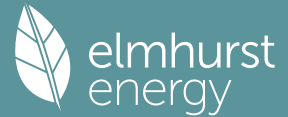


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Plot Reference	79596-06				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	26 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.53		TER	15.42
Environmental	95 A		% DER < TER				51.17
CO ₂ Emissions (t/year)	0.31		DFEE	42.66		TFEE	47.31
Compliance Check	See BREL		% DFEE < TFEE				9.82
% DPER < TPER	4.63		DPER	77.49		TPER	81.25
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.0335 (5)

2. Ventilation rate

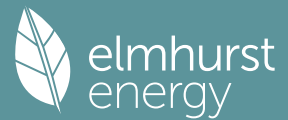
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	1.8200 (17)
Infiltration rate	0.0910 (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) = 0.0774 (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	0.0986	0.0967	0.0948	0.0851	0.0832	0.0735	0.0735	0.0715	0.0774	0.0832	0.0870	0.0909 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	81.8500	11.8600	69.9900	0.1900	13.2981	110.0000	7698.8998 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.3200		9.3200	0.1300	1.2116	9.0000	83.8800 (30)
Total net area of external elements A _{um} (A, m ²)			135.1000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.6049		(33)
Main dwelling							
Party Wall 1			15.9900	0.0000	0.0000	110.0000	1758.9000 (32)
Party Floor 1			44.3800			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10479.9898 (34)

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

221.2368 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.0700	0.0200	0.1614
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421
E3 Sill	22.2000	0.0260	0.5772
E4 Jamb	4.0200	0.0930	0.3739
E5 Ground floor (normal)	29.3300	0.0370	1.0852
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.4900	0.0970	1.4055
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	13.3500	0.0970	1.2950
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	1.8900	0.1010	0.1909
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.4552 (36)
Total fabric heat loss	(33) + (36) + (36a) =	40.0601 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	(38)
Heat transfer coeff	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	(39)
Average = Sum(39)m / 12 =													59.0406

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	(40)
HLP (average)													1.2464
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

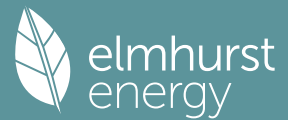
Assumed occupancy													1.6130 (42)
Hot water usage for mixer showers													
74.0080	72.8958	71.2751	68.1742	65.8858	63.3338	61.8833	63.4917	65.2548	67.9949	71.1624	73.7244	(42a)	
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses													
31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)	
Average daily hot water use (litres/day)													96.5503 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.1571	102.9122	100.1588	95.9252	92.5042	88.8195	87.3689	90.1101	93.0059	96.8786	101.1788	104.8736	(44)
Energy content (annual)	166.5432	146.5456	153.9404	131.3169	124.5284	109.2139	105.6652	111.5751	114.6856	131.4634	144.1478	164.2066	(45)
Energy content (annual)										Total = Sum(45)m =			1603.8320
Distribution loss (46)m = 0.15 x (45)m													
24.9815	21.9818	23.0911	19.6975	18.6793	16.3821	15.8498	16.7363	17.2028	19.7195	21.6222	24.6310	(46)	
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h													
193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			1921.1630 (64)
Electric shower(s)													1921 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
55.3756	48.7264	51.1852	43.6629	41.4057	36.3136	35.1337	37.0987	38.1329	43.7116	47.9291	54.5987	(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	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	71.1499	78.7731	71.1499	73.5216	71.1499	73.5216	71.1499	71.1499	73.5216	71.1499	73.5216	71.1499 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	140.4079	141.8649	138.1933	130.3770	120.5102	111.2369	105.0417	103.5847	107.2563	115.0726	124.9394	134.2127 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216 (71)
Water heating gains (Table 5)												
	74.4296	72.5096	68.7973	60.6429	55.6528	50.4356	47.2227	49.8639	52.9624	58.7521	66.5683	73.3854 (72)
Total internal gains												
	333.1830	340.3432	325.3361	311.7370	294.5085	282.3896	270.6099	271.7941	280.9359	292.1703	312.2248	325.9436 (73)

6. Solar gains

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[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c	Access factor Table 6d		Gains W
North					1.0800	10.6334	0.7300		0.7000	0.7700		4.0668 (74)
East					1.6100	19.6403	0.7300		0.7000	0.7700		11.1977 (76)
South					0.7200	46.7521	0.7300		0.7000	0.7700		11.9203 (78)
West					2.5000	19.6403	0.7300		0.7000	0.7700		17.3877 (80)
East					3.8000	19.6403	0.6800		0.7000	0.7700		24.6190 (76)
Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)
Total gains	402.3744	471.7164	534.8137	611.0374	658.7341	654.7823	625.2848	577.6694	522.1408	445.9769	397.7109	383.3868 (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	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069
alpha	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871
util living area	0.9872	0.9744	0.9455	0.8683	0.7307	0.5526	0.4098	0.4602	0.6992	0.9148	0.9764	0.9895 (86)
MIT	19.5621	19.8011	20.1442	20.5511	20.8346	20.9609	20.9913	20.9859	20.8967	20.4968	19.9441	19.5041 (87)
Th 2	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831 (88)
util rest of house	0.9836	0.9673	0.9305	0.8341	0.6692	0.4658	0.3086	0.3532	0.6130	0.8840	0.9686	0.9865 (89)
MIT 2	18.2401	18.5408	18.9665	19.4482	19.7505	19.8613	19.8803	19.8781	19.8161	19.4010	18.7251	18.1666 (90)
Living area fraction	fLA = Living area / (4) = 0.4657 (91)											
MIT	18.8558	19.1277	19.5150	19.9618	20.2553	20.3734	20.3977	20.3940	20.3193	19.9113	19.2928	18.7895 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8558	19.1277	19.5150	19.9618	20.2553	20.3734	20.3977	20.3940	20.3193	19.9113	19.2928	18.7895 (93)
8. Space heating requirement												
Utilisation	0.9791	0.9612	0.9246	0.8368	0.6909	0.5049	0.3557	0.4030	0.6486	0.8849	0.9632	0.9825 (94)
Useful gains	393.9517	453.4241	494.4990	511.3323	455.0925	330.5893	222.4399	232.7863	338.6695	394.6639	383.0918	376.6762 (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	859.3806	840.0129	768.4119	653.0980	505.1127	340.8655	224.2191	235.8087	367.1929	549.7465	719.8708	861.3708 (97)
Space heating kWh	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (98a)
Space heating requirement - total per year (kWh/year)												1667.6195
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	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.6195
Space heating per m2	(98c) / (4) =											35.2041 (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	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (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)	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (64)
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	55.3775	48.9078	51.7706	45.0470	43.3530	38.7213	37.9544	39.6458	40.2872	45.3378	48.7192	54.7088 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	1.9922	1.7994	1.9922	1.9280	1.9922	1.9280	1.9922	1.9922	1.9280	1.9922	1.9280	1.9922 (231)
Lighting	13.6516	10.9518	9.8609	7.2245	5.5804	4.5592	5.0906	6.6170	8.5948	11.2769	12.7372	14.0310 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													1667.6195	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													349.4100	(219)
Water heating fuel used													549.8306	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
(MEV)Decentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)														
mechanical ventilation fans (SFP = 0.1671)													23.4570	(230a)
Total electricity for the above, kWh/year													23.4570	(231)
Electricity for lighting (calculated in Appendix L)													110.1761	(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													2351.0831	(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	1667.6195	0.1558	259.7845 (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)	549.8306	0.1411	77.5920 (264)
Space and water heating			337.3765 (265)
Pumps, fans and electric keep-hot	23.4570	0.1387	3.2538 (267)
Energy for lighting	110.1761	0.1443	15.9018 (268)
Total CO2, kg/year			356.5321 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.5300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1667.6195	1.5767	2629.3753 (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)	549.8306	1.5218	836.7435 (278)
Space and water heating			3466.1188 (279)
Pumps, fans and electric keep-hot	23.4570	1.5128	35.4857 (281)
Energy for lighting	110.1761	1.5338	168.9917 (282)
Total Primary energy kWh/year			3670.5962 (286)
Dwelling Primary energy Rate (DPER)			77.4900 (287)

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

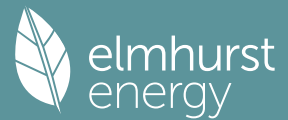
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	47.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 115.0335 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1739 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4239 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3603 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4594	0.4504	0.4413	0.3963	0.3873	0.3423	0.3423	0.3333	0.3603	0.3873	0.4053	0.4233	(22b)
	0.6055	0.6014	0.5974	0.5785	0.5750	0.5586	0.5586	0.5555	0.5649	0.5750	0.5821	0.5896	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			9.7000	1.1450	11.1069			(27)
GF			2.9900	0.1300	0.3887			(28a)
Main	81.8500	11.8500	70.0000	0.1800	12.6000			(29a)
PIJ	40.9400		40.9400	0.1100	4.5034			(30)
PIR	9.3200		9.3200	0.1100	1.0252			(30)
Total net area of external elements Aum(A, m2)			135.1000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.7742		(33)
Main dwelling								
Party Wall 1			15.9900	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							221.2368	(35)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.0700	0.0500	0.4035	
E3 Sill	8.0700	0.0500	0.4035	
E4 Jamb	22.2000	0.0500	1.1100	
E5 Ground floor (normal)	4.0200	0.1600	0.6432	
E7 Party floor between dwellings (in blocks of flats)	29.3300	0.0700	2.0531	
E16 Corner (normal)	17.7000	0.0900	1.5930	
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0900	-0.4320	
E18 Party wall between dwellings	5.7000	0.0600	0.3420	
P1 Party wall - Ground floor	4.0200	0.0800	0.3216	
E25 Staggered party wall between dwellings	4.8000	0.0600	0.2880	
E10 Eaves (insulation at ceiling level)	14.4900	0.0600	0.8694	
E11 Eaves (insulation at rafter level)	1.0100	0.0400	0.0404	
E12 Gable (insulation at ceiling level)	13.3500	0.0600	0.8010	
E13 Gable (insulation at rafter level)	6.9600	0.0800	0.5568	
P4 Party wall - Roof (insulation at ceiling level)	1.8900	0.1200	0.2268	
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0800	0.3488	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.5691	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	41.3433 (37)

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

Point Thermal bridges

Total fabric heat loss

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

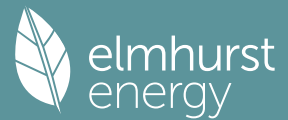
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.9857	22.8301	22.6777	21.9617	21.8277	21.2041	21.2041	21.0886	21.4443	21.8277	22.0987	22.3820	(38)
Heat transfer coeff	64.3289	64.1734	64.0210	63.3049	63.1710	62.5473	62.5473	62.4318	62.7875	63.1710	63.4420	63.7253	(39)
Average = Sum(39)m / 12 =												63.3043	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3580	1.3547	1.3515	1.3364	1.3336	1.3204	1.3204	1.3180	1.3255	1.3336	1.3393	1.3453	(40)
HLP (average)												1.3364	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6130 (42)
Hot water usage for mixer showers	65.7849	64.7962	63.3556	60.5993	58.5652	56.2967	55.0074	56.4371	58.0043	60.4399	63.2555	65.5328	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)
Average daily hot water use (litres/day)												88.9688	(43)
Daily hot water use	96.9340	94.8127	92.2394	88.3503	85.1835	81.7824	80.4930	83.0554	85.7553	89.3236	93.2719	96.6820	(44)
Energy conte	153.5198	135.0120	141.7685	120.9472	114.6734	100.5610	97.3493	102.8400	105.7449	121.2113	132.8829	151.3806	(45)
Energy content (annual)										Total = Sum(45)m =		1477.8909	
Distribution loss (46)m = 0.15 x (45)m	23.0280	20.2518	21.2653	18.1421	17.2010	15.0842	14.6024	15.4260	15.8617	18.1817	19.9324	22.7071	(46)
Water storage loss (or HIU loss):													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	200.1147	177.0977	188.3634	166.0390	161.2683	145.6528	143.9442	149.4349	150.8368	167.8062	177.9748	197.9755	(62)
WWHRS	-30.0741	-26.5978	-27.8517	-23.0623	-21.4932	-18.3919	-17.2395	-18.3324	-19.0290	-22.4330	-25.4139	-29.5172	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	170.0406	150.4999	160.5117	142.9768	139.7751	127.2609	126.7048	131.1024	131.8078	145.3732	152.5608	168.4583	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1747.0724	(64)
Electric shower(s)												1747	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													

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88.3212 78.5601 84.4139 76.2884 75.4048 69.5100 69.6446 71.4702 71.2337 77.5787 80.2570 87.6100 (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	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.1564	78.7803	71.1564	73.5283	71.1564	73.5283	71.1564	71.1564	73.5283	71.1564	73.5283	71.1564	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	140.4079	141.8649	138.1933	130.3770	120.5102	111.2369	105.0417	103.5847	107.2563	115.0726	124.9394	134.2127	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	(71)
Water heating gains (Table 5)	118.7113	116.9049	113.4596	105.9561	101.3506	96.5417	93.6083	96.0621	98.9356	104.2724	111.4681	117.7553	(72)
Total internal gains	380.4712	387.7456	373.0049	360.0570	343.2128	328.5024	317.0020	317.9988	326.9158	340.6971	360.1314	373.3200	(73)

6. Solar gains

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

North					1.0800	10.6334	0.6300	0.7000			0.7700	3.5097 (74)	
East					5.4000	19.6403	0.6300	0.7000			0.7700	32.4125 (76)	
South					0.7200	46.7521	0.6300	0.7000			0.7700	10.2874 (78)	
West					2.5000	19.6403	0.6300	0.7000			0.7700	15.0058 (80)	

Solar gains	61.2154	116.3156	185.6216	265.3586	322.9818	330.2349	314.5196	271.2160	213.7918	136.2242	75.6488	50.8096 (83)	
Total gains	441.6866	504.0612	558.6265	625.4155	666.1945	658.7373	631.5216	589.2148	540.7076	476.9212	435.7801	424.1297 (84)	

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil _m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	45.2535	45.3632	45.4712	45.9855	46.0830	46.5425	46.5425	46.6286	46.3644	46.0830	45.8862	45.6821	
alpha	4.0169	4.0242	4.0314	4.0657	4.0722	4.1028	4.1028	4.1086	4.0910	4.0722	4.0591	4.0455	
util living area	0.9832	0.9707	0.9443	0.8746	0.7494	0.5742	0.4275	0.4740	0.7061	0.9074	0.9702	0.9856	(86)
MIT	19.4705	19.6994	20.0410	20.4745	20.7882	20.9468	20.9874	20.9810	20.8763	20.4616	19.8990	19.4367	(87)
Th 2	19.7957	19.7982	19.8007	19.8124	19.8146	19.8249	19.8249	19.8268	19.8209	19.8146	19.8102	19.8055	(88)
util rest of house	0.9785	0.9625	0.9286	0.8404	0.6865	0.4816	0.3174	0.3595	0.6165	0.8738	0.9604	0.9815	(89)
MIT 2	18.0642	18.3533	18.7789	19.3036	19.6443	19.7954	19.8210	19.8202	19.7412	19.3052	18.6166	18.0282	(90)
Living area fraction	18.7191	18.9801	19.3666	19.8489	20.1770	20.3316	20.3642	20.3608	20.2698	19.8437	19.2138	18.6841	(92)
MIT	18.7191	18.9801	19.3666	19.8489	20.1770	20.3316	20.3642	20.3608	20.2698	19.8437	19.2138	18.6841	(93)
Temperature adjustment												0.0000	
adjusted MIT	18.7191	18.9801	19.3666	19.8489	20.1770	20.3316	20.3642	20.3608	20.2698	19.8437	19.2138	18.6841	(93)

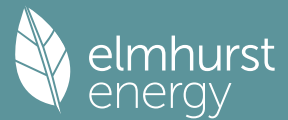
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9727	0.9554	0.9217	0.8415	0.7071	0.5228	0.3687	0.4127	0.6529	0.8748	0.9541	0.9763	(94)
Useful gains	429.6484	481.5826	514.8582	526.3137	471.0329	344.4014	232.8452	243.1793	353.0169	417.2084	415.7840	414.0654	(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	927.5644	903.5707	823.7330	693.1184	535.5003	358.4973	235.4395	247.2789	387.3872	583.9353	768.5255	923.0036	(97)
Space heating kWh	370.4495	283.5760	229.8029	120.0994	47.9637	0.0000	0.0000	0.0000	0.0000	124.0448	253.9739	378.6501	(98a)
Space heating requirement - total per year (kWh/year)												1808.5602	
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	370.4495	283.5760	229.8029	120.0994	47.9637	0.0000	0.0000	0.0000	0.0000	124.0448	253.9739	378.6501	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1808.5602	
Space heating per m ²										(98c) / (4) =		38.1794	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	370.4495	283.5760	229.8029	120.0994	47.9637	0.0000	0.0000	0.0000	0.0000	124.0448	253.9739	378.6501	(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)	401.3537	307.2329	248.9738	130.1185	51.9650	0.0000	0.0000	0.0000	0.0000	134.3930	275.1613	410.2384	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	170.0406	150.4999	160.5117	142.9768	139.7751	127.2609	126.7048	131.1024	131.8078	145.3732	152.5608	168.4583	(64)
Efficiency of water heater	85.7572	85.4583	84.8640	83.6714	81.9212	79.8000	79.8000	79.8000	79.8000	83.7061	85.1943	85.8198	(216)
Fuel for water heating, kWh/month	198.2814	176.1092	189.1400	170.8789	170.6214	159.4749	158.7779	164.2888	165.1727	173.6711	179.0741	196.2931	(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	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	14.7849	11.8610	10.6795	7.8243	6.0437	4.9377	5.5133	7.1663	9.3084	12.2131	13.7946	15.1958	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-22.6353	-32.1618	-46.6139	-52.9018	-57.5177	-53.9194	-53.3086	-50.1194	-44.5230	-37.0503	-24.9943	-19.5448	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-12.0442	-25.4175	-50.6460	-76.2295	-100.9194	-101.3910	-100.1439	-84.6904	-61.9787	-36.3418	-16.0839	-9.5139	(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												1959.4368	(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												2101.7833	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												119.3225	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1170.6905	(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												3095.8521	(238)

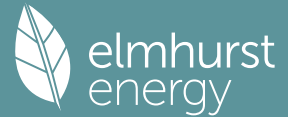
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1959.4368	0.2100	411.4817	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2101.7833	0.2100	441.3745	(264)
Space and water heating			852.8562	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	119.3225	0.1443	17.2219	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-495.2903	0.1344	-66.5562	
PV Unit electricity exported	-675.4002	0.1258	-84.9969	
Total			-151.5531	(269)
Total CO2, kg/year			730.4543	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.4200	(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	1959.4368	1.1300	2214.1636	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2101.7833	1.1300	2375.0151	(278)
Space and water heating			4589.1787	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	119.3225	1.5338	183.0209	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-495.2903	1.4966	-741.2647	
PV Unit electricity exported	-675.4002	0.4619	-311.9964	
Total			-1053.2612	(283)
Total Primary energy kWh/year			3849.0392	(286)
Target Primary Energy Rate (TPER)			81.2500	(287)

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Plot Reference	79596-06				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	26 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.53		TER	15.42
Environmental	95 A		% DER < TER				51.17
CO ₂ Emissions (t/year)	0.31		DFEE	42.66		TFEE	47.31
Compliance Check	See BREL		% DFEE < TFEE				9.82
% DPER < TPER	4.63		DPER	77.49		TPER	81.25
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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

1. Overall dwelling characteristics

		Area (m ²)		Storey height (m)		Volume (m ³)
Main dwelling						
Ground floor		2.9900 (1b)	x	2.8500 (2b)	=	8.5215 (1b) - (3b)
First floor		44.3800 (1c)	x	2.4000 (2c)	=	106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.3700					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	115.0335 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	
Pressure test	20.0000 / (5) =	
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate	1.8200 (17)	
Number of sides sheltered	0.2649 (18)	
	2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	
	0.8500 (20)	
	0.2251 (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	0.2870	0.2814	0.2758	0.2476	0.2420	0.2139	0.2139	0.2082	0.2251	0.2420	0.2533	0.2645 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5412	0.5396	0.5380	0.5307	0.5293	0.5229	0.5229	0.5217	0.5253	0.5293	0.5321	0.5350 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	81.8500	11.8600	69.9900	0.1900	13.2981	110.0000	7698.8998 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.3200		9.3200	0.1300	1.2116	9.0000	83.8800 (30)
Total net area of external elements A _{um} (A, m ²)			135.1000				(31)
Fabric heat loss, W/K = Sum (A x k)				(26)...(30) + (32) =	32.6049		(33)
Main dwelling							
Party Wall 1			15.9900	0.0000	0.0000	110.0000	1758.9000 (32)
Party Floor 1			44.3800			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10479.9898 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							221.2368 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.0700	0.0200	0.1614
E3 Sill	8.0700	0.0300	0.2421
E4 Jamb	22.2000	0.0260	0.5772
E5 Ground floor (normal)	4.0200	0.0930	0.3739
E7 Party floor between dwellings (in blocks of flats)	29.3300	0.0370	1.0852
E16 Corner (normal)	17.7000	0.0510	0.9027
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368
E18 Party wall between dwellings	5.7000	0.0650	0.3705
P1 Party wall - Ground floor	4.0200	0.1080	0.4342
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112
E10 Eaves (insulation at ceiling level)	14.4900	0.0970	1.4055
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172
E12 Gable (insulation at ceiling level)	13.3500	0.0970	1.2950
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246
P4 Party wall - Roof (insulation at ceiling level)	1.8900	0.1010	0.1909
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4552 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	40.0601 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	20.5444	20.4837	20.4242	20.1446	20.0923	19.8488	19.8488	19.8037	19.9426	20.0923	20.1981	20.3087	(38)
Heat transfer coeff	60.6045	60.5438	60.4843	60.2047	60.1524	59.9089	59.9089	59.8638	60.0027	60.1524	60.2582	60.3688	(39)
Average = Sum(39)m / 12 =												60.2044	
HLP	1.2794	1.2781	1.2768	1.2709	1.2698	1.2647	1.2647	1.2637	1.2667	1.2698	1.2721	1.2744	(40)
HLP (average)												1.2709	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6130 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	22.1688	21.8395	21.3759	20.5211	19.8809	19.1712	18.7878	19.2482	19.7494	20.5089	21.3814	22.0938 (42b)
Hot water usage for other uses												
	31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491 (42c)
Average daily hot water use (litres/day)												48.8714 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	53.3179	51.8560	50.2597	48.2721	46.4993	44.6568	44.2734	45.8665	47.5005	49.3927	51.3978	53.2430 (44)
Energy content (annual)												
	84.4425	73.8422	77.2472	66.0821	62.5970	54.9108	53.5449	56.7923	58.5729	67.0254	73.2256	83.3656 (45)
Distribution loss (46)m = 0.15 x (45)m												811.6486
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	71.7762	62.7659	65.6601	56.1698	53.2074	46.6742	45.5131	48.2735	49.7869	56.9716	62.2418	70.8608 (62)
WWHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	71.7762	62.7659	65.6601	56.1698	53.2074	46.6742	45.5131	48.2735	49.7869	56.9716	62.2418	70.8608 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m =
Electric shower(s)												689.9013 (64)
	41.0546	36.5800	39.9439	38.1180	38.8333	37.0432	38.2779	38.8333	38.1180	39.9439	39.1928	41.0546 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												466.9935 (64a)
Heat gains from water heating, kWh/month												
	28.2077	24.8365	26.4010	23.5719	23.0102	20.9293	20.9478	21.7767	21.9762	24.2289	25.3587	27.9788 (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	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.1499	78.7731	71.1499	73.5216	71.1499	73.5216	71.1499	71.1499	73.5216	71.1499	73.5216	71.1499 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	140.4079	141.8649	138.1933	130.3770	120.5102	111.2369	105.0417	103.5847	107.2563	115.0726	124.9394	134.2127 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216 (71)
Water heating gains (Table 5)	37.9136	36.9590	35.4852	32.7388	30.9277	29.0685	28.1556	29.2697	30.5225	32.5657	35.2204	37.6060 (72)
Total internal gains	296.6670	304.7927	292.0241	283.8330	269.7834	261.0226	251.5428	251.2000	258.4960	265.9838	280.8769	290.1642 (73)

6. Solar gains							
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.0800	10.6334	0.7300	0.7000	0.7700	4.0668	(74)
East	1.6100	19.6403	0.7300	0.7000	0.7700	11.1977	(76)

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South	0.7200	46.7521	0.7300	0.7000	0.7700	11.9203 (78)
West	2.5000	19.6403	0.7300	0.7000	0.7700	17.3877 (80)
East	3.8000	19.6403	0.6800	0.7000	0.7700	24.6190 (76)

Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)
Total gains	365.8584	436.1659	501.5017	583.1334	634.0089	633.4152	606.2178	557.0752	499.7010	419.7905	366.3630	347.6074 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	48.0345	48.0827	48.1300	48.3535	48.3956	48.5923	48.5923	48.6289	48.5163	48.3956	48.3106	48.2220
alpha	4.2023	4.2055	4.2087	4.2236	4.2264	4.2395	4.2395	4.2419	4.2344	4.2264	4.2207	4.2148
util living area	0.9911	0.9809	0.9569	0.8866	0.7550	0.5747	0.4275	0.4814	0.7263	0.9304	0.9826	0.9928 (86)
MIT	19.4240	19.6726	20.0359	20.4860	20.8037	20.9528	20.9892	20.9825	20.8757	20.4287	19.8395	19.3748 (87)
Th 2	19.8570	19.8580	19.8590	19.8637	19.8645	19.8686	19.8686	19.8693	19.8670	19.8645	19.8628	19.8609 (88)
util rest of house	0.9885	0.9754	0.9444	0.8551	0.6941	0.4849	0.3212	0.3692	0.6399	0.9036	0.9766	0.9906 (89)
MIT 2	18.4468	18.6926	19.0472	19.4713	19.7404	19.8479	19.8659	19.8645	19.8031	19.4319	18.8634	18.4010 (90)
Living area fraction	18.9019	19.1490	19.5076	19.9438	20.2356	20.3624	20.3890	20.3851	20.3026	19.8961	19.3180	18.8545 (92)
MIT	18.9019	19.1490	19.5076	19.9438	20.2356	20.3624	20.3890	20.3851	20.3026	19.8961	19.3180	18.8545 (93)
Temperature adjustment												0.0000
adjusted MIT	18.9019	19.1490	19.5076	19.9438	20.2356	20.3624	20.3890	20.3851	20.3026	19.8961	19.3180	18.8545 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9855	0.9711	0.9397	0.8576	0.7153	0.5253	0.3708	0.4215	0.6754	0.9044	0.9729	0.9881 (94)
Useful gains	360.5613	423.5560	471.2802	500.0891	453.4934	332.7177	224.7777	234.7845	337.4750	379.6774	356.4285	343.4603 (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	884.9386	862.6888	786.7578	664.8912	513.4346	345.2218	226.9970	238.5655	372.1717	559.1814	736.2319	884.6759 (97)
Space heating kWh	390.1367	295.0972	234.7154	118.6576	44.5962	0.0000	0.0000	0.0000	0.0000	133.5509	273.4585	402.6644 (98a)
Space heating requirement - total per year (kWh/year)												1892.8770
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	390.1367	295.0972	234.7154	118.6576	44.5962	0.0000	0.0000	0.0000	0.0000	133.5509	273.4585	402.6644 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1892.8770
Space heating per m2												39.9594 (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	563.1433	443.3255	454.9646	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8919	0.9378	0.9142	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	502.2738	415.7547	415.9112	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	715.1352	684.7682	628.6860	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	153.2602	200.1460	158.3045	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	38.3151	50.0365	39.5761	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												127.9277 (107)
Energy for space heating												39.9594 (99)
Energy for space cooling												2.7006 (108)
Total												42.6600 (109)
Fabric Energy Efficiency (DFEE)												42.7 (109)

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

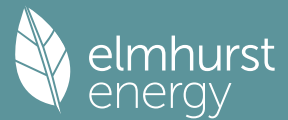
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	47.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	115.0335 (5)

2. Ventilation rate

m3 per hour

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Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000	Air changes per hour	0.1739 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)
Infiltration rate			0.4239	(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) =		0.3603	(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)
	0.4594	0.4504	0.4413	0.3963	0.3873	0.3423	0.3423	0.3333	0.3603	0.3873	0.4053	0.4233	(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	0.6055	0.6014	0.5974	0.5785	0.5750	0.5586	0.5586	0.5555	0.5649	0.5750	0.5821	0.5896	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type			9.7000	1.1450	11.1069		(27)
GF			2.9900	0.1300	0.3887		(28a)
Main	81.8500	11.8500	70.0000	0.1800	12.6000		(29a)
PIJ	40.9400		40.9400	0.1100	4.5034		(30)
PIR	9.3200		9.3200	0.1100	1.0252		(30)
Total net area of external elements Aum(A, m2)			135.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7742		(33)
Main dwelling							
Party Wall 1			15.9900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							221.2368 (35)

List of Thermal Bridges													
K1 Element							Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)							8.0700	0.0500	0.4035				
E3 Sill							8.0700	0.0500	0.4035				
E4 Jamb							22.2000	0.0500	1.1100				
E5 Ground floor (normal)							4.0200	0.1600	0.6432				
E7 Party floor between dwellings (in blocks of flats)							29.3300	0.0700	2.0531				
E16 Corner (normal)							17.7000	0.0900	1.5930				
E17 Corner (inverted - internal area greater than external area)							4.8000	-0.0900	-0.4320				
E18 Party wall between dwellings							5.7000	0.0600	0.3420				
P1 Party wall - Ground floor							4.0200	0.0800	0.3216				
E25 Staggered party wall between dwellings							4.8000	0.0600	0.2880				
E10 Eaves (insulation at ceiling level)							14.4900	0.0600	0.8694				
E11 Eaves (insulation at rafter level)							1.0100	0.0400	0.0404				
E12 Gable (insulation at ceiling level)							13.3500	0.0600	0.8010				
E13 Gable (insulation at rafter level)							6.9600	0.0800	0.5568				
P4 Party wall - Roof (insulation at ceiling level)							1.8900	0.1200	0.2268				
P5 Party wall - Roof (insulation at rafter level)							4.3600	0.0800	0.3488				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												9.5691	(36)
Point Thermal bridges												(36a) =	0.0000
Total fabric heat loss												(33) + (36) + (36a) =	41.3433 (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	22.9857	22.8301	22.6777	21.9617	21.8277	21.2041	21.2041	21.0886	21.4443	21.8277	22.0987	22.3820	(38)
Average = Sum(39)m / 12 =	64.3289	64.1734	64.0210	63.3049	63.1710	62.5473	62.5473	62.4318	62.7875	63.1710	63.4420	63.7253	(39)
												63.3043	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3580	1.3547	1.3515	1.3364	1.3336	1.3204	1.3204	1.3180	1.3255	1.3336	1.3393	1.3453	(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													1.6130 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													22.0938 (42b)
Hot water usage for other uses													31.1491 (42c)
Average daily hot water use (litres/day)													48.8714 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	53.3179	51.8560	50.2597	48.2721	46.4993	44.6568	44.2734	45.8665	47.5005	49.3927	51.3978	53.2430	(44)
Energy content (annual)	84.4425	73.8422	77.2472	66.0821	62.5970	54.9108	53.5449	56.7923	58.5729	67.0254	73.2256	83.3656	(45)
Distribution loss (46)m = 0.15 x (45)m													811.6486
Water storage loss (or HIU loss):													0.0000 (46)
Total storage loss													0.0000 (56)
If cylinder contains dedicated solar storage													0.0000 (57)

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Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	71.7762	62.7659	65.6601	56.1698	53.2074	46.6742	45.5131	48.2735	49.7869	56.9716	62.2418	70.8608 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	71.7762	62.7659	65.6601	56.1698	53.2074	46.6742	45.5131	48.2735	49.7869	56.9716	62.2418	70.8608 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											689.9013 (64)
Electric shower(s)	41.0546	36.5800	39.9439	38.1180	38.8333	37.0432	38.2779	38.8333	38.1180	39.9439	39.1928	41.0546 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											466.9935 (64a)
Heat gains from water heating, kWh/month	28.2077	24.8365	26.4010	23.5719	23.0102	20.9293	20.9478	21.7767	21.9762	24.2289	25.3587	27.9788 (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	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.1564	78.7803	71.1564	73.5283	71.1564	73.5283	71.1564	71.1564	73.5283	71.1564	73.5283	71.1564 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	140.4079	141.8649	138.1933	130.3770	120.5102	111.2369	105.0417	103.5847	107.2563	115.0726	124.9394	134.2127 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216 (71)
Water heating gains (Table 5)	37.9136	36.9590	35.4852	32.7388	30.9277	29.0685	28.1556	29.2697	30.5225	32.5657	35.2204	37.6060 (72)
Total internal gains	296.6734	304.7998	292.0305	283.8396	269.7899	261.0292	251.5493	251.2064	258.5027	265.9903	280.8836	290.1707 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
North	1.0800		10.6334		0.6300		0.7000		0.7700		3.5097 (74)	
East	5.4000		19.6403		0.6300		0.7000		0.7700		32.4125 (76)	
South	0.7200		46.7521		0.6300		0.7000		0.7700		10.2874 (78)	
West	2.5000		19.6403		0.6300		0.7000		0.7700		15.0058 (80)	
Solar gains	61.2154	116.3156	185.6216	265.3586	322.9818	330.2349	314.5196	271.2160	213.7918	136.2242	75.6488	50.8096 (83)
Total gains	357.8888	421.1154	477.6522	549.1982	592.7716	591.2641	566.0689	522.4225	472.2945	402.2145	356.5324	340.9803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	45.2535	45.3632	45.4712	45.9855	46.0830	46.5425	46.5425	46.6286	46.3644	46.0830	45.8862	45.6821
alpha	4.0169	4.0242	4.0314	4.0657	4.0722	4.1028	4.1028	4.1086	4.0910	4.0722	4.0591	4.0455
util living area	0.9919	0.9838	0.9655	0.9102	0.7992	0.6259	0.4729	0.5275	0.7674	0.9427	0.9848	0.9933 (86)
MIT	19.2810	19.5201	19.8822	20.3614	20.7269	20.9272	20.9819	20.9720	20.8298	20.3329	19.7270	19.2467 (87)
Th 2	19.7957	19.7982	19.8007	19.8124	19.8146	19.8249	19.8249	19.8268	19.8209	19.8146	19.8102	19.8055 (88)
util rest of house	0.9895	0.9790	0.9549	0.8826	0.7407	0.5299	0.3530	0.4033	0.6815	0.9190	0.9794	0.9913 (89)
MIT 2	18.2598	18.4978	18.8545	19.3179	19.6380	19.7924	19.8203	19.8189	19.7311	19.3045	18.7137	18.2329 (90)
Living area fraction	18.7354	18.9739	19.3331	19.8038	20.1451	20.3209	20.3613	20.3559	20.2428	19.7834	19.1856	18.7050 (91)
MIT	18.7354	18.9739	19.3331	19.8038	20.1451	20.3209	20.3613	20.3559	20.2428	19.7834	19.1856	18.7050 (92)
Temperature adjustment	18.7354	18.9739	19.3331	19.8038	20.1451	20.3209	20.3613	20.3559	20.2428	19.7834	19.1856	18.7050 (93)
adjusted MIT	18.7354	18.9739	19.3331	19.8038	20.1451	20.3209	20.3613	20.3559	20.2428	19.7834	19.1856	18.7050 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9865	0.9747	0.9497	0.8824	0.7584	0.5722	0.4089	0.4610	0.7150	0.9182	0.9756	0.9888 (94)
Useful gains	353.0733	410.4560	453.6255	484.6040	449.5804	338.3266	231.4666	240.8464	337.6997	369.3242	347.8279	337.1469 (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	928.6108	903.1688	821.5875	690.2664	533.4854	357.8269	235.2569	246.9761	385.6901	580.1255	766.7333	924.3360 (97)
Space heating kWh	428.1999	331.1030	273.7638	148.0769	62.4253	0.0000	0.0000	0.0000	0.0000	156.8361	301.6119	436.8687 (98a)
Space heating requirement - total per year (kWh/year)												2138.8856
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	428.1999	331.1030	273.7638	148.0769	62.4253	0.0000	0.0000	0.0000	0.0000	156.8361	301.6119	436.8687 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2138.8856
Space heating per m2												45.1527 (99)

8c. Space cooling requirement

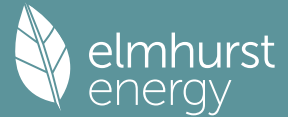
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	587.9449	462.8502	474.4820	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8506	0.9086	0.8800	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	500.1114	420.5466	417.5259	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	665.8605	637.8340	588.1760	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	119.3394	161.6618	126.9637	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	29.8348	40.4154	31.7409	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												101.9912 (107)
Energy for space cooling												45.1527 (99)
Total												2.1531 (108)
Fabric Energy Efficiency (TFEE)												47.3058 (109)
												47.3 (109)

Full SAP Calculation Printout



Plot Reference	79596-06				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	26 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C	DER	7.53	TER	15.42		
Environmental	95 A	% DER < TER				51.17	
CO ₂ Emissions (t/year)	0.31	DFEE	42.66	TFEE	47.31		
Compliance Check	See BREL	% DFEE < TFEE				9.82	
% DPER < TPER	4.63	DPER	77.49	TPER	81.25		
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.0335 (5)

2. Ventilation rate

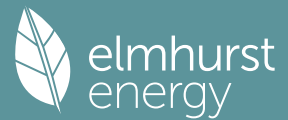
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	1.8200 (17)
Infiltration rate	0.0910 (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) = 0.0774 (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	0.0986	0.0967	0.0948	0.0851	0.0832	0.0735	0.0735	0.0715	0.0774	0.0832	0.0870	0.0909 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	81.8500	11.8600	69.9900	0.1900	13.2981	110.0000	7698.8998 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.3200		9.3200	0.1300	1.2116	9.0000	83.8800 (30)
Total net area of external elements A _{um} (A, m ²)			135.1000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.6049		(33)
Main dwelling							
Party Wall 1			15.9900	0.0000	0.0000	110.0000	1758.9000 (32)
Party Floor 1			44.3800			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10479.9898 (34)

Full SAP Calculation Printout



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

221.2368 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.0700	0.0200	0.1614
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421
E3 Sill	22.2000	0.0260	0.5772
E4 Jamb	4.0200	0.0930	0.3739
E5 Ground floor (normal)	29.3300	0.0370	1.0852
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.4900	0.0970	1.4055
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	13.3500	0.0970	1.2950
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	1.8900	0.1010	0.1909
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.4552 (36)
Total fabric heat loss	(33) + (36) + (36a) =	40.0601 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	(38)
Heat transfer coeff	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	(39)
Average = Sum(39)m / 12 =													59.0406

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	(40)
HLP (average)													1.2464
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

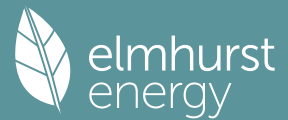
Assumed occupancy													1.6130 (42)
Hot water usage for mixer showers													
74.0080	72.8958	71.2751	68.1742	65.8858	63.3338	61.8833	63.4917	65.2548	67.9949	71.1624	73.7244	(42a)	
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses													
31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)	
Average daily hot water use (litres/day)													96.5503 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.1571	102.9122	100.1588	95.9252	92.5042	88.8195	87.3689	90.1101	93.0059	96.8786	101.1788	104.8736	(44)
Energy content	166.5432	146.5456	153.9404	131.3169	124.5284	109.2139	105.6652	111.5751	114.6856	131.4634	144.1478	164.2066	(45)
Energy content (annual)										Total = Sum(45)m =			1603.8320
Distribution loss (46)m = 0.15 x (45)m													
24.9815	21.9818	23.0911	19.6975	18.6793	16.3821	15.8498	16.7363	17.2028	19.7195	21.6222	24.6310	(46)	
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h													
193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			1921.1630 (64)
Electric shower(s)													1921 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
55.3756	48.7264	51.1852	43.6629	41.4057	36.3136	35.1337	37.0987	38.1329	43.7116	47.9291	54.5987	(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	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	71.1499	78.7731	71.1499	73.5216	71.1499	73.5216	71.1499	71.1499	73.5216	71.1499	73.5216	71.1499 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	140.4079	141.8649	138.1933	130.3770	120.5102	111.2369	105.0417	103.5847	107.2563	115.0726	124.9394	134.2127 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216 (71)
Water heating gains (Table 5)												
	74.4296	72.5096	68.7973	60.6429	55.6528	50.4356	47.2227	49.8639	52.9624	58.7521	66.5683	73.3854 (72)
Total internal gains												
	333.1830	340.3432	325.3361	311.7370	294.5085	282.3896	270.6099	271.7941	280.9359	292.1703	312.2248	325.9436 (73)

6. Solar gains

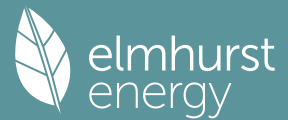
Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North	1.0800				10.6334	0.7300		0.7000		0.7700	4.0668 (74)	
East	1.6100				19.6403	0.7300		0.7000		0.7700	11.1977 (76)	
South	0.7200				46.7521	0.7300		0.7000		0.7700	11.9203 (78)	
West	2.5000				19.6403	0.7300		0.7000		0.7700	17.3877 (80)	
East	3.8000				19.6403	0.6800		0.7000		0.7700	24.6190 (76)	
Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)
Total gains	402.3744	471.7164	534.8137	611.0374	658.7341	654.7823	625.2848	577.6694	522.1408	445.9769	397.7109	383.3868 (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	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069
alpha	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871
util living area	0.9872	0.9744	0.9455	0.8683	0.7307	0.5526	0.4098	0.4602	0.6992	0.9148	0.9764	0.9895 (86)
MIT	19.5621	19.8011	20.1442	20.5511	20.8346	20.9609	20.9913	20.9859	20.8967	20.4968	19.9441	19.5041 (87)
Th 2	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831 (88)
util rest of house	0.9836	0.9673	0.9305	0.8341	0.6692	0.4658	0.3086	0.3532	0.6130	0.8840	0.9686	0.9865 (89)
MIT 2	18.2401	18.5408	18.9665	19.4482	19.7505	19.8613	19.8803	19.8781	19.8161	19.4010	18.7251	18.1666 (90)
Living area fraction	fLA = Living area / (4) = 0.4657 (91)											
MIT	18.8558	19.1277	19.5150	19.9618	20.2553	20.3734	20.3977	20.3940	20.3193	19.9113	19.2928	18.7895 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8558	19.1277	19.5150	19.9618	20.2553	20.3734	20.3977	20.3940	20.3193	19.9113	19.2928	18.7895 (93)
8. Space heating requirement												
Utilisation	0.9791	0.9612	0.9246	0.8368	0.6909	0.5049	0.3557	0.4030	0.6486	0.8849	0.9632	0.9825 (94)
Useful gains	393.9517	453.4241	494.4990	511.3323	455.0925	330.5893	222.4399	232.7863	338.6695	394.6639	383.0918	376.6762 (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	859.3806	840.0129	768.4119	653.0980	505.1127	340.8655	224.2191	235.8087	367.1929	549.7465	719.8708	861.3708 (97)
Space heating kWh	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (98a)
Space heating requirement - total per year (kWh/year)												1667.6195
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	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.6195
Space heating per m2	(98c) / (4) =											35.2041 (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	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (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)	346.2791	259.7877	203.7912	102.0713	37.2150	0.0000	0.0000	0.0000	0.0000	115.3814	242.4809	360.6128 (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	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (64)
Water heating requirement	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (64)
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	55.3775	48.9078	51.7706	45.0470	43.3530	38.7213	37.9544	39.6458	40.2872	45.3378	48.7192	54.7088 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	1.9922	1.7994	1.9922	1.9280	1.9922	1.9280	1.9922	1.9922	1.9280	1.9922	1.9280	1.9922 (231)
Pumps and Fa	13.6516	10.9518	9.8609	7.2245	5.5804	4.5592	5.0906	6.6170	8.5948	11.2769	12.7372	14.0310 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
(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)	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)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

2. Ventilation rate		
		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1739 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4239 (18)
Number of sides sheltered		2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3603 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4594	0.4504	0.4413	0.3963	0.3873	0.3423	0.3423	0.3333	0.3603	0.3873	0.4053	0.4233	(22b)
	0.6055	0.6014	0.5974	0.5785	0.5750	0.5586	0.5586	0.5555	0.5649	0.5750	0.5821	0.5896	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			9.7000	1.1450	11.1069			(27)
GF			2.9900	0.1300	0.3887			(28a)
Main	81.8500	11.8500	70.0000	0.1800	12.6000			(29a)
PIJ	40.9400		40.9400	0.1100	4.5034			(30)
PIR	9.3200		9.3200	0.1100	1.0252			(30)
Total net area of external elements Aum(A, m2)			135.1000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.7742		(33)
Main dwelling								
Party Wall 1			15.9900	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							221.2368	(35)

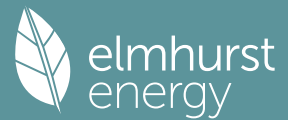
List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	8.0700	0.0500	0.4035	
E2 Other lintels (including other steel lintels)	8.0700	0.0500	0.4035	
E3 Sill	22.2000	0.0500	1.1100	
E4 Jamb	4.0200	0.1600	0.6432	
E5 Ground floor (normal)	29.3300	0.0700	2.0531	
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0900	1.5930	
E16 Corner (normal)	4.8000	-0.0900	-0.4320	
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0600	0.3420	
E18 Party wall between dwellings	4.0200	0.0800	0.3216	
P1 Party wall - Ground floor	4.8000	0.0600	0.2880	
E25 Staggered party wall between dwellings	14.4900	0.0600	0.8694	
E10 Eaves (insulation at ceiling level)	1.0100	0.0400	0.0404	
E11 Eaves (insulation at rafter level)	13.3500	0.0600	0.8010	
E12 Gable (insulation at ceiling level)	6.9600	0.0800	0.5568	
E13 Gable (insulation at rafter level)	1.8900	0.1200	0.2268	
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0800	0.3488	
P5 Party wall - Roof (insulation at rafter level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.5691	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	41.3433 (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	22.9857	22.8301	22.6777	21.9617	21.8277	21.2041	21.2041	21.0886	21.4443	21.8277	22.0987	22.3820	(38)
Heat transfer coeff	64.3289	64.1734	64.0210	63.3049	63.1710	62.5473	62.5473	62.4318	62.7875	63.1710	63.4420	63.7253	(39)
Average = Sum(39)m / 12 =												63.3043	
HLP	1.3580	1.3547	1.3515	1.3364	1.3336	1.3204	1.3204	1.3180	1.3255	1.3336	1.3393	1.3453	(40)
HLP (average)												1.3364	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6130 (42)
Hot water usage for mixer showers	65.7849	64.7962	63.3556	60.5993	58.5652	56.2967	55.0074	56.4371	58.0043	60.4399	63.2555	65.5328	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)
Average daily hot water use (litres/day)												88.9688	(43)
Daily hot water use	96.9340	94.8127	92.2394	88.3503	85.1835	81.7824	80.4930	83.0554	85.7553	89.3236	93.2719	96.6820	(44)
Energy conte	153.5198	135.0120	141.7685	120.9472	114.6734	100.5610	97.3493	102.8400	105.7449	121.2113	132.8829	151.3806	(45)
Energy content (annual)										Total = Sum(45)m =		1477.8909	
Distribution loss (46)m = 0.15 x (45)m	23.0280	20.2518	21.2653	18.1421	17.2010	15.0842	14.6024	15.4260	15.8617	18.1817	19.9324	22.7071	(46)
Water storage loss (or HIU loss):													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	200.1147	177.0977	188.3634	166.0390	161.2683	145.6528	143.9442	149.4349	150.8368	167.8062	177.9748	197.9755	(62)
WWHRS	-30.0741	-26.5978	-27.8517	-23.0623	-21.4932	-18.3919	-17.2395	-18.3324	-19.0290	-22.4330	-25.4139	-29.5172	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	170.0406	150.4999	160.5117	142.9768	139.7751	127.2609	126.7048	131.1024	131.8078	145.3732	152.5608	168.4583	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1747.0724	(64)
Electric shower(s)												1747	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													

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88.3212 78.5601 84.4139 76.2884 75.4048 69.5100 69.6446 71.4702 71.2337 77.5787 80.2570 87.6100 (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	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	80.6520	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.1564	78.7803	71.1564	73.5283	71.1564	73.5283	71.1564	71.1564	73.5283	71.1564	73.5283	71.1564	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	140.4079	141.8649	138.1933	130.3770	120.5102	111.2369	105.0417	103.5847	107.2563	115.0726	124.9394	134.2127	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	31.0652	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	(71)
Water heating gains (Table 5)	118.7113	116.9049	113.4596	105.9561	101.3506	96.5417	93.6083	96.0621	98.9356	104.2724	111.4681	117.7553	(72)
Total internal gains	380.4712	387.7456	373.0049	360.0570	343.2128	328.5024	317.0020	317.9988	326.9158	340.6971	360.1314	373.3200	(73)

6. Solar gains

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

North					1.0800	10.6334	0.6300	0.7000			0.7700	3.5097 (74)	
East					5.4000	19.6403	0.6300	0.7000			0.7700	32.4125 (76)	
South					0.7200	46.7521	0.6300	0.7000			0.7700	10.2874 (78)	
West					2.5000	19.6403	0.6300	0.7000			0.7700	15.0058 (80)	

Solar gains	61.2154	116.3156	185.6216	265.3586	322.9818	330.2349	314.5196	271.2160	213.7918	136.2242	75.6488	50.8096 (83)	
Total gains	441.6866	504.0612	558.6265	625.4155	666.1945	658.7373	631.5216	589.2148	540.7076	476.9212	435.7801	424.1297 (84)	

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil _m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	45.2535	45.3632	45.4712	45.9855	46.0830	46.5425	46.5425	46.6286	46.3644	46.0830	45.8862	45.6821	
alpha	4.0169	4.0242	4.0314	4.0657	4.0722	4.1028	4.1028	4.1086	4.0910	4.0722	4.0591	4.0455	
util living area	0.9832	0.9707	0.9443	0.8746	0.7494	0.5742	0.4275	0.4740	0.7061	0.9074	0.9702	0.9856	(86)
MIT	19.4705	19.6994	20.0410	20.4745	20.7882	20.9468	20.9874	20.9810	20.8763	20.4616	19.8990	19.4367	(87)
Th 2	19.7957	19.7982	19.8007	19.8124	19.8146	19.8249	19.8249	19.8268	19.8209	19.8146	19.8102	19.8055	(88)
util rest of house	0.9785	0.9625	0.9286	0.8404	0.6865	0.4816	0.3174	0.3595	0.6165	0.8738	0.9604	0.9815	(89)
MIT 2	18.0642	18.3533	18.7789	19.3036	19.6443	19.7954	19.8210	19.8202	19.7412	19.3052	18.6166	18.0282	(90)
Living area fraction	18.7191	18.9801	19.3666	19.8489	20.1770	20.3316	20.3642	20.3608	20.2698	19.8437	19.2138	18.6841	(92)
MIT	18.7191	18.9801	19.3666	19.8489	20.1770	20.3316	20.3642	20.3608	20.2698	19.8437	19.2138	18.6841	(93)
Temperature adjustment												0.0000	
adjusted MIT	18.7191	18.9801	19.3666	19.8489	20.1770	20.3316	20.3642	20.3608	20.2698	19.8437	19.2138	18.6841	(93)

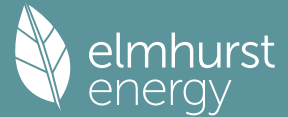
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9727	0.9554	0.9217	0.8415	0.7071	0.5228	0.3687	0.4127	0.6529	0.8748	0.9541	0.9763	(94)
Useful gains	429.6484	481.5826	514.8582	526.3137	471.0329	344.4014	232.8452	243.1793	353.0169	417.2084	415.7840	414.0654	(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	927.5644	903.5707	823.7330	693.1184	535.5003	358.4973	235.4395	247.2789	387.3872	583.9353	768.5255	923.0036	(97)
Space heating kWh	370.4495	283.5760	229.8029	120.0994	47.9637	0.0000	0.0000	0.0000	0.0000	124.0448	253.9739	378.6501	(98a)
Space heating requirement - total per year (kWh/year)												1808.5602	
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	370.4495	283.5760	229.8029	120.0994	47.9637	0.0000	0.0000	0.0000	0.0000	124.0448	253.9739	378.6501	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1808.5602	
Space heating per m ²										(98c) / (4) =		38.1794	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	370.4495	283.5760	229.8029	120.0994	47.9637	0.0000	0.0000	0.0000	0.0000	124.0448	253.9739	378.6501	(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)	401.3537	307.2329	248.9738	130.1185	51.9650	0.0000	0.0000	0.0000	0.0000	134.3930	275.1613	410.2384	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	170.0406	150.4999	160.5117	142.9768	139.7751	127.2609	126.7048	131.1024	131.8078	145.3732	152.5608	168.4583	(64)
Efficiency of water heater	85.7572	85.4583	84.8640	83.6714	81.9212	79.8000	79.8000	79.8000	79.8000	83.7061	85.1943	85.8198	(216)
Fuel for water heating, kWh/month	198.2814	176.1092	189.1400	170.8789	170.6214	159.4749	158.7779	164.2888	165.1727	173.6711	179.0741	196.2931	(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	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	14.7849	11.8610	10.6795	7.8243	6.0437	4.9377	5.5133	7.1663	9.3084	12.2131	13.7946	15.1958	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-22.6353	-32.1618	-46.6139	-52.9018	-57.5177	-53.9194	-53.3086	-50.1194	-44.5230	-37.0503	-24.9943	-19.5448	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-12.0442	-25.4175	-50.6460	-76.2295	-100.9194	-101.3910	-100.1439	-84.6904	-61.9787	-36.3418	-16.0839	-9.5139	(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												1959.4368	(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												2101.7833	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												119.3225	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1170.6905	(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												3095.8521	(238)

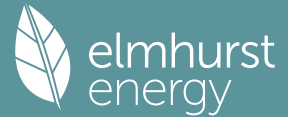
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1959.4368	0.2100	411.4817	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2101.7833	0.2100	441.3745	(264)
Space and water heating			852.8562	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	119.3225	0.1443	17.2219	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-495.2903	0.1344	-66.5562	
PV Unit electricity exported	-675.4002	0.1258	-84.9969	
Total			-151.5531	(269)
Total CO2, kg/year			730.4543	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.4200	(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	1959.4368	1.1300	2214.1636	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2101.7833	1.1300	2375.0151	(278)
Space and water heating			4589.1787	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	119.3225	1.5338	183.0209	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-495.2903	1.4966	-741.2647	
PV Unit electricity exported	-675.4002	0.4619	-311.9964	
Total			-1053.2612	(283)
Total Primary energy kWh/year			3849.0392	(286)
Target Primary Energy Rate (TPER)			81.2500	(287)

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Plot Reference	79596-06				Issued on Date	05/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	26 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C	DER	7.53	TER	15.42		
Environmental	95 A	% DER < TER				51.17	
CO ₂ Emissions (t/year)	0.31	DFEE	42.66	TFEE	47.31		
Compliance Check	See BREL	% DFEE < TFEE				9.82	
% DPER < TPER	4.63	DPER	77.49	TPER	81.25		
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001	
Client	Denton Construction, -						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 115.0335 (5)

2. Ventilation rate

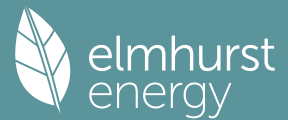
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	1.8200 (17)
Infiltration rate	0.0910 (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) = 0.0774 (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	0.0986	0.0967	0.0948	0.0851	0.0832	0.0735	0.0735	0.0715	0.0774	0.0832	0.0870	0.0909 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	81.8500	11.8600	69.9900	0.1900	13.2981	110.0000	7698.8998 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.3200		9.3200	0.1300	1.2116	9.0000	83.8800 (30)
Total net area of external elements A _{um} (A, m ²)			135.1000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.6049		(33)
Main dwelling							
Party Wall 1			15.9900	0.0000	0.0000	110.0000	1758.9000 (32)
Party Floor 1			44.3800			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10479.9898 (34)

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

221.2368 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.0700	0.0200	0.1614
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421
E3 Sill	22.2000	0.0260	0.5772
E4 Jamb	4.0200	0.0930	0.3739
E5 Ground floor (normal)	29.3300	0.0370	1.0852
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.4900	0.0970	1.4055
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	13.3500	0.0970	1.2950
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	1.8900	0.1010	0.1909
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.4552 (36)
Total fabric heat loss	(33) + (36) + (36a) =	40.0601 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	(38)
Heat transfer coeff	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	(39)
Average = Sum(39)m / 12 =													59.0406

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	(40)
HLP (average)													1.2464
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6130 (42)
Hot water usage for mixer showers													
74.0080	72.8958	71.2751	68.1742	65.8858	63.3338	61.8833	63.4917	65.2548	67.9949	71.1624	73.7244	(42a)	
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses													
31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)	
Average daily hot water use (litres/day)													96.5503 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
105.1571	102.9122	100.1588	95.9252	92.5042	88.8195	87.3689	90.1101	93.0059	96.8786	101.1788	104.8736	(44)	
Energy content (annual)	166.5432	146.5456	153.9404	131.3169	124.5284	109.2139	105.6652	111.5751	114.6856	131.4634	144.1478	164.2066	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1603.8320	
24.9815	21.9818	23.0911	19.6975	18.6793	16.3821	15.8498	16.7363	17.2028	19.7195	21.6222	24.6310	(46)	
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h													
193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(64)	
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
55.3756	48.7264	51.1852	43.6629	41.4057	36.3136	35.1337	37.0987	38.1329	43.7116	47.9291	54.5987	(65)	

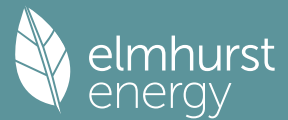
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	15.5966	13.8527	11.2658	8.5289	6.3755	5.3824	5.8159	7.5598	10.1467	12.8836	15.0370	16.0300 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	209.5641	211.7387	206.2587	194.5925	179.8660	166.0252	156.7787	154.6040	160.0840	171.7502	186.4767	200.3175 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216 (71)
Water heating gains (Table 5)												
	74.4296	72.5096	68.7973	60.6429	55.6528	50.4356	47.2227	49.8639	52.9624	58.7521	66.5683	73.3854 (72)
Total internal gains												
	378.1422	376.6530	364.8738	342.3163	320.4463	300.3953	288.3693	290.5797	301.7452	321.9379	346.6340	368.2850 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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			m2	Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W
North			1.0800		10.6334		0.7300		0.7000		0.7700	4.0668 (74)
East			1.6100		19.6403		0.7300		0.7000		0.7700	11.1977 (76)
South			0.7200		46.7521		0.7300		0.7000		0.7700	11.9203 (78)
West			2.5000		19.6403		0.7300		0.7000		0.7700	17.3877 (80)
East			3.8000		19.6403		0.6800		0.7000		0.7700	24.6190 (76)
Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)
Total gains	447.3337	508.0262	574.3515	641.6168	684.6719	672.7879	643.0443	596.4550	542.9501	475.7445	432.1201	425.7282 (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	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069
alpha	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871
util living area	0.9813	0.9671	0.9323	0.8517	0.7124	0.5398	0.3990	0.4467	0.6803	0.8981	0.9687	0.9846 (86)
MIT	19.6640	19.8784	20.2170	20.5899	20.8503	20.9642	20.9922	20.9874	20.9072	20.5439	20.0180	19.6013 (87)
Th 2	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831 (88)
util rest of house	0.9761	0.9583	0.9146	0.8151	0.6503	0.4542	0.3002	0.3424	0.5939	0.8634	0.9587	0.9804 (89)
MIT 2	18.3682	18.6365	19.0531	19.4900	19.7643	19.8633	19.8806	19.8787	19.8236	19.4528	18.8162	18.2893 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.9717	19.2149	19.5952	20.0022	20.2700	20.3760	20.3983	20.3950	20.3282	19.9610	19.3759	18.9003 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.9717	19.2149	19.5952	20.0022	20.2700	20.3760	20.3983	20.3950	20.3282	19.9610	19.3759	18.9003 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9707	0.9517	0.9092	0.8194	0.6729	0.4929	0.3462	0.3909	0.6301	0.8662	0.9530	0.9754 (94)
Useful gains	434.2087	483.5037	522.2255	525.7569	460.7230	331.6269	222.6487	233.1762	342.1332	412.1068	411.7949	415.2513 (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	866.2258	845.1578	773.1462	655.4799	505.9807	341.0182	224.2511	235.8678	367.7178	552.6764	724.7748	867.9156 (97)
Space heating kWh	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822 (98a)
Space heating requirement - total per year (kWh/year)	1544.9212											
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	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1544.9212											
Space heating per m2	(98c) / (4) = 32.6139 (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	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822 (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)	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	55.3775	48.9078	51.7706	45.0470	43.3530	38.7213	37.9544	39.6458	40.2872	45.3378	48.7192	54.7088 (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	1.9922	1.7994	1.9922	1.9280	1.9922	1.9280	1.9922	1.9922	1.9280	1.9922	1.9280	1.9922 (231)
Lighting	13.6516	10.9518	9.8609	7.2245	5.5804	4.5592	5.0906	6.6170	8.5948	11.2769	12.7372	14.0310 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												

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(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1544.9212	(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												549.8306	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)													
mechanical ventilation fans (SFP = 0.1671)												23.4570	(230a)
Total electricity for the above, kWh/year												23.4570	(231)
Electricity for lighting (calculated in Appendix L)												110.1761	(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												2228.3848	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1544.9212	16.4900	254.7575	(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)	549.8306	16.4900	90.6671	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	23.4570	16.4900	3.8681	(249)
Energy for lighting	110.1761	16.4900	18.1680	(250)
Additional standing charges			0.0000	(251)
Total energy cost			367.4606	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.4321	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	76.7852	
SAP rating (Section 12)		77	(258)
SAP band		C	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1544.9212	0.1559	240.7865	(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)	549.8306	0.1411	77.5920	(264)
Space and water heating			318.3784	(265)
Pumps, fans and electric keep-hot	23.4570	0.1387	3.2538	(267)
Energy for lighting	110.1761	0.1443	15.9018	(268)
Total CO2, kg/year			337.5340	(272)
CO2 emissions per m2			7.1300	(273)
EI value			95.1034	
EI rating			95	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215	(1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.3700			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.0335	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 1.8200 (17)
Infiltration rate 0.0910 (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) = 0.0774 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.0832	0.0812	0.0812	0.0754	0.0774	0.0657	0.0638	0.0638	0.0657	0.0735	0.0735	0.0754	(22b)
Mechanical extract ventilation - decentralised													
If mechanical ventilation												0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000	(23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Door			2.1500	1.0000	2.1500			(26)
Window			5.9100	1.2357	7.3032			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500	(28a)
Main	81.8500	11.8600	69.9900	0.1900	13.2981	110.0000	7698.8998	(29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600	(30)
PIR	9.3200		9.3200	0.1300	1.2116	9.0000	83.8800	(30)
Total net area of external elements Aum(A, m2)			135.1000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	32.6049		(33)
Main dwelling								
Party Wall 1			15.9900	0.0000	0.0000	110.0000	1758.9000	(32)
Party Floor 1			44.3800			0.0000	0.0000	(32a)
Timber			38.4000			9.0000	345.6000	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 10479.9898 (34)
List of Thermal Bridges 221.2368 (35)

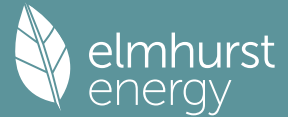
	Length	Psi-value	Total	
K1 Element	8.0700	0.0200	0.1614	
E2 Other lintels (including other steel lintels)	8.0700	0.0300	0.2421	
E3 Sill	22.2000	0.0260	0.5772	
E4 Jamb	4.0200	0.0930	0.3739	
E5 Ground floor (normal)	29.3300	0.0370	1.0852	
E6 Corner (normal)	17.7000	0.0510	0.9027	
E7 Party floor between dwellings (in blocks of flats)	4.8000	-0.0910	-0.4368	
E8 Party wall between dwellings	5.7000	0.0650	0.3705	
P1 Party wall - Ground floor	4.0200	0.1080	0.4342	
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112	
E10 Eaves (insulation at ceiling level)	14.4900	0.0970	1.4055	
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172	
E12 Gable (insulation at ceiling level)	13.3500	0.0970	1.2950	
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246	
P4 Party wall - Roof (insulation at ceiling level)	1.8900	0.1010	0.1909	
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4552	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			40.0601	(33) + (36) + (36a) = (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 18.9805 Feb 18.9805 Mar 18.9805 Apr 18.9805 May 18.9805 Jun 18.9805 Jul 18.9805 Aug 18.9805 Sep 18.9805 Oct 18.9805 Nov 18.9805 Dec 18.9805 (38)
Heat transfer coeff 59.0406 59.0406 59.0406 59.0406 59.0406 59.0406 59.0406 59.0406 59.0406 59.0406 59.0406 59.0406 (39)
Average = Sum(39)m / 12 = 59.0406
HLP Jan 1.2464 Feb 1.2464 Mar 1.2464 Apr 1.2464 May 1.2464 Jun 1.2464 Jul 1.2464 Aug 1.2464 Sep 1.2464 Oct 1.2464 Nov 1.2464 Dec 1.2464 (40)
HLP (average) 1.2464
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6130	(42)
Hot water usage for mixer showers	74.0080	72.8958	71.2751	68.1742	65.8858	63.3338	61.8833	63.4917	65.2548	67.9949	71.1624	73.7244	73.7244	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	31.1491	(42c)
Average daily hot water use (litres/day)													96.5503	(43)
Daily hot water use	Jan 105.1571	Feb 102.9122	Mar 100.1588	Apr 95.9252	May 92.5042	Jun 88.8195	Jul 87.3689	Aug 90.1101	Sep 93.0059	Oct 96.8786	Nov 101.1788	Dec 104.8736	104.8736	(44)
Energy conte	166.5432	146.5456	153.9404	131.3169	124.5284	109.2139	105.6652	111.5751	114.6856	131.4634	144.1478	164.2066	164.2066	(45)
Energy content (annual)													1603.8320	(45)
Distribution loss (46)m = 0.15 x (45)m	24.9815	21.9818	23.0911	19.6975	18.6793	16.3821	15.8498	16.7363	17.2028	19.7195	21.6222	24.6310	24.6310	(46)
Water storage loss (or HIU loss):														
Store volume													201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)

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Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (64)
Total per year (kWh/year) = Sum(64)m =												1921.1630 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	55.3756	48.7264	51.1852	43.6629	41.4057	36.3136	35.1337	37.0987	38.1329	43.7116	47.9291	54.5987 (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	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.5966	13.8527	11.2658	8.5289	6.3755	5.3824	5.8159	7.5598	10.1467	12.8836	15.0370	16.0300 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	209.5641	211.7387	206.2587	194.5925	179.8660	166.0252	156.7787	154.6040	160.0840	171.7502	186.4767	200.3175 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216 (71)
Water heating gains (Table 5)	74.4296	72.5096	68.7973	60.6429	55.6528	50.4356	47.2227	49.8639	52.9624	58.7521	66.5683	73.3854 (72)
Total internal gains	378.1422	376.6530	364.8738	342.3163	320.4463	300.3953	288.3693	290.5797	301.7452	321.9379	346.6340	368.2850 (73)

6. Solar gains

[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
North			1.0800	9.3942	0.7300	0.7000	0.7700	3.5928 (74)				
East			1.6100	17.3606	0.7300	0.7000	0.7700	9.8979 (76)				
South			0.7200	41.2355	0.7300	0.7000	0.7700	10.5138 (78)				
West			2.5000	17.3606	0.7300	0.7000	0.7700	15.3695 (80)				
East			3.8000	17.3606	0.6800	0.7000	0.7700	21.7615 (76)				
Solar gains	61.1354	119.0803	198.3912	289.1354	343.1963	357.3562	333.8896	284.2819	234.7264	146.6665	77.6248	51.9098 (83)
Total gains	439.2777	495.7333	563.2651	631.4518	663.6426	657.7514	622.2589	574.8616	536.4716	468.6045	424.2588	420.1948 (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	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069
alpha	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871
util living area	0.9791	0.9640	0.9245	0.8291	0.6666	0.4733	0.3576	0.4054	0.6494	0.8854	0.9650	0.9825 (86)
MIT	19.7578	19.9610	20.2964	20.6636	20.8980	20.9816	20.9956	20.9924	20.9280	20.6003	20.0965	19.7012 (87)
Th 2	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831 (88)
util rest of house	0.9731	0.9540	0.9040	0.7862	0.5949	0.3805	0.2540	0.2950	0.5562	0.8454	0.9533	0.9775 (89)
MIT 2	18.4875	18.7410	19.1506	19.5733	19.8098	19.8749	19.8820	19.8810	19.8407	19.5180	18.9149	18.4165 (90)
Living area fraction	19.0790	19.3092	19.6842	20.0811	20.3166	20.3903	20.4006	20.3986	20.3470	20.0220	19.4652	19.0148 (92)
MIT	19.0790	19.3092	19.6842	20.0811	20.3166	20.3903	20.4006	20.3986	20.3470	20.0220	19.4652	19.0148 (93)
Temperature adjustment												0.0000
adjusted MIT	19.0790	19.3092	19.6842	20.0811	20.3166	20.3903	20.4006	20.3986	20.3470	20.0220	19.4652	19.0148 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	425.0111	469.7611	506.7782	501.6965	414.0499	278.4475	188.1691	199.2175	320.1080	398.8237	402.1395	408.5489 (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	825.3318	803.4931	731.1693	607.0003	443.7824	282.8227	188.9653	200.6563	339.3078	520.8566	688.7213	827.4425 (97)
Space heating kWh	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568 (98a)
Space heating requirement - total per year (kWh/year)												1395.7815
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1395.7815
Space heating per m ²												(98c) / (4) = 29.4655 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating requirement	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	55.3775	48.9078	51.7706	45.0470	43.3530	38.7213	37.9544	39.6458	40.2872	45.3378	48.7192	54.7088	(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	1.9922	1.7994	1.9922	1.9280	1.9922	1.9280	1.9922	1.9280	1.9922	1.9280	1.9922	1.9280	(231)
Lighting	13.6516	10.9518	9.8609	7.2245	5.5804	4.5592	5.0906	6.6170	8.5948	11.2769	12.7372	14.0310	(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												1395.7815	(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												549.8306	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)												23.4570	(230a)
mechanical ventilation fans (SFP = 0.1671)												23.4570	(231)
Total electricity for the above, kWh/year												110.1761	(232)
Electricity for lighting (calculated in Appendix L)													
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												2079.2451	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1395.7815	28.4300	396.8207	(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)	549.8306	28.4300	156.3168	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	23.4570	28.4300	6.6688	(249)
Energy for lighting	110.1761	28.4300	31.3231	(250)
Additional standing charges			0.0000	(251)
Total energy cost			591.1294	(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	1395.7815	0.1562	218.0405	(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)	549.8306	0.1411	77.5920	(264)
Space and water heating			295.6325	(265)
Pumps, fans and electric keep-hot	23.4570	0.1387	3.2538	(267)
Energy for lighting	110.1761	0.1443	15.9018	(268)
Total CO2, kg/year			314.7881	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1395.7815	1.5783	2202.9912 (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)	549.8306	1.5218	836.7435 (278)
Space and water heating			3039.7347 (279)
Pumps, fans and electric keep-hot	23.4570	1.5128	35.4857 (281)
Energy for lighting	110.1761	1.5338	168.9917 (282)
Total Primary energy kWh/year			3244.2121 (286)

SAP 10 EPC IMPROVEMENTS

001

Current energy efficiency rating: C 77
Current environmental impact rating: A 95

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

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

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

Potential energy efficiency rating: C 77
Potential environmental impact rating: A 95

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

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

	Current	Potential	Saving
Electricity	£591	£591	£0
Space heating	£403	£403	£0
Water heating	£156	£156	£0
Lighting	£31	£31	£0
Total cost of fuels	£591	£591	£0
Total cost of uses	£590	£590	£0
Delivered energy	44 kWh/m²	44 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	7 kg/m²	7 kg/m²	0 kg/m²
Primary energy	68 kWh/m²	68 kWh/m²	0 kWh/m²

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

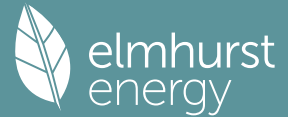
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.0335 (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
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
1.8200 (17)
0.0910 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = $1 - [0.075 \times (19)] = 0.8500$ (20)
(21) = (18) x (20) = 0.0774 (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	0.0986	0.0967	0.0948	0.0851	0.0832	0.0735	0.0735	0.0715	0.0774	0.0832	0.0870	0.0909	(22b)
Mechanical extract ventilation - decentralised													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Door			2.1500	1.0000	2.1500			(26)
Window			5.9100	1.2357	7.3032			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500	(28a)
Main	81.8500	11.8600	69.9900	0.1900	13.2981	110.0000	7698.8998	(29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600	(30)
PIR	9.3200		9.3200	0.1300	1.2116	9.0000	83.8800	(30)
Total net area of external elements Aum(A, m2)			135.1000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 32.6049			(33)
Main dwelling								
Party Wall 1			15.9900	0.0000	0.0000	110.0000	1758.9000	(32)
Party Floor 1			44.3800			0.0000	0.0000	(32d)
Timber			38.4000			9.0000	345.6000	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
List of Thermal Bridges

(28)...(30) + (32) + (32a)...(32e) = 10479.9898 (34)
221.2368 (35)

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.0700	0.0200	0.1614	
E3 Sill	8.0700	0.0300	0.2421	
E4 Jamb	22.2000	0.0260	0.5772	
E5 Ground floor (normal)	4.0200	0.0930	0.3739	
E7 Party floor between dwellings (in blocks of flats)	29.3300	0.0370	1.0852	
E16 Corner (normal)	17.7000	0.0510	0.9027	
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368	
E18 Party wall between dwellings	5.7000	0.0650	0.3705	
P1 Party wall - Ground floor	4.0200	0.1080	0.4342	
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112	
E10 Eaves (insulation at ceiling level)	14.4900	0.0970	1.4055	
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172	
E12 Gable (insulation at ceiling level)	13.3500	0.0970	1.2950	
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246	
P4 Party wall - Roof (insulation at ceiling level)	1.8900	0.1010	0.1909	
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.4552 (36)
Point Thermal Bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	40.0601 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	(38)
Heat transfer coeff	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	(39)
Average = Sum(39)m / 12 =													59.0406

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	(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													
Hot water usage for mixer showers	74.0080	72.8958	71.2751	68.1742	65.8858	63.3338	61.8833	63.4917	65.2548	67.9949	71.1624	73.7244	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)
Average daily hot water use (litres/day)													96.5503 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	105.1571	102.9122	100.1588	95.9252	92.5042	88.8195	87.3689	90.1101	93.0059	96.8786	101.1788	104.8736	(44)
Energy content (annual)	166.5432	146.5456	153.9404	131.3169	124.5284	109.2139	105.6652	111.5751	114.6856	131.4634	144.1478	164.2066	(45)
Distribution loss (46)m = 0.15 x (45)m	24.9815	21.9818	23.0911	19.6975	18.6793	16.3821	15.8498	16.7363	17.2028	19.7195	21.6222	24.6310	(46)
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													

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WWHRS	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	55.3756	48.7264	51.1852	43.6629	41.4057	36.3136	35.1337	37.0987	38.1329	43.7116	47.9291	54.5987 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66m)	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.5966	13.8527	11.2658	8.5289	6.3755	5.3824	5.8159	7.5598	10.1467	12.8836	15.0370	16.0300	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	209.5641	211.7387	206.2587	194.5925	179.8660	166.0252	156.7787	154.6040	160.0840	171.7502	186.4767	200.3175	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	(71)
Water heating gains (Table 5)	74.4296	72.5096	68.7973	60.6429	55.6528	50.4356	47.2227	49.8639	52.9624	58.7521	66.5683	73.3854	(72)
Total internal gains	378.1422	376.6530	364.8738	342.3163	320.4463	300.3953	288.3693	290.5797	301.7452	321.9379	346.6340	368.2850	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
North					1.0800	10.6334	0.7300	0.7000			0.7700	4.0668 (74)	
East					1.6100	19.6403	0.7300	0.7000			0.7700	11.1977 (76)	
South					0.7200	46.7521	0.7300	0.7000			0.7700	11.9203 (78)	
West					2.5000	19.6403	0.7300	0.7000			0.7700	17.3877 (80)	
East					3.8000	19.6403	0.6800	0.7000			0.7700	24.6190 (76)	
Solar gains	69.1915	131.3732	209.4776	299.3004	364.2256	372.3927	354.6750	305.8753	241.2050	153.8066	85.4861	57.4432 (83)	
Total gains	447.3337	508.0262	574.3515	641.6168	684.6719	672.7879	643.0443	596.4550	542.9501	475.7445	432.1201	425.7282 (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	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	
alpha	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	
util living area	0.9813	0.9671	0.9323	0.8517	0.7124	0.5398	0.3990	0.4467	0.6803	0.8981	0.9687	0.9846	(86)
MIT	19.6640	19.8784	20.2170	20.5899	20.8503	20.9642	20.9922	20.9874	20.9072	20.5439	20.0180	19.6013	(87)
Th 2	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	(88)
util rest of house	0.9761	0.9583	0.9146	0.8151	0.6503	0.4542	0.3002	0.3424	0.5939	0.8634	0.9587	0.9804	(89)
MIT 2	18.3682	18.6365	19.0531	19.4900	19.7643	19.8633	19.8806	19.8787	19.8236	19.4528	18.8162	18.2893	(90)
Living area fraction	18.9717	19.2149	19.5952	20.0022	20.2700	20.3760	20.3983	20.3950	20.3282	19.9610	19.3759	18.9003	(91)
MIT	18.9717	19.2149	19.5952	20.0022	20.2700	20.3760	20.3983	20.3950	20.3282	19.9610	19.3759	18.9003	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9717	19.2149	19.5952	20.0022	20.2700	20.3760	20.3983	20.3950	20.3282	19.9610	19.3759	18.9003	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9707	0.9517	0.9092	0.8194	0.6729	0.4929	0.3462	0.3909	0.6301	0.8662	0.9530	0.9754	(94)
Useful gains	434.2087	483.5037	522.2255	525.7569	460.7230	331.6269	222.6487	233.1762	342.1332	412.1068	411.7949	415.2513	(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	866.2258	845.1578	773.1462	655.4799	505.9807	341.0182	224.2511	235.8678	367.7178	552.6764	724.7748	867.9156	(97)
Space heating kWh	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822	(98a)
Space heating requirement - total per year (kWh/year)												1544.9212	
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	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1544.9212	
Space heating per m2												32.6139	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)

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Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822	(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)	321.4207	243.0315	186.6850	93.4006	33.6718	0.0000	0.0000	0.0000	0.0000	104.5838	225.3455	336.7822	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(64)
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	55.3775	48.9078	51.7706	45.0470	43.3530	38.7213	37.9544	39.6458	40.2872	45.3378	48.7192	54.7088	(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	1.9922	1.7994	1.9922	1.9280	1.9922	1.9280	1.9922	1.9280	1.9280	1.9280	1.9280	1.9280	(231)
Lighting	13.6516	10.9518	9.8609	7.2245	5.5804	4.5592	5.0906	6.6170	8.5948	11.2769	12.7372	14.0310	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1544.9212	(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												549.8306	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)													
mechanical ventilation fans (SFP = 0.1671)												23.4570	(230a)
Total electricity for the above, kWh/year												23.4570	(231)
Electricity for lighting (calculated in Appendix L)												110.1761	(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												2228.3848	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1544.9212	16.4900	254.7575	(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)	549.8306	16.4900	90.6671	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	23.4570	16.4900	3.8681	(249)
Energy for lighting	110.1761	16.4900	18.1680	(250)
Additional standing charges			0.0000	(251)
Total energy cost			367.4606	(255)

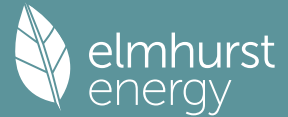
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.4321	(257)
SAP value		76.7852	
SAP rating (Section 12)		77	(258)
SAP band		C	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1544.9212	0.1559	240.7865	(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)	549.8306	0.1411	77.5920	(264)
Space and water heating			318.3784	(265)
Pumps, fans and electric keep-hot	23.4570	0.1387	3.2538	(267)

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Energy for lighting 110.1761 0.1443 15.9018 (268)
Total CO2, kg/year 337.5340 (272)
CO2 emissions per m2 7.1300 (273)
EI value 95.1034
EI rating 95 (274)
EI band A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	44.3800 (1c)	x 2.4000 (2c)	= 106.5120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.0335 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	1.8200	(17)
Infiltration rate	0.0910	(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) =	0.0774 (21)

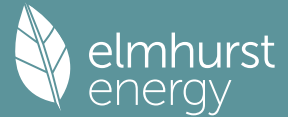
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Adj infilt rate	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
	0.0832	0.0812	0.0812	0.0754	0.0774	0.0657	0.0638	0.0638	0.0657	0.0735	0.0735	0.0754
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			5.9100	1.2357	7.3032		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	81.8500	11.8600	69.9900	0.1900	13.2981	110.0000	7698.8998 (29a)
PIJ	40.9400		40.9400	0.0800	3.2752	9.0000	368.4600 (30)
PIR	9.3200		9.3200	0.1300	1.2116	9.0000	83.8800 (30)
Total net area of external elements Aum(A, m2)			135.1000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.6049		(33)
Main dwelling							
Party Wall 1			15.9900	0.0000	0.0000	110.0000	1758.9000 (32)
Party Floor 1			44.3800			0.0000	0.0000 (32d)
Timber			38.4000			9.0000	345.6000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10479.9898 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							221.2368 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.0700	0.0200	0.1614
E3 Sill	8.0700	0.0300	0.2421
E4 Jamb	22.2000	0.0260	0.5772
E5 Ground floor (normal)	4.0200	0.0930	0.3739
E7 Party floor between dwellings (in blocks of flats)	29.3300	0.0370	1.0852
E16 Corner (normal)	17.7000	0.0510	0.9027
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368
E18 Party wall between dwellings	5.7000	0.0650	0.3705
P1 Party wall - Ground floor	4.0200	0.1080	0.4342
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112
E10 Eaves (insulation at ceiling level)	14.4900	0.0970	1.4055
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172
E12 Gable (insulation at ceiling level)	13.3500	0.0970	1.2950
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246

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P4 Party wall - Roof (insulation at ceiling level)	1.8900	0.1010	0.1909										
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.4552 (36)									
Point Thermal bridges			(36a) =	0.0000									
Total fabric heat loss		(33) + (36) + (36a) =		40.0601 (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	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	18.9805	(38)
Average = Sum(39)m / 12 =	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	59.0406	(39)
													59.0406
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	1.2464	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
													1.2464
													31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6130 (42)
Hot water usage for mixer showers													
Hot water usage for baths	74.0080	72.8958	71.2751	68.1742	65.8858	63.3338	61.8833	63.4917	65.2548	67.9949	71.1624	73.7244	(42a)
Hot water usage for other uses	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Average daily hot water use (litres/day)	31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)
	31.1491	30.0164	28.8837	27.7510	26.6184	25.4857	25.4857	26.6184	27.7510	28.8837	30.0164	31.1491	(42c)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	105.1571	102.9122	100.1588	95.9252	92.5042	88.8195	87.3689	90.1101	93.0059	96.8786	101.1788	104.8736	(44)
Energy content (annual)	166.5432	146.5456	153.9404	131.3169	124.5284	109.2139	105.6652	111.5751	114.6856	131.4634	144.1478	164.2066	(45)
Distribution loss (46)m = 0.15 x (45)m	24.9815	21.9818	23.0911	19.6975	18.6793	16.3821	15.8498	16.7363	17.2028	19.7195	21.6222	24.6310	(46)
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	55.3756	48.7264	51.1852	43.6629	41.4057	36.3136	35.1337	37.0987	38.1329	43.7116	47.9291	54.5987	(65)

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

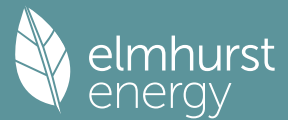
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	96.7824	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	15.5966	13.8527	11.2658	8.5289	6.3755	5.3824	5.8159	7.5598	10.1467	12.8836	15.0370	16.0300	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	209.5641	211.7387	206.2587	194.5925	179.8660	166.0252	156.7787	154.6040	160.0840	171.7502	186.4767	200.3175	(68)
Pumps, fans	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	46.2913	(69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Water heating gains (Table 5)	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	-64.5216	(71)
Total internal gains	74.4296	72.5096	68.7973	60.6429	55.6528	50.4356	47.2227	49.8639	52.9624	58.7521	66.5683	73.3854	(72)
	378.1422	376.6530	364.8738	342.3163	320.4463	300.3953	288.3693	290.5797	301.7452	321.9379	346.6340	368.2850	(73)

6. Solar gains

[Jan]													
				Area	Solar flux		g	FF		Access		Gains	
				m2	Table 6a		Specific data	Specific data		factor		W	
					W/m2		or Table 6b	or Table 6c		Table 6d			
North				1.0800	9.3942		0.7300	0.7000		0.7700		3.5928 (74)	
East				1.6100	17.3606		0.7300	0.7000		0.7700		9.8979 (76)	
South				0.7200	41.2355		0.7300	0.7000		0.7700		10.5138 (78)	
West				2.5000	17.3606		0.7300	0.7000		0.7700		15.3695 (80)	
East				3.8000	17.3606		0.6800	0.7000		0.7700		21.7615 (76)	
Solar gains	61.1354	119.0803	198.3912	289.1354	343.1963	357.3562	333.8896	284.2819	234.7264	146.6665	77.6248	51.9098	(83)
Total gains	439.2777	495.7333	563.2651	631.4518	663.6426	657.7514	622.2589	574.8616	536.4716	468.6045	424.2588	420.1948	(84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069	49.3069
alpha	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871	4.2871
util living area	0.9791	0.9640	0.9245	0.8291	0.6666	0.4733	0.3576	0.4054	0.6494	0.8854	0.9650	0.9825 (86)
MIT	19.7578	19.9610	20.2964	20.6636	20.8980	20.9816	20.9956	20.9924	20.9280	20.6003	20.0965	19.7012 (87)
Th 2	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831	19.8831 (88)
util rest of house	0.9731	0.9540	0.9040	0.7862	0.5949	0.3805	0.2540	0.2950	0.5562	0.8454	0.9533	0.9775 (89)
MIT 2	18.4875	18.7410	19.1506	19.5733	19.8098	19.8749	19.8820	19.8810	19.8407	19.5180	18.9149	18.4165 (90)
Living area fraction									fLA = Living area /	(4) =		0.4657 (91)
MIT	19.0790	19.3092	19.6842	20.0811	20.3166	20.3903	20.4006	20.3986	20.3470	20.0220	19.4652	19.0148 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0790	19.3092	19.6842	20.0811	20.3166	20.3903	20.4006	20.3986	20.3470	20.0220	19.4652	19.0148 (93)

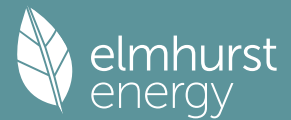
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9675	0.9476	0.8997	0.7945	0.6239	0.4233	0.3024	0.3465	0.5967	0.8511	0.9479	0.9723 (94)
Useful gains	425.0111	469.7611	506.7782	501.6965	414.0499	278.4475	188.1691	199.2175	320.1080	398.8237	402.1395	408.5489 (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	825.3318	803.4931	731.1693	607.0003	443.7824	282.8227	188.9653	200.6563	339.3078	520.8566	688.7213	827.4425 (97)
Space heating kWh	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568 (98a)
Space heating requirement - total per year (kWh/year)												1395.7815
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1395.7815
Space heating per m2										(98c) / (4) =		29.4655 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	297.8386	224.2679	166.9469	75.8188	22.1210	0.0000	0.0000	0.0000	0.0000	90.7925	206.3389	311.6568 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	193.4946	170.8888	180.8918	157.3989	151.4798	135.2959	132.6166	138.5265	140.7676	158.4148	170.2298	191.1580 (64)	
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)	
Fuel for water heating, kWh/month	55.3775	48.9078	51.7706	45.0470	43.3530	38.7213	37.9544	39.6458	40.2872	45.3378	48.7192	54.7088 (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	1.9922	1.7994	1.9922	1.9280	1.9922	1.9280	1.9922	1.9922	1.9280	1.9922	1.9280	1.9922 (231)	
Lighting	13.6516	10.9518	9.8609	7.2245	5.5804	4.5592	5.0906	6.6170	8.5948	11.2769	12.7372	14.0310 (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													1395.7815 (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													549.8306 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 3.5100, total flow = 21.0000, SFP = 0.1671)													23.4570 (230a)
mechanical ventilation fans (SFP = 0.1671)													23.4570 (231)
Total electricity for the above, kWh/year													110.1761 (232)
Electricity for lighting (calculated in Appendix L)													

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2079.2451 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1395.7815	28.4300	396.8207 (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)	549.8306	28.4300	156.3168 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	23.4570	28.4300	6.6688 (249)
Energy for lighting	110.1761	28.4300	31.3231 (250)
Additional standing charges			0.0000 (251)
Total energy cost			591.1294 (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	1395.7815	0.1562	218.0405 (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)	549.8306	0.1411	77.5920 (264)
Space and water heating			295.6325 (265)
Pumps, fans and electric keep-hot	23.4570	0.1387	3.2538 (267)
Energy for lighting	110.1761	0.1443	15.9018 (268)
Total CO2, kg/year			314.7881 (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	1395.7815	1.5783	2202.9912 (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)	549.8306	1.5218	836.7435 (278)
Space and water heating			3039.7347 (279)
Pumps, fans and electric keep-hot	23.4570	1.5128	35.4857 (281)
Energy for lighting	110.1761	1.5338	168.9917 (282)
Total Primary energy kWh/year			3244.2121 (286)