915.0000 (32)
Party Ceiling 1			40.9700			20.0000	819.4000 (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) =	12161.5498	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		296.8404	(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)	17.5900	0.0930	1.6359
E7 Party floor between dwellings (in blocks of flats)	17.5900	0.0370	0.6508
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	10.3100	0.1080	1.1135
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7330 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.3314 (37)

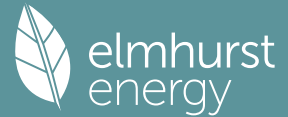
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	(38)
Heat transfer coeff	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	(39)
Average = Sum(39)m / 12 =													44.2175
HLP	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	(40)
HLP (average)													1.0793
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.4323 (42)
Hot water usage for mixer showers	69.6150	68.5688	67.0444	64.1275	61.9750	59.5745	58.2100	59.7230	61.3815	63.9589	66.9383	69.3483 (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	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987 (42c)
Average daily hot water use (litres/day)												90.8179 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	156.6551	137.8449	144.8007	123.5204	117.1349	102.7297	99.3916	104.9506	107.8764	123.6581	135.5894	154.4573 (44)
Energy content (annual)												1508.6094 (45)
Distribution loss (46)m = 0.15 x (45)m	23.4983	20.6767	21.7201	18.5281	17.5702	15.4095	14.9087	15.7426	16.1815	18.5487	20.3384	23.1686 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (64)
12Total per year (kWh/year)												1825.9404 (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	52.0878	45.8334	48.1462	41.0705	38.9474	34.1576	33.0477	34.8961	35.8689	41.1163	45.0835	51.3571 (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	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.0972	69.8577	63.0972	65.2005	63.0972	65.2005	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	123.9805	125.2670	122.0250	115.1232	106.4108	98.2224	92.7521	91.4655	94.7075	101.6094	110.3218	118.5102 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617 (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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940 (71)
Water heating gains (Table 5)	70.0105	68.2045	64.7127	57.0424	52.3486	47.4412	44.4190	46.9033	49.8179	55.2639	62.6160	69.0283 (72)
Total internal gains	301.5735	307.8145	294.3202	281.8513	266.3419	255.3493	244.7535	245.9514	254.2112	264.4558	282.6234	295.1210 (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	359.2196	416.6024	466.6031	526.9054	564.0866	559.6869	534.6373	496.1720	452.1571	391.4630	353.7138	343.0698 (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	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998
alpha	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933
util living area	0.9936	0.9838	0.9561	0.8655	0.6968	0.5017	0.3634	0.4089	0.6535	0.9181	0.9851	0.9951 (86)
MIT	20.1207	20.3038	20.5505	20.8179	20.9581	20.9949	20.9994	20.9988	20.9778	20.7685	20.3865	20.0747 (87)
Th 2	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178 (88)
util rest of house	0.9913	0.9781	0.9414	0.8276	0.6344	0.4266	0.2826	0.3222	0.5698	0.8841	0.9788	0.9933 (89)
MIT 2	19.0154	19.2459	19.5491	19.8535	19.9884	20.0155	20.0177	20.0175	20.0059	19.8098	19.3524	18.9571 (90)
Living area fraction	19.6359	19.8398	20.1113	20.3949	20.5328	20.5653	20.5688	20.5684	20.5515	20.3480	19.9329	19.5845 (92)
MIT	19.6359	19.8398	20.1113	20.3949	20.5328	20.5653	20.5688	20.5684	20.5515	20.3480	19.9329	19.5845 (93)
Temperature adjustment	19.6359	19.8398	20.1113	20.3949	20.5328	20.5653	20.5688	20.5684	20.5515	20.3480	19.9329	19.5845 (93)
adjusted MIT	19.6359	19.8398	20.1113	20.3949	20.5328	20.5653	20.5688	20.5684	20.5515	20.3480	19.9329	19.5845 (93)

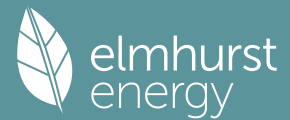
8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9901	0.9769	0.9430	0.8431	0.6679	0.4687	0.3280	0.3709	0.6163	0.8968	0.9781	0.9923 (94)
Useful gains	355.6624	406.9640	439.9954	444.2343	376.7564	262.3403	175.3572	184.0373	278.6577	351.0807	345.9638	340.4245 (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	678.1160	660.6018	601.8572	508.2770	390.5647	263.7716	175.4901	184.3151	285.2709	431.0322	567.4394	680.2653 (97)
Space heating kWh	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (98a)
Space heating requirement - total per year (kWh/year)												1058.9472
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	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1058.9472
Space heating per m2										(98c) / (4) =		25.8469 (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	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (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)	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (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	52.5476	46.4177	49.1549	42.8157	41.2370	36.8655	36.1590	37.7499	38.3385	43.1040	46.2698	51.9186 (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	1.1116	1.0041	1.1116	1.0758	1.1116	1.0758	1.1116	1.1116	1.0758	1.1116	1.0758	1.1116 (231)
Lighting	12.0998	9.7069	8.7400	6.4033	4.9461	4.0410	4.5120	5.8649	7.6179	9.9951	11.2894	12.4361 (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												1058.9472 (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	522.5782 (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)	13.0885 (230a)	
Total electricity for the above, kWh/year	13.0885 (231)	
Electricity for lighting (calculated in Appendix L)	97.6525 (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	1692.2663 (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	1058.9472	0.1569	166.1325 (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)	522.5782	0.1411	73.7331 (264)	
Space and water heating			239.8656 (265)	
Pumps, fans and electric keep-hot	13.0885	0.1387	1.8155 (267)	
Energy for lighting	97.6525	0.1443	14.0943 (268)	
Total CO2, kg/year			255.7754 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.2400 (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	1058.9472	1.5808	1673.9634 (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)	522.5782	1.5217	795.2216 (278)	
Space and water heating			2469.1850 (279)	
Pumps, fans and electric keep-hot	13.0885	1.5128	19.8003 (281)	
Energy for lighting	97.6525	1.5338	149.7826 (282)	
Total Primary energy kWh/year			2638.7680 (286)	
Dwelling Primary energy Rate (DPER)			64.4100 (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	40.9700 (1b)	x 2.3500 (2b)	= 96.2795 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	96.2795 (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) =	0.2077 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4577	(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) =	0.3891 (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	0.4961	0.4863	0.4766	0.4280	0.4182	0.3696	0.3696	0.3599	0.3891	0.4182	0.4377	0.4572 (22b)

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Effective ac 0.6230 0.6183 0.6136 0.5916 0.5875 0.5683 0.5683 0.5648 0.5757 0.5875 0.5958 0.6045 (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			8.0500	1.1450	9.2176		(27)
GF			40.9700	0.1300	5.3261		(28a)
Main	45.2100	10.2000	35.0100	0.1800	6.3018		(29a)
Total net area of external elements Aum (A, m2)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 22.9955		(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000		(32)

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

296.8404 (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)	17.5900	0.1600	2.8144
E7 Party floor between dwellings (in blocks of flats)	17.5900	0.0700	1.2313
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	10.3100	0.0800	0.8248
E25 Staggered party wall between dwellings	5.1400	0.0600	0.3084
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.3726 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.3681 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	19.7954	19.6436	19.4948	18.7959	18.6651	18.0564	18.0564	17.9437	18.2909	18.6651	18.9296	19.2062 (38)
Heat transfer coeff	50.1634	50.0116	49.8628	49.1639	49.0332	48.4245	48.4245	48.3117	48.6589	49.0332	49.2977	49.5742 (39)
Average = Sum(39)m / 12 =												49.1633
HLP	1.2244	1.2207	1.2171	1.2000	1.1968	1.1819	1.1819	1.1792	1.1877	1.1968	1.2033	Dec 1.2100 (40)
HLP (average)												1.2000
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4323 (42)
Hot water usage for mixer showers	61.8800	60.9501	59.5950	57.0022	55.0889	52.9551	51.7422	53.0871	54.5613	56.8523	59.5008	61.6429 (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	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987 (42c)
Average daily hot water use (litres/day)												83.6865 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	91.1787	89.1834	86.7629	83.1047	80.1259	76.9267	75.7139	78.1242	80.6638	84.0202	87.7340	90.9416 (44)
Distribution loss (46)m = 0.15 x (45)m	144.4048	126.9959	133.3513	113.7662	107.8649	94.5904	91.5694	96.7340	99.4665	114.0146	124.9932	142.3926 (45)
Water storage loss (or HIU loss):										Total = Sum(45)m =		1390.1439
Store volume	21.6607	19.0494	20.0027	17.0649	16.1797	14.1886	13.7354	14.5101	14.9200	17.1022	18.7490	21.3589 (46)
a) If manufacturer declared loss factor is known (kWh/day):												150.0000 (47)
Temperature factor from Table 2b												1.3938 (48)
Enter (49) or (54) in (55)												0.5400 (49)
Total storage loss												0.7527 (55)
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 (56)
Primary 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 (57)
Combi 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)
Total heat required for water heating calculated for each month	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)
WWHRS	190.9997	169.0816	179.9462	158.8580	154.4598	139.6822	138.1643	143.3289	144.5583	160.6095	170.0851	188.9875 (62)
PV diverter	-28.2890	-25.0190	-26.1984	-21.6933	-20.2174	-17.3002	-16.2162	-17.2443	-17.8994	-21.1015	-23.9054	-27.7651 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	162.7107	144.0627	153.7477	137.1647	134.2424	122.3821	121.9481	126.0847	126.6589	139.5081	146.1797	161.2224 (64)
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =				1675.9121 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1676 (64)
												0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	85.2905	75.8947	81.6152	73.9007	73.1410	67.5248	67.7227	69.4400	69.1461	75.1858	77.6337	84.6215 (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	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175 (66)
Lighting gains (calculated in Appendix L, equation L9a), also see Table 5												
	63.0972	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	123.9805	125.2670	122.0250	115.1232	106.4108	98.2224	92.7521	91.4655	94.7075	101.6094	110.3218	118.5102 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617 (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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940 (71)
Water heating gains (Table 5)	114.6378	112.9386	109.6979	102.6399	98.3078	93.7844	91.0252	93.3333	96.0362	101.0562	107.8246	113.7385 (72)
Total internal gains	349.2008	355.5485	342.3054	330.4488	315.3011	301.6926	291.3597	292.3813	300.4295	313.2480	330.8321	342.8312 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W

North					1.0800	10.6334	0.6300	0.7000			0.7700	3.5097 (74)
East					4.5700	19.6403	0.6300	0.7000			0.7700	27.4306 (76)
South					0.7200	46.7521	0.6300	0.7000			0.7700	10.2874 (78)
West					1.6800	19.6403	0.6300	0.7000			0.7700	10.0839 (80)

Solar gains	51.3116	96.9416	153.7154	218.8253	265.9535	271.8563	258.9408	223.4747	176.6836	113.2353	63.2999	42.6652 (83)
Total gains	400.5123	452.4901	496.0208	549.2741	581.2546	573.5489	550.3005	515.8560	477.1131	426.4834	394.1320	385.4964 (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	67.3441	67.5485	67.7500	68.7131	68.8964	69.7624	69.7624	69.9252	69.4263	68.8964	68.5267	68.1444
alpha	5.4896	5.5032	5.5167	5.5809	5.5931	5.6508	5.6508	5.6617	5.6284	5.5931	5.5684	5.5430
util living area	0.9908	0.9812	0.9570	0.8797	0.7300	0.5326	0.3861	0.4287	0.6717	0.9130	0.9799	0.9924 (86)
MIT	20.0070	20.1860	20.4401	20.7475	20.9283	20.9899	20.9986	20.9976	20.9655	20.7273	20.3243	19.9836 (87)
Th 2	19.9005	19.9035	19.9064	19.9200	19.9226	19.9345	19.9345	19.9367	19.9299	19.9226	19.9174	19.9120 (88)
util rest of house	0.9875	0.9745	0.9420	0.8422	0.6635	0.4476	0.2932	0.3308	0.5812	0.8761	0.9716	0.9897 (89)
MIT 2	18.7818	19.0088	19.3241	19.6902	19.8716	19.9299	19.9341	19.9360	19.9114	19.6803	19.1955	18.7608 (90)
Living area fraction	19.4696	19.6696	19.9506	20.2838	20.4649	20.5249	20.5317	20.5320	20.5031	20.2680	19.8292	19.4473 (92)
MIT	19.4696	19.6696	19.9506	20.2838	20.4649	20.5249	20.5317	20.5320	20.5031	20.2680	19.8292	19.4473 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4696	19.6696	19.9506	20.2838	20.4649	20.5249	20.5317	20.5320	20.5031	20.2680	19.8292	19.4473 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9858	0.9728	0.9427	0.8559	0.6981	0.4952	0.3454	0.3859	0.6311	0.8894	0.9707	0.9881 (94)
Useful gains	394.8279	440.1636	467.5819	470.1127	405.8027	284.0218	190.0818	199.0545	301.1270	379.2967	382.5892	380.9188 (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	760.9591	738.6526	670.6843	559.6701	429.7686	286.9123	190.3914	199.6221	311.5688	474.0547	627.5193	755.8712 (97)
Space heating kWh	272.4016	200.5846	151.1082	64.4814	17.8307	0.0000	0.0000	0.0000	0.0000	70.4999	176.3497	278.9646 (98a)
Space heating requirement - total per year (kWh/year)												1232.2207
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	272.4016	200.5846	151.1082	64.4814	17.8307	0.0000	0.0000	0.0000	0.0000	70.4999	176.3497	278.9646 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1232.2207
Space heating per m ²										(98c) / (4) =		30.0762 (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	272.4016	200.5846	151.1082	64.4814	17.8307	0.0000	0.0000	0.0000	0.0000	70.4999	176.3497	278.9646 (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)	295.1264	217.3181	163.7142	69.8607	19.3182	0.0000	0.0000	0.0000	0.0000	76.3813	191.0614	302.2368 (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	162.7107	144.0627	153.7477	137.1647	134.2424	122.3821	121.9481	126.0847	126.6589	139.5081	146.1797	161.2224 (64)
Efficiency of water heater (217)m	85.2064	84.8022	84.0210	82.4729	80.7597	79.8000	79.8000	79.8000	79.8000	82.6107	84.4816	79.8000 (216)
Fuel for water heating, kWh/month	190.9606	169.8808	182.9874	166.3148	166.2245	153.3610	152.8172	158.0008	158.7204	168.8740	173.0313	189.0564 (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	7.0685	7.3041	7.0685	7.3041	7.3041 (231)
Lighting	13.1104	10.5176	9.4699	6.9381	5.3592	4.3785	4.8888	6.3547	8.2541	10.8298	12.2323	13.4747 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-19.7219	-28.0974	-40.8370	-46.4898	-50.6838	-47.5806	-47.0597	-44.1873	-39.1524	-32.4522	-21.8109	-17.0219 (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	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	-10.2722	-21.7025	-43.2824	-65.1951	-86.3474	-85.6603	-72.4089	-52.9601	-31.0242	-13.7174	-8.1107		(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												1335.0170	(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												2030.2293	(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)												105.8081	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1012.5225	(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												2544.5319	(238)

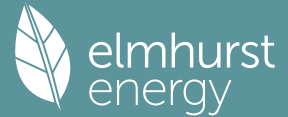
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1335.0170	0.2100	280.3536	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2030.2293	0.2100	426.3481	(264)
Space and water heating			706.7017	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	105.8081	0.1443	15.2714	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-435.0948	0.1343	-58.4370	
PV Unit electricity exported	-577.4276	0.1258	-72.6578	
Total			-131.0948	(269)
Total CO2, kg/year			602.8076	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.7100	(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	1335.0170	1.1300	1508.5692	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2030.2293	1.1300	2294.1591	(278)
Space and water heating			3802.7283	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	105.8081	1.5338	162.2920	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-435.0948	1.4964	-651.0611	
PV Unit electricity exported	-577.4276	0.4619	-266.7034	
Total			-917.7645	(283)
Total Primary energy kWh/year			3177.3566	(286)
Target Primary Energy Rate (TPER)			77.5500	(287)

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Plot Reference	79596-03			Issued on Date	18/03/2026
Assessment Reference	001	Plot Type Ref	GF Flat		
Plot Address	22 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2
SAP Rating	82 B	DER	6.24	TER	14.71
Environmental	96 A	% DER < TER			57.58
CO ₂ Emissions (t/year)	0.22	DFEE	35.42	TFEE	40.09
Compliance Check	See BREL	% DFEE < TFEE			11.66
% DPER < TPER	16.95	DPER	64.41	TPER	77.55
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	40.9700 (1b)	2.3500 (2b)	96.2795 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		96.2795 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	96.2795 (5)

2. Ventilation rate

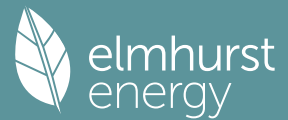
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.2077 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.7900 (17)
Infiltration rate	0.3972 (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) = 0.3376 (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	0.4305	0.4221	0.4136	0.3714	0.3630	0.3208	0.3208	0.3123	0.3376	0.3630	0.3798	0.3967 (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	0.5927	0.5891	0.5855	0.5690	0.5659	0.5514	0.5514	0.5488	0.5570	0.5659	0.5721	0.5787 (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			40.9700	0.1100	4.5067	75.0000	3072.7500 (28a)
Main	45.2100	10.2000	35.0100	0.1900	6.6519	110.0000	3851.0999 (29a)
Total net area of external elements Aum(A, m ²)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 23.5984		(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000	110.0000	2915.0000 (32)
Party Ceiling 1			40.9700			20.0000	819.4000 (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) =	12161.5498 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.8404 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.4900	0.0200	0.1298	

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E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	17.5900	0.0930	1.6359
E7 Party floor between dwellings (in blocks of flats)	17.5900	0.0370	0.6508
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	10.3100	0.1080	1.1135
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7330 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.3314 (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	18.8302	18.7159	18.6039	18.0775	17.9790	17.5206	17.5206	17.4357	17.6972	17.9790	18.1783	18.3865 (38)
Average = Sum(39)m / 12 =	47.1616	47.0473	46.9353	46.4089	46.3104	45.8520	45.8520	45.7671	46.0286	46.3104	46.5096	46.7179 (39)
												46.4084
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1511	1.1483	1.1456	1.1328	1.1303	1.1192	1.1192	1.1171	1.1235	1.1303	1.1352	1.1403 (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												1.4323 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	20.8659	20.5561	20.1197	19.3151	18.7126	18.0445	17.6836	18.1170	18.5888	19.3036	20.1248	20.7954 (42b)
Hot water usage for other uses	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987 (42c)
Average daily hot water use (litres/day)												45.9812 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	50.1646	48.7893	47.2875	45.4175	43.7496	42.0161	41.6553	43.1540	44.6913	46.4715	48.3581	50.0941 (44)
Energy content (annual)	79.4485	69.4754	72.6792	62.1743	58.8954	51.6638	50.3785	53.4337	55.1088	63.0614	68.8950	78.4353 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 763.6492
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
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	67.5312	59.0541	61.7773	52.8482	50.0611	43.9142	42.8217	45.4187	46.8425	53.6022	58.5608	66.6700 (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	67.5312	59.0541	61.7773	52.8482	50.0611	43.9142	42.8217	45.4187	46.8425	53.6022	58.5608	66.6700 (64)
12Total per year (kWh/year)												649.1019 (64)
Electric shower(s)	38.6284	34.4182	37.5833	35.8653	36.5383	34.8540	36.0158	36.5383	35.8653	37.5833	36.8766	38.6284 (64a)
Heat gains from water heating, kWh/month	26.5399	23.3681	24.8402	22.1784	21.6499	19.6921	19.7094	20.4892	20.6770	22.7964	23.8593	26.3246 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 439.3953 (64a)												

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.0972	69.8577	63.0972	65.2005	63.0972	65.2005	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	123.9805	125.2670	122.0250	115.1232	106.4108	98.2224	92.7521	91.4655	94.7075	101.6094	110.3218	118.5102 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617 (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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940 (71)
Water heating gains (Table 5)	35.6719	34.7739	33.3873	30.8033	29.0993	27.3501	26.4911	27.5393	28.7180	30.6403	33.1380	35.3825 (72)
Total internal gains	267.2349	274.3838	262.9948	255.6122	243.0925	235.2582	226.8256	226.5873	233.1113	239.8322	253.1455	261.4751 (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	324.8809	383.1718	435.2777	500.6663	540.8372	539.5959	516.7094	476.8080	431.0572	366.8395	324.2358	309.4239 (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	71.6304	71.8045	71.9759	72.7922	72.9470	73.6764	73.6764	73.8130	73.3937	72.9470	72.6346	72.3108
alpha	5.7754	5.7870	5.7984	5.8528	5.8631	5.9118	5.9118	5.9209	5.8929	5.8631	5.8423	5.8207
util living area	0.9965	0.9903	0.9716	0.8983	0.7424	0.5370	0.3895	0.4396	0.7003	0.9429	0.9911	0.9973 (86)
MIT	19.9431	20.1383	20.4125	20.7445	20.9333	20.9915	20.9989	20.9979	20.9640	20.6897	20.2573	19.9129 (87)
Th 2	19.9593	19.9616	19.9638	19.9742	19.9761	19.9852	19.9852	19.9869	19.9817	19.9761	19.9722	19.9681 (88)
util rest of house	0.9951	0.9867	0.9611	0.8650	0.6784	0.4552	0.3002	0.3439	0.6123	0.9158	0.9871	0.9963 (89)
MIT 2	19.0132	19.2081	19.4767	19.7894	19.9387	19.9822	19.9850	19.9865	19.9662	19.7515	19.3357	18.9903 (90)
Living area fraction									fLA = Living area /	(4) =		0.5614 (91)
MIT	19.5352	19.7303	20.0020	20.3256	20.4970	20.5488	20.5542	20.5542	20.5264	20.2782	19.8531	19.5083 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5352	19.7303	20.0020	20.3256	20.4970	20.5488	20.5542	20.5542	20.5264	20.2782	19.8531	19.5083 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9944	0.9857	0.9615	0.8774	0.7121	0.5010	0.3504	0.3977	0.6609	0.9249	0.9865	0.9957 (94)
Useful gains	323.0547	377.6941	418.5369	439.2925	385.1195	270.3528	181.0670	189.6328	284.8927	339.2994	319.8514	308.0814 (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	718.5174	697.7273	633.7208	530.2486	407.3946	272.7645	181.3081	190.1278	295.7960	448.2007	593.1402	715.1701 (97)
Space heating kWh	294.2242	215.0623	160.0968	65.4884	16.5727	0.0000	0.0000	0.0000	0.0000	81.0225	196.7680	302.8740 (98a)
Space heating requirement - total per year (kWh/year)												1332.1090
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	294.2242	215.0623	160.0968	65.4884	16.5727	0.0000	0.0000	0.0000	0.0000	81.0225	196.7680	302.8740 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1332.1090
Space heating per m2										(98c) / (4) =		32.5143 (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	431.0088	339.3048	347.8300	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9583	0.9826	0.9719	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	413.0242	333.4014	338.0538	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	608.8642	583.3911	537.9482	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	141.0048	185.9923	148.7214	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	35.2512	46.4981	37.1804	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												118.9296 (107)
Energy for space heating												32.5143 (99)
Energy for space cooling												2.9028 (108)
Total												35.4171 (109)
Fabric Energy Efficiency (DFEE)												35.4 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

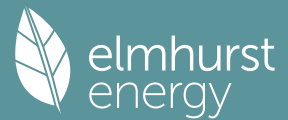
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	40.9700 (1b)	x 2.3500 (2b)	= 96.2795 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	96.2795 (5)

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) =	0.2077 (8)
Pressure Test Method												Yes	
Measured/design AP50												Blower Door	
Infiltration rate												5.0000 (17)	
Number of sides sheltered												0.4577 (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) =	0.3891 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)	
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)	
	0.4961	0.4863	0.4766	0.4280	0.4182	0.3696	0.3696	0.3599	0.3891	0.4182	0.4377	0.4572 (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	0.6230	0.6183	0.6136	0.5916	0.5875	0.5683	0.5683	0.5648	0.5757	0.5875	0.5958	0.6045 (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			8.0500	1.1450	9.2176			(27)
GF			40.9700	0.1300	5.3261			(28a)
Main	45.2100	10.2000	35.0100	0.1800	6.3018			(29a)
Total net area of external elements Aum(A, m2)			86.1800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.9955			(33)
Main dwelling								
Party Wall 1			26.5000	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								296.8404 (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)				17.5900	0.1600	2.8144		
E7 Party floor between dwellings (in blocks of flats)				17.5900	0.0700	1.2313		
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				10.3100	0.0800	0.8248		
E25 Staggered party wall between dwellings				5.1400	0.0600	0.3084		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.3726 (36)	
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	30.3681 (37)

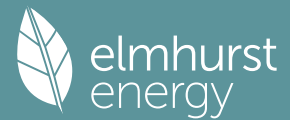
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	19.7954	19.6436	19.4948	18.7959	18.6651	18.0564	18.0564	17.9437	18.2909	18.6651	18.9296	19.2062 (38)	
Average = Sum(39)m / 12 =	50.1634	50.0116	49.8628	49.1639	49.0332	48.4245	48.4245	48.3117	48.6589	49.0332	49.2977	49.5742 (39)	
												49.1633	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2244	1.2207	1.2171	1.2000	1.1968	1.1819	1.1819	1.1792	1.1877	1.1968	1.2033	1.2100 (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												1.4323 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	20.8659	20.5561	20.1197	19.3151	18.7126	18.0445	17.6836	18.1170	18.5888	19.3036	20.1248	20.7954 (42b)
Hot water usage for other uses	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987 (42c)
Average daily hot water use (litres/day)												45.9812 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	50.1646	48.7893	47.2875	45.4175	43.7496	42.0161	41.6553	43.1540	44.6913	46.4715	48.3581	50.0941 (44)
Distribution loss (46)m = 0.15 x (45)m	79.4485	69.4754	72.6792	62.1743	58.8954	51.6638	50.3785	53.4337	55.1088	63.0614	68.8950	78.4353 (45)
	Total = Sum(45)m =											763.6492
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
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	67.5312	59.0541	61.7773	52.8482	50.0611	43.9142	42.8217	45.4187	46.8425	53.6022	58.5608	66.6700 (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	67.5312	59.0541	61.7773	52.8482	50.0611	43.9142	42.8217	45.4187	46.8425	53.6022	58.5608	66.6700 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											649.1019 (64)
Electric shower(s)	38.6284	34.4182	37.5833	35.8653	36.5383	34.8540	36.0158	36.5383	35.8653	37.5833	36.8766	38.6284 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											439.3953 (64a)
Heat gains from water heating, kWh/month	26.5399	23.3681	24.8402	22.1784	21.6499	19.6921	19.7094	20.4892	20.6770	22.7964	23.8593	26.3246 (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	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.0972	69.8577	63.0972	65.2005	63.0972	65.2005	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	123.9805	125.2670	122.0250	115.1232	106.4108	98.2224	92.7521	91.4655	94.7075	101.6094	110.3218	118.5102 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617 (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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940 (71)
Water heating gains (Table 5)	35.6719	34.7739	33.3873	30.8033	29.0993	27.3501	26.4911	27.5393	28.7180	30.6403	33.1380	35.3825 (72)
Total internal gains	267.2349	274.3838	262.9948	255.6122	243.0925	235.2582	226.8256	226.5873	233.1113	239.8322	253.1455	261.4751 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
North	1.0800		10.6334		0.6300		0.7000		0.7700		3.5097 (74)	
East	4.5700		19.6403		0.6300		0.7000		0.7700		27.4306 (76)	
South	0.7200		46.7521		0.6300		0.7000		0.7700		10.2874 (78)	
West	1.6800		19.6403		0.6300		0.7000		0.7700		10.0839 (80)	
Solar gains	51.3116	96.9416	153.7154	218.8253	265.9535	271.8563	258.9408	223.4747	176.6836	113.2353	63.2999	42.6652 (83)
Total gains	318.5465	371.3254	416.7103	474.4375	509.0460	507.1145	485.7664	450.0620	409.7948	353.0675	316.4453	304.1403 (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	67.3441	67.5485	67.7500	68.7131	68.8964	69.7624	69.7624	69.9252	69.4263	68.8964	68.5267	68.1444
alpha	5.4896	5.5032	5.5167	5.5809	5.5931	5.6508	5.6508	5.6617	5.6284	5.5931	5.5684	5.5430
util living area	0.9969	0.9923	0.9792	0.9260	0.7980	0.5959	0.4363	0.4891	0.7535	0.9568	0.9927	0.9976 (86)
MIT	19.8284	20.0158	20.2897	20.6483	20.8874	20.9824	20.9974	20.9953	20.9389	20.6106	20.1613	19.8048 (87)
Th 2	19.9005	19.9035	19.9064	19.9200	19.9226	19.9345	19.9345	19.9367	19.9299	19.9226	19.9174	19.9120 (88)
util rest of house	0.9957	0.9894	0.9709	0.8983	0.7351	0.5038	0.3320	0.3787	0.6628	0.9344	0.9893	0.9967 (89)
MIT 2	18.8523	19.0404	19.3113	19.6586	19.8570	19.9280	19.9340	19.9357	19.9025	19.6348	19.1969	18.8379 (90)
Living area fraction	19.4003	19.5880	19.8606	20.2142	20.4354	20.5200	20.5310	20.5305	20.4844	20.1826	19.7383	19.3807 (92)
Temperature adjustment	19.4003	19.5880	19.8606	20.2142	20.4354	20.5200	20.5310	20.5305	20.4844	20.1826	19.7383	19.3807 (93)
adjusted MIT	19.4003	19.5880	19.8606	20.2142	20.4354	20.5200	20.5310	20.5305	20.4844	20.1826	19.7383	19.3807 (93)

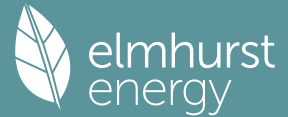
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9950	0.9883	0.9705	0.9067	0.7667	0.5553	0.3907	0.4409	0.7122	0.9407	0.9885	0.9961 (94)
Useful gains	316.9521	366.9743	404.4057	430.1889	390.2783	281.5937	189.7730	198.4361	291.8464	332.1406	312.8220	302.9426 (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	757.4816	734.5697	666.1959	556.2513	428.3266	286.6709	190.3556	199.5523	310.6562	469.8654	623.0408	752.5741 (97)
Space heating kWh	327.7540	247.0241	194.7719	90.7649	28.3079	0.0000	0.0000	0.0000	0.0000	102.4673	223.3575	334.5258 (98a)
Space heating requirement - total per year (kWh/year)												1548.9735
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	327.7540	247.0241	194.7719	90.7649	28.3079	0.0000	0.0000	0.0000	0.0000	102.4673	223.3575	334.5258 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1548.9735
Space heating per m ²										(98c) / (4) =		37.8075 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	455.1900	358.3411	367.1693	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9276	0.9664	0.9496	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	422.2286	346.3151	348.6817	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	570.8990	547.2239	506.6866	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	107.0427	149.4762	117.5557	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									fc = cooled area /	(4) =		1.0000 (105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	26.7607	37.3690	29.3889	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												93.5186 (107)
Energy for space cooling												37.8075 (99)
Total												2.2826 (108)
												40.0901 (109)

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Plot Reference	79596-03			Issued on Date	18/03/2026
Assessment Reference	001	Plot Type Ref	GF Flat		
Plot Address	22 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2
SAP Rating	82 B	DER	6.24	TER	14.71
Environmental	96 A	% DER < TER			57.58
CO ₂ Emissions (t/year)	0.22	DFEE	35.42	TFEE	40.09
Compliance Check	See BREL	% DFEE < TFEE			11.66
% DPER < TPER	16.95	DPER	64.41	TPER	77.55
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	40.9700 (1b)	2.3500 (2b)	96.2795 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		96.2795 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 96.2795 (5)

2. Ventilation rate

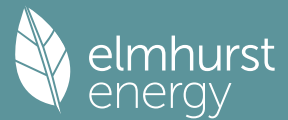
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	3.7900 (17)
Infiltration rate	0.1895 (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) = 0.1611 (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	0.2054	0.2013	0.1973	0.1772	0.1732	0.1530	0.1530	0.1490	0.1611	0.1732	0.1812	0.1893 (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			40.9700	0.1100	4.5067	75.0000	3072.7500 (28a)
Main	45.2100	10.2000	35.0100	0.1900	6.6519	110.0000	3851.0999 (29a)
Total net area of external elements Aum(A, m ²)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 23.5984		(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000	110.0000	2915.0000 (32)
Party Ceiling 1			40.9700			20.0000	819.4000 (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) =	12161.5498 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							296.8404 (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)	17.5900	0.0930	1.6359
E7 Party floor between dwellings (in blocks of flats)	17.5900	0.0370	0.6508
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	10.3100	0.1080	1.1135
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7330 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.3314 (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	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	(38)
Heat transfer coeff	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	(39)
Average = Sum(39)m / 12 =													44.2175
HLP	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	(40)
HLP (average)													1.0793
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4323 (42)
Hot water usage for mixer showers	69.6150	68.5688	67.0444	64.1275	61.9750	59.5745	58.2100	59.7230	61.3815	63.9589	66.9383	69.3483	(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	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987	(42c)
Average daily hot water use (litres/day)													90.8179 (43)
Daily hot water use	98.9137	96.8021	94.2122	90.2300	87.0120	83.5461	82.1817	84.7600	87.4839	91.1267	95.1716	98.6470	(44)
Energy conte	156.6551	137.8449	144.8007	123.5204	117.1349	102.7297	99.3916	104.9506	107.8764	123.6581	135.5894	154.4573	(45)
Energy content (annual)													Total = Sum(45)m = 1508.6094
Distribution loss (46)m = 0.15 x (45)m	23.4983	20.6767	21.7201	18.5281	17.5702	15.4095	14.9087	15.7426	16.1815	18.5487	20.3384	23.1686	(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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	(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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	(64)
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 1825.9404 (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	1826 (64)
Heat gains from water heating, kWh/month	52.0878	45.8334	48.1462	41.0705	38.9474	34.1576	33.0477	34.8961	35.8689	41.1163	45.0835	51.3571	(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	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.0972	69.8577	63.0972	65.2005	63.0972	65.2005	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	123.9805	125.2670	122.0250	115.1232	106.4108	98.2224	92.7521	91.4655	94.7075	101.6094	110.3218	118.5102	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	(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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	(71)
Water heating gains (Table 5)	70.0105	68.2045	64.7127	57.0424	52.3486	47.4412	44.4190	46.9033	49.8179	55.2639	62.6160	69.0283	(72)
Total internal gains	301.5735	307.8145	294.3202	281.8513	266.3419	255.3493	244.7535	245.9514	254.2112	264.4558	282.6234	295.1210	(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	359.2196	416.6024	466.6031	526.9054	564.0866	559.6869	534.6373	496.1720	452.1571	391.4630	353.7138	343.0698 (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	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998
alpha	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933
util living area	0.9936	0.9838	0.9561	0.8655	0.6968	0.5017	0.3634	0.4089	0.6535	0.9181	0.9851	0.9951 (86)
MIT	20.1207	20.3038	20.5505	20.8179	20.9581	20.9949	20.9994	20.9988	20.9778	20.7685	20.3865	20.0747 (87)
Th 2	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178 (88)
util rest of house	0.9913	0.9781	0.9414	0.8276	0.6344	0.4266	0.2826	0.3222	0.5698	0.8841	0.9788	0.9933 (89)
MIT 2	19.0154	19.2459	19.5491	19.8535	19.9884	20.0155	20.0177	20.0175	20.0059	19.8098	19.3524	18.9571 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.6359	19.8398	20.1113	20.3949	20.5328	20.5653	20.5688	20.5684	20.5515	20.3480	19.9329	19.5845 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.6359	19.8398	20.1113	20.3949	20.5328	20.5653	20.5688	20.5684	20.5515	20.3480	19.9329	19.5845 (93)

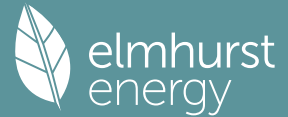
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9901	0.9769	0.9430	0.8431	0.6679	0.4687	0.3280	0.3709	0.6163	0.8968	0.9781	0.9923 (94)
Useful gains	355.6624	406.9640	439.9954	444.2343	376.7564	262.3403	175.3572	184.0373	278.6577	351.0807	345.9638	340.4245 (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	678.1160	660.6018	601.8572	508.2770	390.5647	263.7716	175.4901	184.3151	285.2709	431.0322	567.4394	680.2653 (97)
Space heating kWh	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (98a)
Space heating requirement - total per year (kWh/year)												1058.9472
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	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1058.9472
Space heating per m2												(98c) / (4) = 25.8469 (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	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (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)	239.9055	170.4446	120.4252	46.1107	10.2734	0.0000	0.0000	0.0000	0.0000	59.4839	159.4624	252.8415 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (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	52.5476	46.4177	49.1549	42.8157	41.2370	36.8655	36.1590	37.7499	38.3385	43.1040	46.2698	51.9186 (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	1.1116	1.0041	1.1116	1.0758	1.1116	1.0758	1.1116	1.1116	1.0758	1.1116	1.0758	1.1116 (231)
Lighting	12.0998	9.7069	8.7400	6.4033	4.9461	4.0410	4.5120	5.8649	7.6179	9.9951	11.2894	12.4361 (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												1058.9472 (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	522.5782 (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)	13.0885 (230a)	
Total electricity for the above, kWh/year	13.0885 (231)	
Electricity for lighting (calculated in Appendix L)	97.6525 (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	1692.2663 (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	1058.9472	0.1569	166.1325 (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)	522.5782	0.1411	73.7331 (264)	
Space and water heating			239.8656 (265)	
Pumps, fans and electric keep-hot	13.0885	0.1387	1.8155 (267)	
Energy for lighting	97.6525	0.1443	14.0943 (268)	
Total CO2, kg/year			255.7754 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.2400 (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	1058.9472	1.5808	1673.9634 (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)	522.5782	1.5217	795.2216 (278)	
Space and water heating			2469.1850 (279)	
Pumps, fans and electric keep-hot	13.0885	1.5128	19.8003 (281)	
Energy for lighting	97.6525	1.5338	149.7826 (282)	
Total Primary energy kWh/year			2638.7680 (286)	
Dwelling Primary energy Rate (DPER)			64.4100 (287)	

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

1. Overall dwelling characteristics

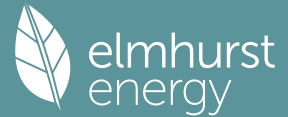
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	40.9700 (1b)	x 2.3500 (2b)	= 96.2795 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	96.2795 (5)	

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) =	0.2077 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4577	(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) =	0.3891 (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	0.4961	0.4863	0.4766	0.4280	0.4182	0.3696	0.3696	0.3599	0.3891	0.4182	0.4377	0.4572 (22b)

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Effective ac 0.6230 0.6183 0.6136 0.5916 0.5875 0.5683 0.5683 0.5648 0.5757 0.5875 0.5958 0.6045 (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			8.0500	1.1450	9.2176		(27)
GF			40.9700	0.1300	5.3261		(28a)
Main	45.2100	10.2000	35.0100	0.1800	6.3018		(29a)
Total net area of external elements Aum (A, m2)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 22.9955		(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000		(32)

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

296.8404 (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)	17.5900	0.1600	2.8144
E7 Party floor between dwellings (in blocks of flats)	17.5900	0.0700	1.2313
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	10.3100	0.0800	0.8248
E25 Staggered party wall between dwellings	5.1400	0.0600	0.3084
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.3726 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.3681 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	19.7954	19.6436	19.4948	18.7959	18.6651	18.0564	18.0564	17.9437	18.2909	18.6651	18.9296	19.2062 (38)
Heat transfer coeff	50.1634	50.0116	49.8628	49.1639	49.0332	48.4245	48.4245	48.3117	48.6589	49.0332	49.2977	49.5742 (39)
Average = Sum(39)m / 12 =												49.1633
HLP	1.2244	1.2207	1.2171	1.2000	1.1968	1.1819	1.1819	1.1792	1.1877	1.1968	1.2033	Dec 1.2100 (40)
HLP (average)												1.2000
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

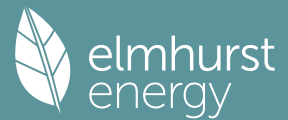
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4323 (42)
Hot water usage for mixer showers	61.8800	60.9501	59.5950	57.0022	55.0889	52.9551	51.7422	53.0871	54.5613	56.8523	59.5008	61.6429 (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	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987 (42c)
Average daily hot water use (litres/day)												83.6865 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	91.1787	89.1834	86.7629	83.1047	80.1259	76.9267	75.7139	78.1242	80.6638	84.0202	87.7340	90.9416 (44)
Energy content (annual)	144.4048	126.9959	133.3513	113.7662	107.8649	94.5904	91.5694	96.7340	99.4665	114.0146	124.9932	142.3926 (45)
Distribution loss (46)m = 0.15 x (45)m	21.6607	19.0494	20.0027	17.0649	16.1797	14.1886	13.7354	14.5101	14.9200	17.1022	18.7490	21.3589 (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	190.9997	169.0816	179.9462	158.8580	154.4598	139.6822	138.1643	143.3289	144.5583	160.6095	170.0851	188.9875 (62)
WWHRS	-28.2890	-25.0190	-26.1984	-21.6933	-20.2174	-17.3002	-16.2162	-17.2443	-17.8994	-21.1015	-23.9054	-27.7651 (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	162.7107	144.0627	153.7477	137.1647	134.2424	122.3821	121.9481	126.0847	126.6589	139.5081	146.1797	161.2224 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 1675.9121 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	85.2905	75.8947	81.6152	73.9007	73.1410	67.5248	67.7227	69.4400	69.1461	75.1858	77.6337	84.6215 (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	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175	71.6175 (66)
Lighting gains (calculated in Appendix L, equation L9a), also see Table 5												
	63.0972	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972	63.0972	65.2005	63.0972	65.2005	63.0972 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	123.9805	125.2670	122.0250	115.1232	106.4108	98.2224	92.7521	91.4655	94.7075	101.6094	110.3218	118.5102 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617	30.1617 (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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940 (71)
Water heating gains (Table 5)	114.6378	112.9386	109.6979	102.6399	98.3078	93.7844	91.0252	93.3333	96.0362	101.0562	107.8246	113.7385 (72)
Total internal gains	349.2008	355.5485	342.3054	330.4488	315.3011	301.6926	291.3597	292.3813	300.4295	313.2480	330.8321	342.8312 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W

North					1.0800	10.6334	0.6300	0.7000			0.7700	3.5097 (74)
East					4.5700	19.6403	0.6300	0.7000			0.7700	27.4306 (76)
South					0.7200	46.7521	0.6300	0.7000			0.7700	10.2874 (78)
West					1.6800	19.6403	0.6300	0.7000			0.7700	10.0839 (80)

Solar gains	51.3116	96.9416	153.7154	218.8253	265.9535	271.8563	258.9408	223.4747	176.6836	113.2353	63.2999	42.6652 (83)
Total gains	400.5123	452.4901	496.0208	549.2741	581.2546	573.5489	550.3005	515.8560	477.1131	426.4834	394.1320	385.4964 (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	67.3441	67.5485	67.7500	68.7131	68.8964	69.7624	69.7624	69.9252	69.4263	68.8964	68.5267	68.1444
alpha	5.4896	5.5032	5.5167	5.5809	5.5931	5.6508	5.6508	5.6617	5.6284	5.5931	5.5684	5.5430
util living area	0.9908	0.9812	0.9570	0.8797	0.7300	0.5326	0.3861	0.4287	0.6717	0.9130	0.9799	0.9924 (86)
MIT	20.0070	20.1860	20.4401	20.7475	20.9283	20.9899	20.9986	20.9976	20.9655	20.7273	20.3243	19.9836 (87)
Th 2	19.9005	19.9035	19.9064	19.9200	19.9226	19.9345	19.9345	19.9367	19.9299	19.9226	19.9174	19.9120 (88)
util rest of house	0.9875	0.9745	0.9420	0.8422	0.6635	0.4476	0.2932	0.3308	0.5812	0.8761	0.9716	0.9897 (89)
MIT 2	18.7818	19.0088	19.3241	19.6902	19.8716	19.9299	19.9341	19.9360	19.9114	19.6803	19.1955	18.7608 (90)
Living area fraction	19.4696	19.6696	19.9506	20.2838	20.4649	20.5249	20.5317	20.5320	20.5031	20.2680	19.8292	19.4473 (91)
MIT	19.4696	19.6696	19.9506	20.2838	20.4649	20.5249	20.5317	20.5320	20.5031	20.2680	19.8292	19.4473 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4696	19.6696	19.9506	20.2838	20.4649	20.5249	20.5317	20.5320	20.5031	20.2680	19.8292	19.4473 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9858	0.9728	0.9427	0.8559	0.6981	0.4952	0.3454	0.3859	0.6311	0.8894	0.9707	0.9881 (94)
Useful gains	394.8279	440.1636	467.5819	470.1127	405.8027	284.0218	190.0818	199.0545	301.1270	379.2967	382.5892	380.9188 (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	760.9591	738.6526	670.6843	559.6701	429.7686	286.9123	190.3914	199.6221	311.5688	474.0547	627.5193	755.8712 (97)
Space heating kWh	272.4016	200.5846	151.1082	64.4814	17.8307	0.0000	0.0000	0.0000	0.0000	70.4999	176.3497	278.9646 (98a)
Space heating requirement - total per year (kWh/year)												1232.2207
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	272.4016	200.5846	151.1082	64.4814	17.8307	0.0000	0.0000	0.0000	0.0000	70.4999	176.3497	278.9646 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1232.2207
Space heating per m ²										(98c) / (4) =		30.0762 (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	272.4016	200.5846	151.1082	64.4814	17.8307	0.0000	0.0000	0.0000	0.0000	70.4999	176.3497	278.9646 (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)	295.1264	217.3181	163.7142	69.8607	19.3182	0.0000	0.0000	0.0000	0.0000	76.3813	191.0614	302.2368 (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	162.7107	144.0627	153.7477	137.1647	134.2424	122.3821	121.9481	126.0847	126.6589	139.5081	146.1797	161.2224 (64)
Efficiency of water heater (217)m	85.2064	84.8022	84.0210	82.4729	80.7597	79.8000	79.8000	79.8000	79.8000	82.6107	84.4816	79.8000 (216)
Fuel for water heating, kWh/month	190.9606	169.8808	182.9874	166.3148	166.2245	153.3610	152.8172	158.0008	158.7204	168.8740	173.0313	189.0564 (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	13.1104	10.5176	9.4699	6.9381	5.3592	4.3785	4.8888	6.3547	8.2541	10.8298	12.2323	13.4747 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-19.7219	-28.0974	-40.8370	-46.4898	-50.6838	-47.5806	-47.0597	-44.1873	-39.1524	-32.4522	-21.8109	-17.0219 (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	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	-10.2722	-21.7025	-43.2824	-65.1951	-86.3474	-85.6603	-72.4089	-52.9601	-31.0242	-13.7174	-8.1107		(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												1335.0170	(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												2030.2293	(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)												105.8081	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1012.5225	(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												2544.5319	(238)

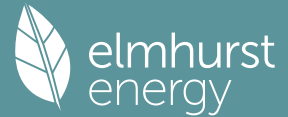
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1335.0170	0.2100	280.3536	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2030.2293	0.2100	426.3481	(264)
Space and water heating			706.7017	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	105.8081	0.1443	15.2714	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-435.0948	0.1343	-58.4370	
PV Unit electricity exported	-577.4276	0.1258	-72.6578	
Total			-131.0948	(269)
Total CO2, kg/year			602.8076	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.7100	(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	1335.0170	1.1300	1508.5692	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2030.2293	1.1300	2294.1591	(278)
Space and water heating			3802.7283	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	105.8081	1.5338	162.2920	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-435.0948	1.4964	-651.0611	
PV Unit electricity exported	-577.4276	0.4619	-266.7034	
Total			-917.7645	(283)
Total Primary energy kWh/year			3177.3566	(286)
Target Primary Energy Rate (TPER)			77.5500	(287)

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Plot Reference	79596-03				Issued on Date	18/03/2026	
Assessment Reference	001		Plot Type Ref	GF Flat			
Plot Address	22 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	82 B	DER	6.24	TER	14.71		
Environmental	96 A	% DER < TER				57.58	
CO ₂ Emissions (t/year)	0.22	DFEE	35.42	TFEE	40.09		
Compliance Check	See BREL	% DFEE < TFEE				11.66	
% DPER < TPER	16.95	DPER	64.41	TPER	77.55		
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	40.9700 (1b)	2.3500 (2b)	96.2795 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	96.2795 (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	3.7900	(17)
Infiltration rate	0.1895	(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) =	0.1611 (21)

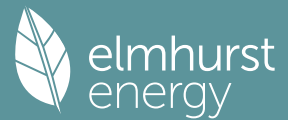
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2054	0.2013	0.1973	0.1772	0.1732	0.1530	0.1530	0.1490	0.1611	0.1732	0.1812	0.1893 (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			40.9700	0.1100	4.5067	75.0000	3072.7500 (28a)
Main	45.2100	10.2000	35.0100	0.1900	6.6519	110.0000	3851.0999 (29a)
Total net area of external elements Aum(A, m ²)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.5984		(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000	110.0000	2915.0000 (32)
Party Ceiling 1			40.9700			20.0000	819.4000 (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) =	12161.5498 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		296.8404 (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)	17.5900	0.0930	1.6359
E7 Party floor between dwellings (in blocks of flats)	17.5900	0.0370	0.6508
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	10.3100	0.1080	1.1135
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7330 (36)
Point Thermal Bridges			0.0000 (36a) =
Total fabric heat loss			28.3314 (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	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	(38)
Heat transfer coeff	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	(39)
Average = Sum(39)m / 12 =													44.2175
HLP	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	(40)
HLP (average)													1.0793
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4323 (42)
Hot water usage for mixer showers	69.6150	68.5688	67.0444	64.1275	61.9750	59.5745	58.2100	59.7230	61.3815	63.9589	66.9383	69.3483	(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	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987	(42c)
Average daily hot water use (litres/day)													90.8179 (43)
Daily hot water use	98.9137	96.8021	94.2122	90.2300	87.0120	83.5461	82.1817	84.7600	87.4839	91.1267	95.1716	98.6470	(44)
Energy content (annual)	156.6551	137.8449	144.8007	123.5204	117.1349	102.7297	99.3916	104.9506	107.8764	123.6581	135.5894	154.4573	(45)
Distribution loss (46)m = 0.15 x (45)m	23.4983	20.6767	21.7201	18.5281	17.5702	15.4095	14.9087	15.7426	16.1815	18.5487	20.3384	23.1686	(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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	(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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	(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	52.0878	45.8334	48.1462	41.0705	38.9474	34.1576	33.0477	34.8961	35.8689	41.1163	45.0835	51.3571	(65)

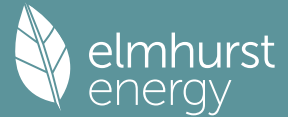
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.8237	12.2781	9.9852	7.5595	5.6508	4.7706	5.1548	6.7004	8.9933	11.4191	13.3278	14.2079	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	185.0455	186.9657	182.1269	171.8256	158.8221	146.6006	138.4359	136.5157	141.3545	151.6558	164.6594	176.8808	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	(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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	(71)
Water heating gains (Table 5)	70.0105	68.2045	64.7127	57.0424	52.3486	47.4412	44.4190	46.9033	49.8179	55.2639	62.6160	69.0283	(72)
Total internal gains	342.5532	341.1218	330.4982	310.1009	290.4949	272.4858	261.6832	263.7929	273.8392	292.0122	314.2765	333.7905	(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	400.1993	449.9098	502.7811	555.1550	588.2396	576.8235	551.5670	514.0136	471.7852	419.0195	385.3669	381.7393 (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	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	
alpha	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	
util living area	0.9889	0.9766	0.9403	0.8427	0.6733	0.4873	0.3523	0.3949	0.6299	0.8957	0.9775	0.9915 (86)	
MIT	20.2102	20.3719	20.6119	20.8451	20.9650	20.9956	20.9995	20.9990	20.9817	20.8051	20.4516	20.1602 (87)	
Th 2	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178 (88)	
util rest of house	0.9850	0.9688	0.9217	0.8019	0.6113	0.4142	0.2739	0.3110	0.5477	0.8563	0.9685	0.9885 (89)	
MIT 2	19.1282	19.3299	19.6205	19.8805	19.9936	20.0158	20.0177	20.0175	20.0082	19.8474	19.4323	19.0653 (90)	
Living area fraction									fLA = Living area / (4) =				0.5614 (91)
MIT	19.7356	19.9149	20.1771	20.4220	20.5390	20.5659	20.5689	20.5685	20.5547	20.3851	20.0045	19.6800 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.7356	19.9149	20.1771	20.4220	20.5390	20.5659	20.5689	20.5685	20.5547	20.3851	20.0045	19.6800 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9836	0.9679	0.9250	0.8196	0.6449	0.4552	0.3180	0.3581	0.5935	0.8724	0.9683	0.9872 (94)
Useful gains	393.6502	435.4514	465.0973	455.0117	379.3437	262.5743	175.3813	184.0929	279.9838	365.5572	373.1689	376.8507 (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	682.5245	663.9215	604.7661	509.4741	390.8372	263.7966	175.4929	184.3215	285.4109	432.6711	570.6064	684.4857 (97)
Space heating kWh	214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (98a)
Space heating requirement - total per year (kWh/year)												941.1001
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	214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												941.1001
Space heating per m2										(98c) / (4) =		22.9705 (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	214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (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)	214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (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	52.5476	46.4177	49.1549	42.8157	41.2370	36.8655	36.1590	37.7499	38.3385	43.1040	46.2698	51.9186 (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	1.1116	1.0041	1.1116	1.0758	1.1116	1.0758	1.1116	1.1116	1.0758	1.1116	1.0758	1.1116 (231)
Lighting	12.0998	9.7069	8.7400	6.4033	4.9461	4.0410	4.5120	5.8649	7.6179	9.9951	11.2894	12.4361 (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												941.1001 (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	522.5782 (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)	13.0885 (230a)
Total electricity for the above, kWh/year	13.0885 (231)
Electricity for lighting (calculated in Appendix L)	97.6525 (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	1574.4193 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	941.1001	16.4900	155.1874 (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)	522.5782	16.4900	86.1731 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	13.0885	16.4900	2.1583 (249)
Energy for lighting	97.6525	16.4900	16.1029 (250)
Additional standing charges			0.0000 (251)
Total energy cost			259.6217 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.0872 (257)
SAP value	82.3770
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	941.1001	0.1570	147.7962 (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)	522.5782	0.1411	73.7331 (264)
Space and water heating			221.5293 (265)
Pumps, fans and electric keep-hot	13.0885	0.1387	1.8155 (267)
Energy for lighting	97.6525	0.1443	14.0943 (268)
Total CO2, kg/year			237.4391 (272)
CO2 emissions per m2			5.8000 (273)
EI value			96.2991
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

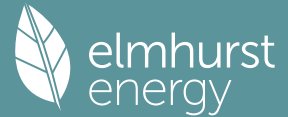
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	40.9700 (1b)	x 2.3500 (2b)	= 96.2795 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 96.2795 (5)

2. Ventilation rate

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

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Pressure Test Method												Blower Door
Measured/design AP50												3.7900 (17)
Infiltration rate												0.1895 (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) = 0.1611 (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)
	0.1732	0.1691	0.1691	0.1570	0.1611	0.1369	0.1329	0.1329	0.1369	0.1530	0.1530	0.1570 (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)

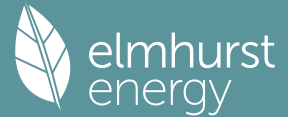
3. Heat losses and heat loss parameter

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			40.9700	0.1100	4.5067	75.0000	3072.7500	(28a)					
Main	45.2100	10.2000	35.0100	0.1900	6.6519	110.0000	3851.0999	(29a)					
Total net area of external elements Aum(A, m2)			86.1800					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.5984			(33)					
Main dwelling													
Party Wall 1			26.5000	0.0000	0.0000	110.0000	2915.0000	(32)					
Party Ceiling 1			40.9700			20.0000	819.4000	(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) =	12161.5498	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							296.8404	(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)				17.5900	0.0930	1.6359							
E7 Party floor between dwellings (in blocks of flats)				17.5900	0.0370	0.6508							
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				10.3100	0.1080	1.1135							
E25 Staggered party wall between dwellings				5.1400	0.0440	0.2262							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7330	(36)					
Point Thermal bridges							(36a) = 0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	28.3314	(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	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	15.8861	(38)
Average = Sum(39)m / 12 =	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	44.2175	(39)
												44.2175	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	1.0793	(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												1.4323 (42)
Hot water usage for mixer showers												
69.6150	68.5688	67.0444	64.1275	61.9750	59.5745	58.2100	59.7230	61.3815	63.9589	66.9383	69.3483	(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												
29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987	(42c)
Average daily hot water use (litres/day)												90.8179 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	98.9137	96.8021	94.2122	90.2300	87.0120	83.5461	82.1817	84.7600	87.4839	91.1267	95.1716	98.6470 (44)
Energy conte	156.6551	137.8449	144.8007	123.5204	117.1349	102.7297	99.3916	104.9506	107.8764	123.6581	135.5894	154.4573 (45)
Energy content (annual)												Total = Sum(45)m = 1508.6094
Distribution loss (46)m = 0.15 x (45)m												
23.4983	20.6767	21.7201	18.5281	17.5702	15.4095	14.9087	15.7426	16.1815	18.5487	20.3384	23.1686	(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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (64)

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Electric shower(s)											Total per year (kWh/year) = Sum(64)m = 1825.9404 (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)
Heat gains from water heating, kWh/month											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
52.0878	45.8334	48.1462	41.0705	38.9474	34.1576	33.0477	34.8961	35.8689	41.1163	45.0835	51.3571 (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	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.8237	12.2781	9.9852	7.5595	5.6508	4.7706	5.1548	6.7004	8.9933	11.4191	13.3278	14.2079 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	185.0455	186.9657	182.1269	171.8256	158.8221	146.6006	138.4359	136.5157	141.3545	151.6558	164.6594	176.8808 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264 (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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940 (71)
Water heating gains (Table 5)	70.0105	68.2045	64.7127	57.0424	52.3486	47.4412	44.4190	46.9033	49.8179	55.2639	62.6160	69.0283 (72)
Total internal gains	342.5532	341.1218	330.4982	310.1009	290.4949	272.4858	261.6832	263.7929	273.8392	292.0122	314.2765	333.7905 (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	393.4834	439.7231	493.6549	546.8262	571.0461	564.5339	534.5770	496.3449	466.4606	413.1157	378.8243	377.1169 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998
util living area	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933
	0.9870	0.9734	0.9306	0.8131	0.6198	0.4217	0.3141	0.3559	0.5950	0.8787	0.9736	0.9898 (86)
MIT	20.2747	20.4273	20.6626	20.8834	20.9800	20.9983	20.9998	20.9995	20.9874	20.8379	20.5048	20.2297 (87)
Th 2	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178 (88)
util rest of house												
	0.9822	0.9642	0.9084	0.7657	0.5517	0.3457	0.2330	0.2688	0.5092	0.8330	0.9626	0.9860 (89)
MIT 2	19.2100	19.3993	19.6810	19.9200	20.0056	20.0172	20.0178	20.0177	20.0118	19.8824	19.4985	19.1536 (90)
Living area fraction												
MIT	19.8077	19.9764	20.2320	20.4608	20.5526	20.5680	20.5690	20.5689	20.5595	20.4188	20.0634	19.7577 (92)
Temperature adjustment												
adjusted MIT	19.8077	19.9764	20.2320	20.4608	20.5526	20.5680	20.5690	20.5689	20.5595	20.4188	20.0634	19.7577 (93)

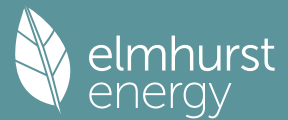
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9810	0.9637	0.9138	0.7881	0.5893	0.3884	0.2786	0.3177	0.5572	0.8532	0.9632	0.9847 (94)
Useful gains	385.9962	423.7588	451.0972	430.9696	336.5199	219.2452	148.9262	157.7070	259.9188	352.4783	364.8943	371.3650 (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												
	650.3375	631.2656	571.8218	471.3950	342.8021	219.6723	148.9709	157.8069	263.5146	407.6332	542.2587	652.5488 (97)
Space heating kWh												
	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007 (98a)
Space heating requirement - total per year (kWh/year)												
	837.6521											
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
Space heating kWh												
	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
	837.6521											
Space heating per m2												
										(98c) / (4) =		20.4455 (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
	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007 (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)	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007	(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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	(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	52.5476	46.4177	49.1549	42.8157	41.2370	36.8655	36.1590	37.7499	38.3385	43.1040	46.2698	51.9186	(217)
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	1.1116	1.0041	1.1116	1.0758	1.1116	1.0758	1.1116	1.1116	1.0758	1.1116	1.0758	1.1116	(231)
Lighting	12.0998	9.7069	8.7400	6.4033	4.9461	4.0410	4.5120	5.8649	7.6179	9.9951	11.2894	12.4361	(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												837.6521	(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												522.5782	(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)												13.0885	(230a)
Total electricity for the above, kWh/year												13.0885	(231)
Electricity for lighting (calculated in Appendix L)												97.6525	(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												1470.9712	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	837.6521	28.4300	238.1445	(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)	522.5782	28.4300	148.5690	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	13.0885	28.4300	3.7211	(249)
Energy for lighting	97.6525	28.4300	27.7626	(250)
Additional standing charges			0.0000	(251)
Total energy cost			418.1971	(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	837.6521	0.1574	131.8534	(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)	522.5782	0.1411	73.7331	(264)
Space and water heating			205.5865	(265)
Pumps, fans and electric keep-hot	13.0885	0.1387	1.8155	(267)
Energy for lighting	97.6525	0.1443	14.0943	(268)
Total CO2, kg/year			221.4963	(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	837.6521	1.5827	1325.7546	(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)	522.5782	1.5217	795.2216	(278)
Space and water heating			2120.9762	(279)
Pumps, fans and electric keep-hot	13.0885	1.5128	19.8003	(281)
Energy for lighting	97.6525	1.5338	149.7826	(282)
Total Primary energy kWh/year			2290.5592	(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 £418	Potential £418	Saving £0
Space heating	£242	£242	£0
Water heating	£149	£149	£0
Lighting	£28	£28	£0
Total cost of fuels	£418	£418	£0
Total cost of uses	£419	£419	£0
Delivered energy	36 kWh/m²	36 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	5 kg/m²	5 kg/m²	0 kg/m²
Primary energy	56 kWh/m²	56 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	40.9700 (1b)	x 2.3500 (2b)	= 96.2795 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 96.2795 (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)

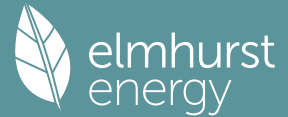
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

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

Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1611 (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	0.2054	0.2013	0.1973	0.1772	0.1732	0.1530	0.1530	0.1490	0.1611	0.1732	0.1812	0.1893 (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			40.9700	0.1100	4.5067	75.0000	3072.7500 (28a)
Main	45.2100	10.2000	35.0100	0.1900	6.6519	110.0000	3851.0999 (29a)
Total net area of external elements Aum(A, m2)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.5984		(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000	110.0000	2915.0000 (32)
Party Ceiling 1			40.9700			20.0000	819.4000 (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) = 12161.5498 (34)
296.8404 (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)	17.5900	0.0930	1.6359
E7 Party floor between dwellings (in blocks of flats)	17.5900	0.0370	0.6508
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	10.3100	0.1080	1.1135
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
Total fabric heat loss
(33) + (36) + (36a) = 28.3314 (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 15.8861 15.8861 15.8861 15.8861 15.8861 15.8861 15.8861 15.8861 15.8861 15.8861 15.8861 15.8861 (38)
Average = Sum(39)m / 12 = 44.2175 44.2175 44.2175 44.2175 44.2175 44.2175 44.2175 44.2175 44.2175 44.2175 44.2175 44.2175 (39)

Average = Sum(39)m / 12 = 44.2175
HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP (average) 1.0793 1.0793 1.0793 1.0793 1.0793 1.0793 1.0793 1.0793 1.0793 1.0793 1.0793 1.0793 (40)
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

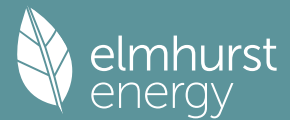
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4323 (42)
Hot water usage for mixer showers													
69.6150 68.5688	67.0444	64.1275	61.9750	59.5745	58.2100	59.7230	61.3815	63.9589	66.9383	69.3483	69.3483	(42a)	
Hot water usage for baths													
0.0000 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses													
29.2987 28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987	29.2987	(42c)	
Average daily hot water use (litres/day)												90.8179 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
98.9137 96.8021	94.2122	90.2300	87.0120	83.5461	82.1817	84.7600	87.4839	91.1267	95.1716	98.6470	98.6470	(44)	
Energy content 156.6551 137.8449	144.8007	123.5204	117.1349	102.7297	99.3916	104.9506	107.8764	123.6581	135.5894	154.4573	154.4573	(45)	
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
23.4983 20.6767	21.7201	18.5281	17.5702	15.4095	14.9087	15.7426	16.1815	18.5487	20.3384	23.1686	23.1686	(46)	
Water storage loss (or HIU loss):													
Store volume												201.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8694 (55)	
Total storage loss													
26.9514 24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514 24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
183.6065 162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	181.4087	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (64)	
Electric shower(s)													
0.0000 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Heat gains from water heating, kWh/month	52.0878	45.8334	48.1462	41.0705	38.9474	34.1576	33.0477	34.8961	35.8689	41.1163	45.0835	51.3571 (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	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.8237	12.2781	9.9852	7.5595	5.6508	4.7706	5.1548	6.7004	8.9933	11.4191	13.3278	14.2079 (67)

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	185.0455	186.9657	182.1269	171.8256	158.8221	146.6006	138.4359	136.5157	141.3545	151.6558	164.6594	176.8808 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264 (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)	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940 (71)
Water heating gains (Table 5)	70.0105	68.2045	64.7127	57.0424	52.3486	47.4412	44.4190	46.9033	49.8179	55.2639	62.6160	69.0283 (72)
Total internal gains	342.5532	341.1218	330.4982	310.1009	290.4949	272.4858	261.6832	263.7929	273.8392	292.0122	314.2765	333.7905 (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	400.1993	449.9098	502.7811	555.1550	588.2396	576.8235	551.5670	514.0136	471.7852	419.0195	385.3669	381.7393 (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	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998
alpha	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933
util living area	0.9889	0.9766	0.9403	0.8427	0.6733	0.4873	0.3523	0.3949	0.6299	0.8957	0.9775	0.9915 (86)
MIT	20.2102	20.3719	20.6119	20.8451	20.9650	20.9956	20.9995	20.9990	20.9817	20.8051	20.4516	20.1602 (87)
Th 2	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178 (88)
util rest of house	0.9850	0.9688	0.9217	0.8019	0.6113	0.4142	0.2739	0.3110	0.5477	0.8563	0.9685	0.9885 (89)
MIT 2	19.1282	19.3299	19.6205	19.8805	19.9936	20.0158	20.0177	20.0175	20.0082	19.8474	19.4323	19.0653 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7356	19.9149	20.1771	20.4220	20.5390	20.5659	20.5689	20.5685	20.5547	20.3851	20.0045	19.6800 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7356	19.9149	20.1771	20.4220	20.5390	20.5659	20.5689	20.5685	20.5547	20.3851	20.0045	19.6800 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9836	0.9679	0.9250	0.8196	0.6449	0.4552	0.3180	0.3581	0.5935	0.8724	0.9683	0.9872 (94)
Ext temp.	393.6502	435.4514	465.0973	455.0117	379.3437	262.5743	175.3813	184.0929	279.9838	365.5572	373.1689	376.8507 (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	682.5245	663.9215	604.7661	509.4741	390.8372	263.7966	175.4929	184.3215	285.4109	432.6711	570.6064	684.4857 (97)
Space heating requirement - total per year (kWh/year)	214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (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	214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	(98c) / (4) =											
Space heating per m2	22.9705 (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
214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (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)	214.9225	153.5319	103.9136	39.2129	8.5511	0.0000	0.0000	0.0000	0.0000	49.9327	142.1549	228.8804 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (64)
Efficiency of water heater	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	52.5476	46.4177	49.1549	42.8157	41.2370	36.8655	36.1590	37.7499	38.3385	43.1040	46.2698	51.9186 (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	1.1116	1.0041	1.1116	1.0758	1.1116	1.0758	1.1116	1.1116	1.0758	1.1116	1.0758	1.1116 (231)
Lighting	12.0998	9.7069	8.7400	6.4033	4.9461	4.0410	4.5120	5.8649	7.6179	9.9951	11.2894	12.4361 (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												941.1001 (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												522.5782 (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)												13.0885 (230a)
Total electricity for the above, kWh/year												13.0885 (231)
Electricity for lighting (calculated in Appendix L)												97.6525 (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												1574.4193 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	941.1001	16.4900	155.1874 (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)	522.5782	16.4900	86.1731 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	13.0885	16.4900	2.1583 (249)
Energy for lighting	97.6525	16.4900	16.1029 (250)
Additional standing charges			0.0000 (251)
Total energy cost			259.6217 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.0872 (257)
SAP value		82.3770
SAP rating (Section 12)		82 (258)
SAP band		B

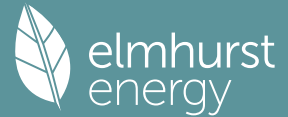
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	941.1001	0.1570	147.7962 (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)	522.5782	0.1411	73.7331 (264)
Space and water heating			221.5293 (265)
Pumps, fans and electric keep-hot	13.0885	0.1387	1.8155 (267)
Energy for lighting	97.6525	0.1443	14.0943 (268)
Total CO2, kg/year			237.4391 (272)
CO2 emissions per m2			5.8000 (273)
EI value			96.2991
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

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Main dwelling		Area (m2)	Storey height (m)	Volume (m3)	
Ground floor		40.9700 (1b)	x 2.3500 (2b)	= 96.2795 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.9700				(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n)	=	96.2795 (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) =	
Pressure Test Method										Yes	
Measured/design AP50										Blower Door	
Infiltration rate										3.7900 (17)	
Number of sides sheltered										0.1895 (18)	
										2 (19)	
Shelter factor										(20) = 1 - [0.075 x (19)] =	
Infiltration rate adjusted to include shelter factor										0.8500 (20)	
										(21) = (18) x (20) =	
										0.1611 (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
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate												
	0.1732	0.1691	0.1691	0.1570	0.1611	0.1369	0.1329	0.1329	0.1369	0.1530	0.1530	0.1570
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)

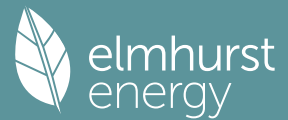
3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K
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			40.9700	0.1100	4.5067	75.0000	3072.7500 (28a)
Main	45.2100	10.2000	35.0100	0.1900	6.6519	110.0000	3851.0999 (29a)
Total net area of external elements Aum(A, m2)			86.1800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.5984		(33)
Main dwelling							
Party Wall 1			26.5000	0.0000	0.0000	110.0000	2915.0000 (32)
Party Ceiling 1			40.9700			20.0000	819.4000 (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) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							12161.5498 (34)
List of Thermal Bridges							296.8404 (35)
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)				17.5900	0.0930	1.6359	
E7 Party floor between dwellings (in blocks of flats)				17.5900	0.0370	0.6508	
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				10.3100	0.1080	1.1135	
E25 Staggered party wall between dwellings				5.1400	0.0440	0.2262	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7330 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	28.3314 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4323 (42)
Hot water usage for mixer showers												
	69.6150	68.5688	67.0444	64.1275	61.9750	59.5745	58.2100	59.7230	61.3815	63.9589	66.9383	69.3483 (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												
	29.2987	28.2333	27.1679	26.1025	25.0371	23.9717	23.9717	25.0371	26.1025	27.1679	28.2333	29.2987 (42c)
Average daily hot water use (litres/day)												90.8179 (43)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	98.9137	96.8021	94.2122	90.2300	87.0120	83.5461	82.1817	84.7600	87.4839	91.1267	95.1716	98.6470	(44)
Energy conte	156.6551	137.8449	144.8007	123.5204	117.1349	102.7297	99.3916	104.9506	107.8764	123.6581	135.5894	154.4573	(45)
Energy content (annual)	Total = Sum(45)m = 1508.6094												
Distribution loss	(46)m = 0.15 x (45)m												
	23.4983	20.6767	21.7201	18.5281	17.5702	15.4095	14.9087	15.7426	16.1815	18.5487	20.3384	23.1686	(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													
	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	(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													
	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087	(64)
	Total per year (kWh/year) = Sum(64)m = 1825.9404												(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													
	52.0878	45.8334	48.1462	41.0705	38.9474	34.1576	33.0477	34.8961	35.8689	41.1163	45.0835	51.3571	(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	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	85.9410	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	13.8237	12.2781	9.9852	7.5595	5.6508	4.7706	5.1548	6.7004	8.9933	11.4191	13.3278	14.2079	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	185.0455	186.9657	182.1269	171.8256	158.8221	146.6006	138.4359	136.5157	141.3545	151.6558	164.6594	176.8808	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	45.0264	(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)													
	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	-57.2940	(71)
Water heating gains (Table 5)													
	70.0105	68.2045	64.7127	57.0424	52.3486	47.4412	44.4190	46.9033	49.8179	55.2639	62.6160	69.0283	(72)
Total internal gains													
	342.5532	341.1218	330.4982	310.1009	290.4949	272.4858	261.6832	263.7929	273.8392	292.0122	314.2765	333.7905	(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	393.4834	439.7231	493.6549	546.8262	571.0461	564.5339	534.5770	496.3449	466.4606	413.1157	378.8243	377.1169 (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	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998	76.3998		
alpha	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933	6.0933		
util living area														
	0.9870	0.9734	0.9306	0.8131	0.6198	0.4217	0.3141	0.3559	0.5950	0.8787	0.9736	0.9898	(86)	
MIT	20.2747	20.4273	20.6626	20.8834	20.9800	20.9983	20.9998	20.9995	20.9874	20.8379	20.5048	20.2297	(87)	
Th 2	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	20.0178	(88)	
util rest of house														
	0.9822	0.9642	0.9084	0.7657	0.5517	0.3457	0.2330	0.2688	0.5092	0.8330	0.9626	0.9860	(89)	
MIT 2	19.2100	19.3993	19.6810	19.9200	20.0056	20.0172	20.0178	20.0177	20.0118	19.8824	19.4985	19.1536	(90)	
Living area fraction														
	19.8077	19.9764	20.2320	20.4608	20.5526	20.5680	20.5690	20.5689	20.5595	20.4188	20.0634	19.7577	(92)	
Temperature adjustment														
adjusted MIT	19.8077	19.9764	20.2320	20.4608	20.5526	20.5680	20.5690	20.5689	20.5595	20.4188	20.0634	19.7577	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9810	0.9637	0.9138	0.7881	0.5893	0.3884	0.2786	0.3177	0.5572	0.8532	0.9632	0.9847	(94)
Useful gains	385.9962	423.7588	451.0972	430.9696	336.5199	219.2452	148.9262	157.7070	259.9188	352.4783	364.8943	371.3650	(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													
	650.3375	631.2656	571.8218	471.3950	342.8021	219.6723	148.9709	157.8069	263.5146	407.6332	542.2587	652.5488	(97)
Space heating kWh													

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Space heating requirement - total per year (kWh/year)	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007 (98a)
Solar heating kWh												837.6521
Space heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating requirement after solar contribution - total per year (kWh/year)	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007 (98c)
Space heating per m2												837.6521 (98c) / (4) = 20.4455 (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
Space heating requirement	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007 (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)	196.6699	139.4445	89.8191	29.1063	4.6740	0.0000	0.0000	0.0000	0.0000	41.0352	127.7023	209.2007 (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	183.6065	162.1881	171.7521	149.6024	144.0863	128.8117	126.3430	131.9020	133.9584	150.6095	161.6714	181.4087 (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	52.5476	46.4177	49.1549	42.8157	41.2370	36.8655	36.1590	37.7499	38.3385	43.1040	46.2698	51.9186 (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	1.1116	1.0041	1.1116	1.0758	1.1116	1.0758	1.1116	1.1116	1.0758	1.1116	1.0758	1.1116 (231)
Lighting	12.0998	9.7069	8.7400	6.4033	4.9461	4.0410	4.5120	5.8649	7.6179	9.9951	11.2894	12.4361 (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												837.6521 (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												522.5782 (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)												13.0885 (230a)
Total electricity for the above, kWh/year												13.0885 (231)
Electricity for lighting (calculated in Appendix L)												97.6525 (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												1470.9712 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	837.6521	28.4300	238.1445 (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)	522.5782	28.4300	148.5690 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	13.0885	28.4300	3.7211 (249)
Energy for lighting	97.6525	28.4300	27.7626 (250)
Additional standing charges			0.0000 (251)
Total energy cost			418.1971 (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	837.6521	0.1574	131.8534 (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)	522.5782	0.1411	73.7331 (264)
Space and water heating			205.5865 (265)
Pumps, fans and electric keep-hot	13.0885	0.1387	1.8155 (267)
Energy for lighting	97.6525	0.1443	14.0943 (268)
Total CO2, kg/year			221.4963 (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	837.6521	1.5827	1325.7546 (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)	522.5782	1.5217	795.2216 (278)
Space and water heating			2120.9762 (279)
Pumps, fans and electric keep-hot	13.0885	1.5128	19.8003 (281)
Energy for lighting	97.6525	1.5338	149.7826 (282)
Total Primary energy kWh/year			2290.5592 (286)