

Full SAP Calculation Printout



Plot Reference	79596-04				Issued on Date	18/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	24 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C	DER	7.25	TER	14.84		
Environmental	95 A	% DER < TER				51.15	
CO ₂ Emissions (t/year)	0.32	DFEE	41.86	TFEE	45.52		
Compliance Check	See BREL	% DFEE < TFEE				8.05	
% DPER < TPER	4.42	DPER	74.66	TPER	78.11		
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	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.0415 (5)

2. Ventilation rate

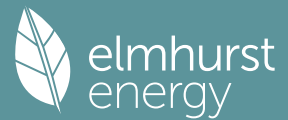
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.5200 (17)
Infiltration rate	0.1260 (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) = 0.1071 (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	0.1366	0.1339	0.1312	0.1178	0.1151	0.1017	0.1017	0.0991	0.1071	0.1151	0.1205	0.1258 (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			7.6500	1.2357	9.4534		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	(28a)
Main	75.7500	13.6000	62.1500	0.1900	11.8085	110.0000	6836.5000 (29a)
PIJ	42.8100		42.8100	0.0800	3.4248	9.0000	385.2900 (30)
PIR	9.0300		9.0300	0.1300	1.1739	9.0000	81.2700 (30)
Total net area of external elements A _{um} (A, m ²)			130.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.3774		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			46.0500			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10245.9100 (34)

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

208.9297 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	9.2100	0.0200	0.1842
E2 Other lintels (including other steel lintels)	9.2100	0.0300	0.2763
E3 Sill	24.9000	0.0260	0.6474
E4 Jamb	4.0200	0.0930	0.3739
E5 Ground floor (normal)	26.7900	0.0370	0.9912
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.7100	0.0970	1.4269
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	12.0800	0.0970	1.1718
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	4.0500	0.1010	0.4091
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.6047 (36)
Total fabric heat loss	(33) + (36) + (36a) =	40.9821 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	(38)
Heat transfer coeff	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	(39)
Average = Sum(39)m / 12 =												60.6240	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	(40)
HLP (average)												1.2362	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

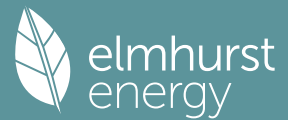
Assumed occupancy													1.6619 (42)
Hot water usage for mixer showers													
75.1953	74.0653	72.4186	69.2679	66.9428	64.3499	62.8761	64.5103	66.3017	69.0857	72.3041	74.9072	74.9072	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493	31.6493	(42c)
Average daily hot water use (litres/day)												98.0996	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	106.8446	104.5636	101.7661	97.4645	93.9886	90.2448	88.7709	91.5560	94.4983	98.4332	102.8024	106.5565	(44)
Energy conte	169.2157	148.8972	156.4106	133.4241	126.5267	110.9665	107.3608	113.3655	116.5259	133.5730	146.4609	166.8417	(45)
Energy content (annual)										Total = Sum(45)m =		1629.5685	
Distribution loss (46)m = 0.15 x (45)m													
25.3823	22.3346	23.4616	20.0136	18.9790	16.6450	16.1041	17.0048	17.4789	20.0359	21.9691	25.0262	25.0262	(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	26.9514	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	26.9514	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													
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	193.7931	(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													
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	193.7931	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1946.8995	(64)
Electric shower(s)												1947	(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													
56.2642	49.5083	52.0065	44.3635	42.0701	36.8963	35.6975	37.6940	38.7449	44.4130	48.6983	55.4748	55.4748	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
73.0051	80.8271	73.0051	75.4386	73.0051	75.4386	73.0051	73.0051	75.4386	73.0051	75.4386	73.0051	75.4386	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
144.7408	146.2428	142.4579	134.4003	124.2291	114.6696	108.2832	106.7813	110.5662	118.6237	128.7950	138.3545	138.3545	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	(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)													
-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	(71)
Water heating gains (Table 5)													
75.6239	73.6731	69.9013	61.6160	56.5459	51.2449	47.9804	50.6640	53.8123	59.6949	67.6365	74.5630	74.5630	(72)
Total internal gains	341.2980	348.6711	333.2924	319.3831	301.7082	289.2813	277.1969	278.3786	287.7452	299.2519	319.7982	333.8507	(73)

6. Solar gains

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[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b		g	Specific data or Table 6c	FF	Access factor Table 6d		Gains W
North				1.0800	10.6334	0.7300			0.7000		0.7700		4.0668 (74)
East				2.9800	19.6403	0.7300			0.7000		0.7700		20.7261 (76)
South				0.7200	46.7521	0.7300			0.7000		0.7700		11.9203 (78)
West				2.8700	19.6403	0.7300			0.7000		0.7700		19.9610 (80)
East				3.8000	19.6403	0.6800			0.7000		0.7700		24.6190 (76)
Solar gains	81.2933	155.0470	248.4649	356.1610	433.9103	443.7275	422.5886	364.2121	286.5487	181.8975	100.5757	67.3951	(83)
Total gains	422.5913	503.7181	581.7573	675.5441	735.6186	733.0087	699.7855	642.5907	574.2940	481.1494	420.3739	401.2459	(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	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465
alpha	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298
util living area													
	0.9840	0.9674	0.9301	0.8367	0.6863	0.5106	0.3768	0.4261	0.6618	0.8966	0.9708	0.9870	(86)
MIT	19.5279	19.7939	20.1660	20.5847	20.8545	20.9661	20.9924	20.9874	20.9057	20.5087	19.9276	19.4640	(87)
Th 2	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	(88)
util rest of house													
	0.9798	0.9591	0.9126	0.7995	0.6251	0.4294	0.2840	0.3271	0.5775	0.8628	0.9618	0.9834	(89)
MIT 2	18.2093	18.5431	19.0017	19.4914	19.7748	19.8720	19.8886	19.8865	19.8296	19.4221	18.7160	18.1285	(90)
Living area fraction	fLA = Living area / (4) =												
MIT	18.8379	19.1394	19.5568	20.0126	20.2896	20.3937	20.4148	20.4114	20.3426	19.9402	19.2937	18.7652	(92)
Temperature adjustment	0.0000												
adjusted MIT	18.8379	19.1394	19.5568	20.0126	20.2896	20.3937	20.4148	20.4114	20.3426	19.9402	19.2937	18.7652	(93)
8. Space heating requirement													
Utilisation	0.9744	0.9519	0.9064	0.8040	0.6481	0.4669	0.3282	0.3742	0.6135	0.8645	0.9556	0.9786	(94)
Useful gains	411.7733	479.5118	527.3133	543.1056	476.7336	342.2627	229.6641	240.4346	352.3205	415.9742	401.7205	392.6699	(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	881.3463	863.2514	791.5546	673.6921	520.7333	351.2344	231.2695	243.1866	378.4534	566.2374	739.2279	883.0001	(97)
Space heating kWh	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057	(98a)
Space heating requirement - total per year (kWh/year)	1650.1958												
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	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1650.1958												
Space heating per m2	(98c) / (4) = 33.6500 (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	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057	(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)	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057	(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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	(64)
Water heating requirement	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(217)
Fuel for water heating, kWh/month	56.1424	49.5808	52.4776	45.6501	43.9249	39.2228	38.4397	40.1582	40.8139	45.9416	49.3812	55.4629	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m	2.0616	1.8621	2.0616	1.9951	2.0616	1.9951	2.0616	2.0616	1.9951	2.0616	1.9951	2.0616	(231)
Pumps and Fa	14.0075	11.2374	10.1180	7.4129	5.7259	4.6781	5.2234	6.7895	8.8189	11.5709	13.0693	14.3969	(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	(234a)
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	(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 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)

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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												1650.1958	(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												557.1963	(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)												24.2743	(230a)	
Total electricity for the above, kWh/year												24.2743	(231)	
Electricity for lighting (calculated in Appendix L)												113.0489	(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												2344.7152	(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	1650.1958	0.1560	257.4125 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	557.1963	0.1411	78.6349 (264)
Space and water heating			336.0475 (265)
Pumps, fans and electric keep-hot	24.2743	0.1387	3.3671 (267)
Energy for lighting	113.0489	0.1443	16.3164 (268)
Total CO2, kg/year			355.7310 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.2500 (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	1650.1958	1.5775	2603.1558 (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)	557.1963	1.5218	847.9659 (278)
Space and water heating			3451.1217 (279)
Pumps, fans and electric keep-hot	24.2743	1.5128	36.7221 (281)
Energy for lighting	113.0489	1.5338	173.3981 (282)
Total Primary energy kWh/year			3661.2419 (286)
Dwelling Primary energy Rate (DPER)			74.6600 (287)

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

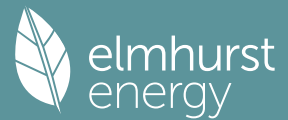
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	119.0415 (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) = 0.1680 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4180 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3553 \quad (21)$$

	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	0.4530	0.4441	0.4353	0.3908	0.3820	0.3375	0.3375	0.3287	0.3553	0.3820	0.3997	0.4175	(22b)
	0.6026	0.5986	0.5947	0.5764	0.5729	0.5570	0.5570	0.5540	0.5631	0.5729	0.5799	0.5871	(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			10.1100	1.1450	11.5763			(27)
GF			2.9900	0.1300	0.3887			(28a)
Main	75.7500	12.2600	63.4900	0.1800	11.4282			(29a)
PIJ	42.8100		42.8100	0.1100	4.7091			(30)
PIR	9.0300		9.0300	0.1100	0.9933			(30)
Total net area of external elements Aum(A, m2)			130.5800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.2456		(33)
Main dwelling								
Party Wall 1			21.1800	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.9297	(35)

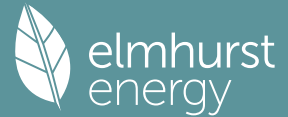
List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	9.2100	0.0500	0.4605	
E2 Other lintels (including other steel lintels)	9.2100	0.0500	0.4605	
E3 Sill	24.9000	0.0500	1.2450	
E4 Jamb	4.0200	0.1600	0.6432	
E5 Ground floor (normal)	26.7900	0.0700	1.8753	
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0900	1.5930	
E16 Corner (normal)	4.8000	-0.0900	-0.4320	
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0600	0.3420	
E18 Party wall between dwellings	4.0200	0.0800	0.3216	
P1 Party wall - Ground floor	4.8000	0.0600	0.2880	
E25 Staggered party wall between dwellings	14.7100	0.0600	0.8826	
E10 Eaves (insulation at ceiling level)	1.0100	0.0400	0.0404	
E11 Eaves (insulation at rafter level)	12.0800	0.0600	0.7248	
E12 Gable (insulation at ceiling level)	6.9600	0.0800	0.5568	
E13 Gable (insulation at rafter level)	4.0500	0.1200	0.4860	
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0800	0.3488	
P5 Party wall - Roof (insulation at rafter level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.8365	(36)
Point Thermal Bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	41.0821 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.6728	23.5163	23.3629	22.6422	22.5074	21.8797	21.8797	21.7635	22.1215	22.5074	22.7802	23.0653	(38)
Heat transfer coeff	64.7550	64.5984	64.4450	63.7244	63.5895	62.9619	62.9619	62.8456	63.2036	63.5895	63.8623	64.1475	(39)
Average = Sum(39)m / 12 =												63.7237	
HLP	1.3205	1.3173	1.3141	1.2994	1.2967	1.2839	1.2839	1.2815	1.2888	1.2967	1.3022	1.3081	(40)
HLP (average)												1.2994	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6619 (42)
Hot water usage for mixer showers	66.8403	65.8358	64.3721	61.5715	59.5047	57.1999	55.8899	57.3425	58.9349	61.4095	64.2703	66.5842	(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	31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493	(42c)
Average daily hot water use (litres/day)												90.3965	(43)
Daily hot water use	98.4895	96.3342	93.7196	89.7681	86.5505	83.0948	81.7847	84.3882	87.1315	90.7570	94.7687	98.2334	(44)
Energy conte	155.9833	137.1786	144.0435	122.8880	116.5136	102.1747	98.9115	104.4903	107.4418	123.1565	135.0153	153.8098	(45)
Energy content (annual)										Total = Sum(45)m =		1501.6069	
Distribution loss (46)m = 0.15 x (45)m	23.3975	20.5768	21.6065	18.4332	17.4770	15.3262	14.8367	15.6735	16.1163	18.4735	20.2523	23.0715	(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	202.5782	179.2643	190.6384	167.9799	163.1085	147.2666	145.5064	151.0852	152.5337	169.7514	180.1072	200.4047	(62)
WWHRS	-30.5566	-27.0245	-28.2985	-23.4323	-21.8380	-18.6870	-17.5160	-18.6266	-19.3342	-22.7929	-25.8216	-29.9907	(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	172.0217	152.2398	162.3399	144.5476	141.2704	128.5796	127.9904	132.4586	133.1994	146.9584	154.2855	170.4140	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1766.3054	(64)
Electric shower(s)												1766	(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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89.1404 79.2804 85.1704 76.9337 76.0167 70.0466 70.1640 72.0189 71.7979 78.2254 80.9661 88.4177 (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	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	73.3096	81.1642	73.3096	75.7532	73.3096	75.7532	73.3096	73.3096	75.7532	73.3096	75.7532	73.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.7408	146.2428	142.4579	134.4003	124.2291	114.6696	108.2832	106.7813	110.5662	118.6237	128.7950	138.3545	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	(71)
Water heating gains (Table 5)	119.8123	117.9769	114.4763	106.8524	102.1730	97.2869	94.3065	96.7996	99.7193	105.1417	112.4529	118.8410	(72)
Total internal gains	388.7909	396.3119	381.1719	367.9341	350.6398	335.6378	323.8274	324.8186	333.9668	348.0032	367.9292	381.4332	(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				0.9500	10.6334		0.6300		0.7000		0.7700		3.0872 (74)
East				5.9900	19.6403		0.6300		0.7000		0.7700		35.9539 (76)
South				0.6400	46.7521		0.6300		0.7000		0.7700		9.1443 (78)
West				2.5300	19.6403		0.6300		0.7000		0.7700		15.1859 (80)
Solar gains	63.3713	120.9161	193.8541	277.9451	338.6337	346.2905	329.7961	284.2368	223.5951	141.8822	78.4129		52.5301 (83)
Total gains	452.1622	517.2281	575.0261	645.8792	689.2734	681.9284	653.6235	609.0554	557.5619	489.8854	446.3421		433.9632 (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	43.9516	44.0581	44.1630	44.6624	44.7571	45.2033	45.2033	45.2869	45.0304	44.7571	44.5660	44.3679	
alpha	3.9301	3.9372	3.9442	3.9775	3.9838	4.0136	4.0136	4.0191	4.0020	3.9838	3.9711	3.9579	
util living area	0.9808	0.9668	0.9377	0.8630	0.7340	0.5594	0.4159	0.4619	0.6921	0.8989	0.9665	0.9835	(86)
MIT	19.4527	19.6894	20.0400	20.4796	20.7917	20.9475	20.9874	20.9810	20.8774	20.4614	19.8891	19.4173	(87)
Th 2	19.8248	19.8273	19.8298	19.8413	19.8434	19.8535	19.8535	19.8553	19.8496	19.8434	19.8391	19.8345	(88)
util rest of house	0.9757	0.9582	0.9213	0.8284	0.6725	0.4710	0.3113	0.3529	0.6054	0.8649	0.9562	0.9791	(89)
MIT 2	18.0690	18.3676	18.8036	19.3344	19.6737	19.8234	19.8493	19.8484	19.7686	19.3303	18.6308	18.0309	(90)
Living area fraction	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(91)
MIT	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(92)
Temperature adjustment	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(93)
adjusted MIT	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(93)

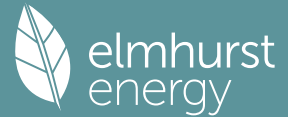
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9694	0.9504	0.9140	0.8298	0.6931	0.5111	0.3612	0.4046	0.6411	0.8658	0.9493	0.9732	(94)
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	934.3275	910.6929	830.8947	699.7179	540.9383	362.6169	238.7435	250.6493	391.6864	589.4464	774.6942	929.6141	(97)
Space heating kWh	369.0366	281.6546	227.1788	117.9349	47.0440	0.0000	0.0000	0.0000	0.0000	122.9835	252.7158	377.4040	(98a)
Space heating requirement - total per year (kWh/year)												1795.9523	
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	369.0366	281.6546	227.1788	117.9349	47.0440	0.0000	0.0000	0.0000	0.0000	122.9835	252.7158	377.4040	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1795.9523	
Space heating per m ²										(98c) / (4) =		36.6222	(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	
369.0366	281.6546	227.1788	117.9349	47.0440	0.0000	0.0000	0.0000	0.0000	0.0000	122.9835	252.7158	377.4040	(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)	399.8230	305.1513	246.1309	127.7735	50.9686	0.0000	0.0000	0.0000	0.0000	133.2432	273.7983	408.8884	(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	172.0217	152.2398	162.3399	144.5476	141.2704	128.5796	127.9904	132.4586	133.1994	146.9584	154.2855	170.4140	(64)
Efficiency of water heater	85.7261	85.4198	84.8134	83.6073	81.8730	79.8000	79.8000	79.8000	79.8000	83.6631	85.1592	85.7901	(216)
(217)m													(217)
Fuel for water heating, kWh/month	200.6643	178.2254	191.4083	172.8888	172.5484	161.1273	160.3889	165.9882	166.9166	175.6549	181.1731	198.6405	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	15.2323	12.2199	11.0027	8.0610	6.2266	5.0872	5.6801	7.3832	9.5900	12.5826	14.2121	15.6556	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-23.3961	-33.2237	-48.1239	-54.5785	-59.3052	-55.5773	-54.9427	-51.6703	-45.9268	-38.2517	-25.8258	-20.2036	(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	-12.5060	-26.3855	-52.5648	-79.1053	-104.7176	-105.2085	-103.9197	-87.8921	-64.3295	-37.7278	-16.7007	-9.8795	(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												1945.7771	(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												2125.6248	(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)												122.9332	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1211.9624	(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												3068.3727	(238)

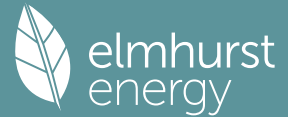
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1945.7771	0.2100	408.6132 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2125.6248	0.2100	446.3812 (264)
Space and water heating			854.9944 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	122.9332	0.1443	17.7431 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-511.0256	0.1344	-68.6785
PV Unit electricity exported	-700.9368	0.1259	-88.2130
Total			-156.8915 (269)
Total CO2, kg/year			727.7753 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.8400 (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	1945.7771	1.1300	2198.7281 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2125.6248	1.1300	2401.9560 (278)
Space and water heating			4600.6841 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	122.9332	1.5338	188.5591 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-511.0256	1.4967	-764.8440
PV Unit electricity exported	-700.9368	0.4620	-323.8016
Total			-1088.6456 (283)
Total Primary energy kWh/year			3830.6985 (286)
Target Primary Energy Rate (TPER)			78.1100 (287)

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Plot Reference	79596-04				Issued on Date	18/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	24 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.25		TER	14.84
Environmental	95 A		% DER < TER				51.15
CO ₂ Emissions (t/year)	0.32		DFEE	41.86		TFEE	45.52
Compliance Check	See BREL		% DFEE < TFEE				8.05
% DPER < TPER	4.42		DPER	74.66		TPER	78.11
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		46.0500 (1c)	x	2.4000 (2c)	=	110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.0400					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	119.0415 (5)

2. Ventilation rate

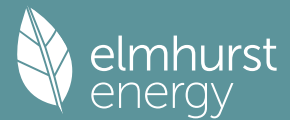
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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	2.5200 (17)	
Number of sides sheltered	0.2940 (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)	
	0.2499 (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	0.3186	0.3124	0.3061	0.2749	0.2687	0.2374	0.2374	0.2312	0.2499	0.2687	0.2811	0.2936 (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	0.5508	0.5488	0.5469	0.5378	0.5361	0.5282	0.5282	0.5267	0.5312	0.5361	0.5395	0.5431 (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			7.6500	1.2357	9.4534		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	(28a)
Main	75.7500	13.6000	62.1500	0.1900	11.8085	110.0000	6836.5000 (29a)
PIJ	42.8100		42.8100	0.0800	3.4248	9.0000	385.2900 (30)
PIR	9.0300		9.0300	0.1300	1.1739	9.0000	81.2700 (30)
Total net area of external elements Aum(A, m2)			130.5800				
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	33.3774 (33)			
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			46.0500			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) = 10245.9100 (34)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				208.9297 (35)			
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2100	0.0200	0.1842
E3 Sill	9.2100	0.0300	0.2763
E4 Jamb	24.9000	0.0260	0.6474
E5 Ground floor (normal)	4.0200	0.0930	0.3739
E7 Party floor between dwellings (in blocks of flats)	26.7900	0.0370	0.9912
E16 Corner (normal)	17.7000	0.0510	0.9027
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368
E18 Party wall between dwellings	5.7000	0.0650	0.3705
P1 Party wall - Ground floor	4.0200	0.1080	0.4342
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112
E10 Eaves (insulation at ceiling level)	14.7100	0.0970	1.4269
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172
E12 Gable (insulation at ceiling level)	12.0800	0.0970	1.1718
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246
P4 Party wall - Roof (insulation at ceiling level)	4.0500	0.1010	0.4091
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.6047 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	40.9821 (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	21.6360	21.5586	21.4827	21.1262	21.0595	20.7489	20.7489	20.6914	20.8686	21.0595	21.1944	21.3355	(38)
Heat transfer coeff	62.6181	62.5407	62.4648	62.1083	62.0416	61.7311	61.7311	61.6736	61.8507	62.0416	62.1765	62.3176	(39)
Average = Sum(39)m / 12 =												62.1080	
HLP	1.2769	1.2753	1.2738	1.2665	1.2651	1.2588	1.2588	1.2576	1.2612	1.2651	1.2679	1.2708	(40)
HLP (average)												1.2665	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6619 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												22.5209 (42b)
Hot water usage for other uses												31.6493 (42c)
Average daily hot water use (litres/day)												49.6525 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	54.1702	52.6848	51.0629	49.0436	47.2425	45.3705	44.9811	46.5996	48.2598	50.1822	52.2194	54.0940 (44)
Energy content (annual)	85.7923	75.0225	78.4818	67.1383	63.5974	55.7884	54.4007	57.7001	59.5091	68.0968	74.3961	84.6982 (45)
Distribution loss (46)m = 0.15 x (45)m												824.6217
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												
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 (57)
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 (59)
Total heat required for water heating calculated for each month												
WWHRS	72.9235	63.7691	66.7096	57.0675	54.0578	47.4201	46.2406	49.0451	50.5828	57.8823	63.2367	71.9935 (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	72.9235	63.7691	66.7096	57.0675	54.0578	47.4201	46.2406	49.0451	50.5828	57.8823	63.2367	71.9935 (64)
12Total per year (kWh/year)												700.9284 (64)
Electric shower(s)	41.7103	37.1643	40.5819	38.7268	39.4535	37.6349	38.8893	39.4535	38.7268	40.5819	39.8188	41.7103 (64a)
Heat gains from water heating, kWh/month	28.6585	25.2333	26.8229	23.9486	23.3778	21.2637	21.2825	22.1247	22.3274	24.6160	25.7639	28.4260 (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	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	73.0051	80.8271	73.0051	75.4386	73.0051	75.4386	73.0051	73.0051	75.4386	73.0051	75.4386	73.0051 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.7408	146.2428	142.4579	134.4003	124.2291	114.6696	108.2832	106.7813	110.5662	118.6237	128.7950	138.3545 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094 (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)	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750 (71)
Water heating gains (Table 5)	38.5194	37.5496	36.0523	33.2619	31.4218	29.5330	28.6055	29.7374	31.0103	33.0861	35.7832	38.2069 (72)
Total internal gains	304.1935	312.5476	299.4434	291.0290	276.5842	267.5693	257.8220	257.4520	264.9432	272.6431	287.9449	297.4947 (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	2.9800	19.6403	0.7300	0.7000	0.7700	20.7261	(76)

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South	0.7200	46.7521	0.7300	0.7000	0.7700	11.9203 (78)
West	2.8700	19.6403	0.7300	0.7000	0.7700	19.9610 (80)
East	3.8000	19.6403	0.6800	0.7000	0.7700	24.6190 (76)

Solar gains	81.2933	155.0470	248.4649	356.1610	433.9103	443.7275	422.5886	364.2121	286.5487	181.8975	100.5757	67.3951 (83)
Total gains	385.4868	467.5946	547.9083	647.1901	710.4945	711.2968	680.4106	621.6641	551.4920	454.5406	388.5206	364.8898 (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	45.4515	45.5077	45.5630	45.8246	45.8738	46.1046	46.1046	46.1476	46.0154	45.8738	45.7743	45.6707
alpha	4.0301	4.0338	4.0375	4.0550	4.0583	4.0736	4.0736	4.0765	4.0677	4.0583	4.0516	4.0447
util living area	0.9886	0.9752	0.9436	0.8572	0.7114	0.5317	0.3934	0.4460	0.6890	0.9141	0.9780	0.9908 (86)
MIT	19.3735	19.6514	20.0481	20.5175	20.8245	20.9586	20.9904	20.9842	20.8852	20.4364	19.8127	19.3206 (87)
Th 2	19.8590	19.8602	19.8615	19.8672	19.8683	19.8733	19.8733	19.8742	19.8713	19.8683	19.8661	19.8638 (88)
util rest of house	0.9855	0.9686	0.9286	0.8221	0.6499	0.4472	0.2955	0.3417	0.6035	0.8840	0.9710	0.9882 (89)
MIT 2	18.4044	18.6785	19.0636	19.5016	19.7578	19.8550	19.8708	19.8697	19.8121	19.4434	18.8449	18.3556 (90)
Living area fraction	fLA = Living area / (4) =											0.4768 (91)
MIT	18.8664	19.1424	19.5330	19.9859	20.2663	20.3811	20.4046	20.4010	20.3237	19.9168	19.3063	18.8157 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8664	19.1424	19.5330	19.9859	20.2663	20.3811	20.4046	20.4010	20.3237	19.9168	19.3063	18.8157 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9818	0.9633	0.9235	0.8262	0.6726	0.4862	0.3422	0.3913	0.6397	0.8855	0.9665	0.9850 (94)
Useful gains	378.4759	450.4192	505.9905	534.7054	477.9119	345.8306	232.8314	243.2847	352.8148	402.4930	375.4976	359.4278 (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	912.1236	890.7266	814.1019	688.5276	531.4692	356.8742	234.8593	246.7586	384.9401	578.0294	758.9479	910.8127 (97)
Space heating kWh	397.0339	295.8866	229.2349	110.7520	39.8467	0.0000	0.0000	0.0000	0.0000	130.5991	276.0842	410.2304 (98a)
Space heating requirement - total per year (kWh/year)												1889.6677
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	397.0339	295.8866	229.2349	110.7520	39.8467	0.0000	0.0000	0.0000	0.0000	130.5991	276.0842	410.2304 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1889.6677
Space heating per m2												(98c) / (4) = 38.5332 (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	580.2721	456.8099	468.7191	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9093	0.9480	0.9270	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	527.6668	433.0627	434.5004	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	805.5824	770.9297	703.6572	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	200.0992	251.3730	200.2526	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	50.0248	62.8433	50.0632	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												162.9312 (107)
Energy for space heating												38.5332 (99)
Energy for space cooling												3.3224 (108)
Total												41.8556 (109)
Fabric Energy Efficiency (DFEE)												41.9 (109)

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

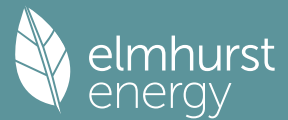
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 119.0415 (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	0.1680 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)
Infiltration rate			0.4180	(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) =		0.3553	(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)
	0.4530	0.4441	0.4353	0.3908	0.3820	0.3375	0.3375	0.3287	0.3553	0.3820	0.3997	0.4175	(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	0.6026	0.5986	0.5947	0.5764	0.5729	0.5570	0.5570	0.5540	0.5631	0.5729	0.5799	0.5871	(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			10.1100	1.1450	11.5763		(27)
GF			2.9900	0.1300	0.3887		(28a)
Main	75.7500	12.2600	63.4900	0.1800	11.4282		(29a)
PIJ	42.8100		42.8100	0.1100	4.7091		(30)
PIR	9.0300		9.0300	0.1100	0.9933		(30)
Total net area of external elements Aum(A, m2)			130.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2456		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 208.9297 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2100	0.0500	0.4605
E3 Sill	9.2100	0.0500	0.4605
E4 Jamb	24.9000	0.0500	1.2450
E5 Ground floor (normal)	4.0200	0.1600	0.6432
E7 Party floor between dwellings (in blocks of flats)	26.7900	0.0700	1.8753
E16 Corner (normal)	17.7000	0.0900	1.5930
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0900	-0.4320
E18 Party wall between dwellings	5.7000	0.0600	0.3420
P1 Party wall - Ground floor	4.0200	0.0800	0.3216
E25 Staggered party wall between dwellings	4.8000	0.0600	0.2880
E10 Eaves (insulation at ceiling level)	14.7100	0.0600	0.8826
E11 Eaves (insulation at rafter level)	1.0100	0.0400	0.0404
E12 Gable (insulation at ceiling level)	12.0800	0.0600	0.7248
E13 Gable (insulation at rafter level)	6.9600	0.0800	0.5568
P4 Party wall - Roof (insulation at ceiling level)	4.0500	0.1200	0.4860
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0800	0.3488
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.8365 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 41.0821 (37)

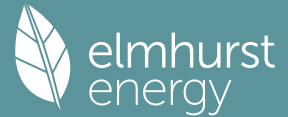
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	23.6728	23.5163	23.3629	22.6422	22.5074	21.8797	21.8797	21.7635	22.1215	22.5074	22.7802	23.0653	(38)
Average = Sum(39)m / 12 =	64.7550	64.5984	64.4450	63.7244	63.5895	62.9619	62.9619	62.8456	63.2036	63.5895	63.8623	64.1475	(39)
												63.7237	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3205	1.3173	1.3141	1.2994	1.2967	1.2839	1.2839	1.2815	1.2888	1.2967	1.3022	1.3081	(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													1.6619 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
22.5209	22.1864	21.7154	20.8470	20.1967	19.4757	19.0862	19.5539	20.0631	20.8347	21.7210	22.4448		(42b)
Hot water usage for other uses													
31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493		(42c)
Average daily hot water use (litres/day)													49.6525 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
54.1702	52.6848	51.0629	49.0436	47.2425	45.3705	44.9811	46.5996	48.2598	50.1822	52.2194	54.0940		(44)
Energy conte	85.7923	75.0225	78.4818	67.1383	63.5974	55.7884	54.4007	57.7001	59.5091	68.0968	74.3961	84.6982	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	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												
	72.9235	63.7691	66.7096	57.0675	54.0578	47.4201	46.2406	49.0451	50.5828	57.8823	63.2367	71.9935 (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	72.9235	63.7691	66.7096	57.0675	54.0578	47.4201	46.2406	49.0451	50.5828	57.8823	63.2367	71.9935 (64)
								Total per year (kWh/year) = Sum(64)m =				700.9284 (64)
												701 (64)
12Total per year (kWh/year)												
Electric shower(s)	41.7103	37.1643	40.5819	38.7268	39.4535	37.6349	38.8893	39.4535	38.7268	40.5819	39.8188	41.7103 (64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				474.4526 (64a)
Heat gains from water heating, kWh/month												
	28.6585	25.2333	26.8229	23.9486	23.3778	21.2637	21.2825	22.1247	22.3274	24.6160	25.7639	28.4260 (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	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	73.3096	81.1642	73.3096	75.7532	73.3096	75.7532	73.3096	73.3096	75.7532	73.3096	75.7532	73.3096 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.7408	146.2428	142.4579	134.4003	124.2291	114.6696	108.2832	106.7813	110.5662	118.6237	128.7950	138.3545 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094 (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)	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750 (71)
Water heating gains (Table 5)	38.5194	37.5496	36.0523	33.2619	31.4218	29.5330	28.6055	29.7374	31.0103	33.0861	35.7832	38.2069 (72)
Total internal gains	304.4980	312.8847	299.7479	291.3436	276.8886	267.8839	258.1264	257.7564	265.2578	272.9475	288.2595	297.7991 (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	0.9500		10.6334		0.6300		0.7000		0.7700		3.0872 (74)	
East	5.9900		19.6403		0.6300		0.7000		0.7700		35.9539 (76)	
South	0.6400		46.7521		0.6300		0.7000		0.7700		9.1443 (78)	
West	2.5300		19.6403		0.6300		0.7000		0.7700		15.1859 (80)	
Solar gains	63.3713	120.9161	193.8541	277.9451	338.6337	346.2905	329.7961	284.2368	223.5951	141.8822	78.4129	52.5301 (83)
Total gains	367.8693	433.8008	493.6020	569.2888	615.5223	614.1744	587.9225	541.9932	488.8528	414.8298	366.6724	350.3292 (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	43.9516	44.0581	44.1630	44.6624	44.7571	45.2033	45.2033	45.2869	45.0304	44.7571	44.5660	44.3679
alpha	3.9301	3.9372	3.9442	3.9775	3.9838	4.0136	4.0136	4.0191	4.0020	3.9838	3.9711	3.9579
util living area	0.9904	0.9811	0.9602	0.8995	0.7831	0.6088	0.4588	0.5126	0.7520	0.9356	0.9823	0.9921 (86)
MIT	19.2607	19.5087	19.8816	20.3691	20.7334	20.9290	20.9821	20.9725	20.8328	20.3340	19.7157	19.2245 (87)
Th 2	19.8248	19.8273	19.8298	19.8413	19.8434	19.8535	19.8535	19.8496	19.8496	19.8434	19.8391	19.8345 (88)
util rest of house	0.9877	0.9758	0.9489	0.8711	0.7251	0.5169	0.3451	0.3945	0.6681	0.9109	0.9764	0.9898 (89)
MIT 2	18.2677	18.5143	18.8809	19.3508	19.6691	19.8209	19.8487	19.8472	19.7597	19.3318	18.7300	18.2389 (90)
Living area fraction	18.7411	18.9884	19.3580	19.8363	20.1765	20.3492	20.3891	20.3837	20.2713	19.8096	19.1999	18.7088 (91)
MIT	18.7411	18.9884	19.3580	19.8363	20.1765	20.3492	20.3891	20.3837	20.2713	19.8096	19.1999	18.7088 (92)
Temperature adjustment	18.7411	18.9884	19.3580	19.8363	20.1765	20.3492	20.3891	20.3837	20.2713	19.8096	19.1999	18.7088 (93)
adjusted MIT	18.7411	18.9884	19.3580	19.8363	20.1765	20.3492	20.3891	20.3837	20.2713	19.8096	19.1999	18.7088 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9843	0.9709	0.9432	0.8709	0.7431	0.5582	0.3993	0.4505	0.7014	0.9100	0.9721	0.9869 (94)
Useful gains	362.1070	421.1985	465.5734	495.8080	457.4240	342.8208	234.7284	244.1853	342.8615	377.5075	356.4391	345.7229 (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	935.1333	910.0873	828.6356	696.9089	539.0177	361.9806	238.5669	250.3561	390.0508	585.6351	772.7304	930.7047 (97)
Space heating kWh	426.3315	328.5333	270.1183	144.7927	60.7057	0.0000	0.0000	0.0000	0.0000	154.8469	299.7297	435.2265 (98a)
Space heating requirement - total per year (kWh/year)												2120.2845
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	426.3315	328.5333	270.1183	144.7927	60.7057	0.0000	0.0000	0.0000	0.0000	154.8469	299.7297	435.2265 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2120.2845
Space heating per m2												43.2358 (99)

8c. Space cooling requirement

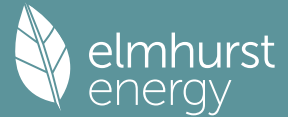
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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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	591.8416	465.9178	477.6268	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8576	0.9128	0.8853	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	507.5890	425.3064	422.8352	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	691.7217	662.4997	610.2170	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	132.5756	176.4718	139.4120	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	33.1439	44.1180	34.8530	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												112.1149 (107)
Energy for space cooling												43.2358 (99)
Total												2.2862 (108)
Fabric Energy Efficiency (TFEE)												45.5220 (109)
												45.5 (109)

Full SAP Calculation Printout



Plot Reference	79596-04				Issued on Date	18/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	24 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.25		TER	14.84
Environmental	95 A		% DER < TER				51.15
CO ₂ Emissions (t/year)	0.32		DFEE	41.86		TFEE	45.52
Compliance Check	See BREL		% DFEE < TFEE				8.05
% DPER < TPER	4.42		DPER	74.66		TPER	78.11
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	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.0415 (5)

2. Ventilation rate

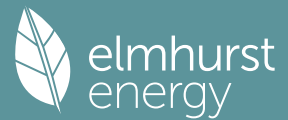
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.5200 (17)
Infiltration rate	0.1260 (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) = 0.1071 (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	0.1366	0.1339	0.1312	0.1178	0.1151	0.1017	0.1017	0.0991	0.1071	0.1151	0.1205	0.1258 (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			7.6500	1.2357	9.4534		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	(28a)
Main	75.7500	13.6000	62.1500	0.1900	11.8085	110.0000	6836.5000 (29a)
PIJ	42.8100		42.8100	0.0800	3.4248	9.0000	385.2900 (30)
PIR	9.0300		9.0300	0.1300	1.1739	9.0000	81.2700 (30)
Total net area of external elements A _{um} (A, m ²)			130.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.3774		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			46.0500			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10245.9100 (34)

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

208.9297 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	9.2100	0.0200	0.1842
E2 Other lintels (including other steel lintels)	9.2100	0.0300	0.2763
E3 Sill	24.9000	0.0260	0.6474
E4 Jamb	4.0200	0.0930	0.3739
E5 Ground floor (normal)	26.7900	0.0370	0.9912
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.7100	0.0970	1.4269
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	12.0800	0.0970	1.1718
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	4.0500	0.1010	0.4091
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.6047 (36)
Total fabric heat loss	(33) + (36) + (36a) =	40.9821 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	(38)
Heat transfer coeff	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	(39)
Average = Sum(39)m / 12 =												60.6240	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	(40)
HLP (average)												1.2362	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

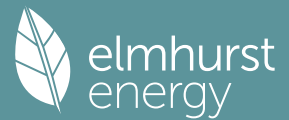
Assumed occupancy													1.6619 (42)
Hot water usage for mixer showers													
75.1953	74.0653	72.4186	69.2679	66.9428	64.3499	62.8761	64.5103	66.3017	69.0857	72.3041	74.9072	74.9072	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493	31.6493	(42c)
Average daily hot water use (litres/day)												98.0996	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	106.8446	104.5636	101.7661	97.4645	93.9886	90.2448	88.7709	91.5560	94.4983	98.4332	102.8024	106.5565	(44)
Energy conte	169.2157	148.8972	156.4106	133.4241	126.5267	110.9665	107.3608	113.3655	116.5259	133.5730	146.4609	166.8417	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.3823	22.3346	23.4616	20.0136	18.9790	16.6450	16.1041	17.0048	17.4789	20.0359	21.9691	25.0262	25.0262	(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	26.9514	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	26.9514	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													
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	193.7931	(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													
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	193.7931	(64)
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
56.2642	49.5083	52.0065	44.3635	42.0701	36.8963	35.6975	37.6940	38.7449	44.4130	48.6983	55.4748	55.4748	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
73.0051	80.8271	73.0051	75.4386	73.0051	75.4386	73.0051	73.0051	75.4386	73.0051	75.4386	73.0051	73.0051	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
144.7408	146.2428	142.4579	134.4003	124.2291	114.6696	108.2832	106.7813	110.5662	118.6237	128.7950	138.3545	138.3545	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	(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)													
-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	(71)
Water heating gains (Table 5)													
75.6239	73.6731	69.9013	61.6160	56.5459	51.2449	47.9804	50.6640	53.8123	59.6949	67.6365	74.5630	74.5630	(72)
Total internal gains													
341.2980	348.6711	333.2924	319.3831	301.7082	289.2813	277.1969	278.3786	287.7452	299.2519	319.7982	333.8507	333.8507	(73)

6. Solar gains

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[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
North	1.0800				10.6334	0.7300		0.7000		0.7700	4.0668 (74)	
East	2.9800				19.6403	0.7300		0.7000		0.7700	20.7261 (76)	
South	0.7200				46.7521	0.7300		0.7000		0.7700	11.9203 (78)	
West	2.8700				19.6403	0.7300		0.7000		0.7700	19.9610 (80)	
East	3.8000				19.6403	0.6800		0.7000		0.7700	24.6190 (76)	
Solar gains	81.2933	155.0470	248.4649	356.1610	433.9103	443.7275	422.5886	364.2121	286.5487	181.8975	100.5757	67.3951 (83)
Total gains	422.5913	503.7181	581.7573	675.5441	735.6186	733.0087	699.7855	642.5907	574.2940	481.1494	420.3739	401.2459 (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	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465
alpha	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298
util living area	0.9840	0.9674	0.9301	0.8367	0.6863	0.5106	0.3768	0.4261	0.6618	0.8966	0.9708	0.9870 (86)
MIT	19.5279	19.7939	20.1660	20.5847	20.8545	20.9661	20.9924	20.9874	20.9057	20.5087	19.9276	19.4640 (87)
Th 2	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911 (88)
util rest of house	0.9798	0.9591	0.9126	0.7995	0.6251	0.4294	0.2840	0.3271	0.5775	0.8628	0.9618	0.9834 (89)
MIT 2	18.2093	18.5431	19.0017	19.4914	19.7748	19.8720	19.8886	19.8865	19.8296	19.4221	18.7160	18.1285 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.8379	19.1394	19.5568	20.0126	20.2896	20.3937	20.4148	20.4114	20.3426	19.9402	19.2937	18.7652 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8379	19.1394	19.5568	20.0126	20.2896	20.3937	20.4148	20.4114	20.3426	19.9402	19.2937	18.7652 (93)
8. Space heating requirement												
Utilisation	0.9744	0.9519	0.9064	0.8040	0.6481	0.4669	0.3282	0.3742	0.6135	0.8645	0.9556	0.9786 (94)
Useful gains	411.7733	479.5118	527.3133	543.1056	476.7336	342.2627	229.6641	240.4346	352.3205	415.9742	401.7205	392.6699 (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	881.3463	863.2514	791.5546	673.6921	520.7333	351.2344	231.2695	243.1866	378.4534	566.2374	739.2279	883.0001 (97)
Space heating kWh	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057 (98a)
Space heating requirement - total per year (kWh/year)	1650.1958											
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	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1650.1958											
Space heating per m2	(98c) / (4) = 33.6500 (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	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057 (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)	349.3623	257.8730	196.5955	94.0223	32.7358	0.0000	0.0000	0.0000	0.0000	111.7959	243.0054	364.8057 (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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931 (64)
Water heating requirement	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Efficiency of water heater (217)m	56.1424	49.5808	52.4776	45.6501	43.9249	39.2228	38.4397	40.1582	40.8139	45.9416	49.3812	55.4629 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	2.0616	1.8621	2.0616	1.9951	2.0616	1.9951	2.0616	2.0616	1.9951	2.0616	1.9951	2.0616 (231)
Pumps and Fa	14.0075	11.2374	10.1180	7.4129	5.7259	4.6781	5.2234	6.7895	8.8189	11.5709	13.0693	14.3969 (232)
Lighting	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by PVs (Appendix M) (negative quantity) (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)

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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												1650.1958	(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												557.1963	(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)												24.2743	(230a)	
Total electricity for the above, kWh/year												24.2743	(231)	
Electricity for lighting (calculated in Appendix L)												113.0489	(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												2344.7152	(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	1650.1958	0.1560	257.4125 (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)	557.1963	0.1411	78.6349 (264)
Space and water heating			336.0475 (265)
Pumps, fans and electric keep-hot	24.2743	0.1387	3.3671 (267)
Energy for lighting	113.0489	0.1443	16.3164 (268)
Total CO2, kg/year			355.7310 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.2500 (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	1650.1958	1.5775	2603.1558 (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)	557.1963	1.5218	847.9659 (278)
Space and water heating			3451.1217 (279)
Pumps, fans and electric keep-hot	24.2743	1.5128	36.7221 (281)
Energy for lighting	113.0489	1.5338	173.3981 (282)
Total Primary energy kWh/year			3661.2419 (286)
Dwelling Primary energy Rate (DPER)			74.6600 (287)

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

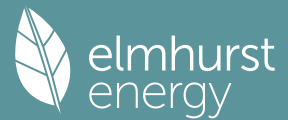
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	2.9900 (1b)	x 2.8500 (2b)	= 8.5215 (1b) - (3b)
First floor	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	119.0415 (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) = 0.1680 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4180 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3553 \quad (21)$$

	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	0.4530	0.4441	0.4353	0.3908	0.3820	0.3375	0.3375	0.3287	0.3553	0.3820	0.3997	0.4175	(22b)
	0.6026	0.5986	0.5947	0.5764	0.5729	0.5570	0.5570	0.5540	0.5631	0.5729	0.5799	0.5871	(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			10.1100	1.1450	11.5763			(27)
GF			2.9900	0.1300	0.3887			(28a)
Main	75.7500	12.2600	63.4900	0.1800	11.4282			(29a)
PIJ	42.8100		42.8100	0.1100	4.7091			(30)
PIR	9.0300		9.0300	0.1100	0.9933			(30)
Total net area of external elements Aum(A, m2)			130.5800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.2456		(33)
Main dwelling								
Party Wall 1			21.1800	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.9297	(35)

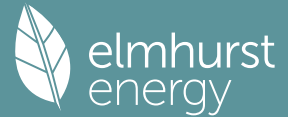
List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	9.2100	0.0500	0.4605	
E2 Other lintels (including other steel lintels)	9.2100	0.0500	0.4605	
E3 Sill	24.9000	0.0500	1.2450	
E4 Jamb	4.0200	0.1600	0.6432	
E5 Ground floor (normal)	26.7900	0.0700	1.8753	
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0900	1.5930	
E16 Corner (normal)	4.8000	-0.0900	-0.4320	
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0600	0.3420	
E18 Party wall between dwellings	4.0200	0.0800	0.3216	
P1 Party wall - Ground floor	4.8000	0.0600	0.2880	
E25 Staggered party wall between dwellings	14.7100	0.0600	0.8826	
E10 Eaves (insulation at ceiling level)	1.0100	0.0400	0.0404	
E11 Eaves (insulation at rafter level)	12.0800	0.0600	0.7248	
E12 Gable (insulation at ceiling level)	6.9600	0.0800	0.5568	
E13 Gable (insulation at rafter level)	4.0500	0.1200	0.4860	
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0800	0.3488	
P5 Party wall - Roof (insulation at rafter level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.8365	(36)
Point Thermal Bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	41.0821 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.6728	23.5163	23.3629	22.6422	22.5074	21.8797	21.8797	21.7635	22.1215	22.5074	22.7802	23.0653	(38)
Heat transfer coeff	64.7550	64.5984	64.4450	63.7244	63.5895	62.9619	62.9619	62.8456	63.2036	63.5895	63.8623	64.1475	(39)
Average = Sum(39)m / 12 =												63.7237	
HLP	1.3205	1.3173	1.3141	1.2994	1.2967	1.2839	1.2839	1.2815	1.2888	1.2967	1.3022	1.3081	(40)
HLP (average)												1.2994	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6619 (42)
Hot water usage for mixer showers	66.8403	65.8358	64.3721	61.5715	59.5047	57.1999	55.8899	57.3425	58.9349	61.4095	64.2703	66.5842	(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	31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493	(42c)
Average daily hot water use (litres/day)												90.3965	(43)
Daily hot water use	98.4895	96.3342	93.7196	89.7681	86.5505	83.0948	81.7847	84.3882	87.1315	90.7570	94.7687	98.2334	(44)
Energy conte	155.9833	137.1786	144.0435	122.8880	116.5136	102.1747	98.9115	104.4903	107.4418	123.1565	135.0153	153.8098	(45)
Energy content (annual)										Total = Sum(45)m =		1501.6069	
Distribution loss (46)m = 0.15 x (45)m	23.3975	20.5768	21.6065	18.4332	17.4770	15.3262	14.8367	15.6735	16.1163	18.4735	20.2523	23.0715	(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	202.5782	179.2643	190.6384	167.9799	163.1085	147.2666	145.5064	151.0852	152.5337	169.7514	180.1072	200.4047	(62)
WWHRS	-30.5566	-27.0245	-28.2985	-23.4323	-21.8380	-18.6870	-17.5160	-18.6266	-19.3342	-22.7929	-25.8216	-29.9907	(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	172.0217	152.2398	162.3399	144.5476	141.2704	128.5796	127.9904	132.4586	133.1994	146.9584	154.2855	170.4140	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1766.3054	(64)
Electric shower(s)												1766	(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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89.1404 79.2804 85.1704 76.9337 76.0167 70.0466 70.1640 72.0189 71.7979 78.2254 80.9661 88.4177 (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	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	83.0938	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	73.3096	81.1642	73.3096	75.7532	73.3096	75.7532	73.3096	73.3096	75.7532	73.3096	75.7532	73.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.7408	146.2428	142.4579	134.4003	124.2291	114.6696	108.2832	106.7813	110.5662	118.6237	128.7950	138.3545	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	31.3094	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	(71)
Water heating gains (Table 5)	119.8123	117.9769	114.4763	106.8524	102.1730	97.2869	94.3065	96.7996	99.7193	105.1417	112.4529	118.8410	(72)
Total internal gains	388.7909	396.3119	381.1719	367.9341	350.6398	335.6378	323.8274	324.8186	333.9668	348.0032	367.9292	381.4332	(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						0.9500	10.6334	0.6300	0.7000	0.7700		3.0872 (74)
East						5.9900	19.6403	0.6300	0.7000	0.7700		35.9539 (76)
South						0.6400	46.7521	0.6300	0.7000	0.7700		9.1443 (78)
West						2.5300	19.6403	0.6300	0.7000	0.7700		15.1859 (80)
Solar gains	63.3713	120.9161	193.8541	277.9451	338.6337	346.2905	329.7961	284.2368	223.5951	141.8822	78.4129	52.5301 (83)
Total gains	452.1622	517.2281	575.0261	645.8792	689.2734	681.9284	653.6235	609.0554	557.5619	489.8854	446.3421	433.9632 (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	43.9516	44.0581	44.1630	44.6624	44.7571	45.2033	45.2033	45.2869	45.0304	44.7571	44.5660	44.3679	
alpha	3.9301	3.9372	3.9442	3.9775	3.9838	4.0136	4.0136	4.0191	4.0020	3.9838	3.9711	3.9579	
util living area	0.9808	0.9668	0.9377	0.8630	0.7340	0.5594	0.4159	0.4619	0.6921	0.8989	0.9665	0.9835	(86)
MIT	19.4527	19.6894	20.0400	20.4796	20.7917	20.9475	20.9874	20.9810	20.8774	20.4614	19.8891	19.4173	(87)
Th 2	19.8248	19.8273	19.8298	19.8413	19.8434	19.8535	19.8535	19.8553	19.8496	19.8434	19.8391	19.8345	(88)
util rest of house	0.9757	0.9582	0.9213	0.8284	0.6725	0.4710	0.3113	0.3529	0.6054	0.8649	0.9562	0.9791	(89)
MIT 2	18.0690	18.3676	18.8036	19.3344	19.6737	19.8234	19.8493	19.8484	19.7686	19.3303	18.6308	18.0309	(90)
Living area fraction	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(91)
MIT	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(92)
Temperature adjustment	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(93)
adjusted MIT	18.7287	18.9978	19.3931	19.8804	20.2067	20.3593	20.3919	20.3883	20.2972	19.8696	19.2307	18.6918	(93)

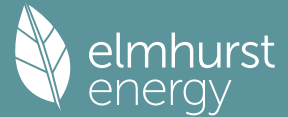
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9694	0.9504	0.9140	0.8298	0.6931	0.5111	0.3612	0.4046	0.6411	0.8658	0.9493	0.9732	(94)
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	934.3275	910.6929	830.8947	699.7179	540.9383	362.6169	238.7435	250.6493	391.6864	589.4464	774.6942	929.6141	(97)
Space heating kWh	369.0366	281.6546	227.1788	117.9349	47.0440	0.0000	0.0000	0.0000	0.0000	122.9835	252.7158	377.4040	(98a)
Space heating requirement - total per year (kWh/year)												1795.9523	
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	369.0366	281.6546	227.1788	117.9349	47.0440	0.0000	0.0000	0.0000	0.0000	122.9835	252.7158	377.4040	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1795.9523	
Space heating per m ²										(98c) / (4) =		36.6222	(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	
369.0366	281.6546	227.1788	117.9349	47.0440	0.0000	0.0000	0.0000	0.0000	0.0000	122.9835	252.7158	377.4040	(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)	399.8230	305.1513	246.1309	127.7735	50.9686	0.0000	0.0000	0.0000	0.0000	133.2432	273.7983	408.8884	(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	172.0217	152.2398	162.3399	144.5476	141.2704	128.5796	127.9904	132.4586	133.1994	146.9584	154.2855	170.4140	(64)
Efficiency of water heater	85.7261	85.4198	84.8134	83.6073	81.8730	79.8000	79.8000	79.8000	79.8000	83.6631	85.1592	85.7901	(216)
(217)m													(217)
Fuel for water heating, kWh/month	200.6643	178.2254	191.4083	172.8888	172.5484	161.1273	160.3889	165.9882	166.9166	175.6549	181.1731	198.6405	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	15.2323	12.2199	11.0027	8.0610	6.2266	5.0872	5.6801	7.3832	9.5900	12.5826	14.2121	15.6556	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-23.3961	-33.2237	-48.1239	-54.5785	-59.3052	-55.5773	-54.9427	-51.6703	-45.9268	-38.2517	-25.8258	-20.2036	(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	-12.5060	-26.3855	-52.5648	-79.1053	-104.7176	-105.2085	-103.9197	-87.8921	-64.3295	-37.7278	-16.7007	-9.8795	(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												1945.7771	(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												2125.6248	(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)												122.9332	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1211.9624	(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												3068.3727	(238)

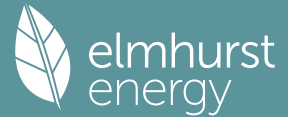
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1945.7771	0.2100	408.6132 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2125.6248	0.2100	446.3812 (264)
Space and water heating			854.9944 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	122.9332	0.1443	17.7431 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-511.0256	0.1344	-68.6785
PV Unit electricity exported	-700.9368	0.1259	-88.2130
Total			-156.8915 (269)
Total CO2, kg/year			727.7753 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.8400 (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	1945.7771	1.1300	2198.7281 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2125.6248	1.1300	2401.9560 (278)
Space and water heating			4600.6841 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	122.9332	1.5338	188.5591 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-511.0256	1.4967	-764.8440
PV Unit electricity exported	-700.9368	0.4620	-323.8016
Total			-1088.6456 (283)
Total Primary energy kWh/year			3830.6985 (286)
Target Primary Energy Rate (TPER)			78.1100 (287)

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Plot Reference	79596-04				Issued on Date	18/03/2026	
Assessment Reference	001			Plot Type Ref	Top Flat		
Plot Address	24 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	77 C		DER	7.25		TER	14.84
Environmental	95 A		% DER < TER				51.15
CO ₂ Emissions (t/year)	0.32		DFEE	41.86		TFEE	45.52
Compliance Check	See BREL		% DFEE < TFEE				8.05
% DPER < TPER	4.42		DPER	74.66		TPER	78.11
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	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.0415 (5)

2. Ventilation rate

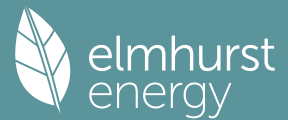
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.5200 (17)
Infiltration rate	0.1260 (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) = 0.1071 (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	0.1366	0.1339	0.1312	0.1178	0.1151	0.1017	0.1017	0.0991	0.1071	0.1151	0.1205	0.1258 (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			7.6500	1.2357	9.4534		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	(28a)
Main	75.7500	13.6000	62.1500	0.1900	11.8085	110.0000	6836.5000 (29a)
PIJ	42.8100		42.8100	0.0800	3.4248	9.0000	385.2900 (30)
PIR	9.0300		9.0300	0.1300	1.1739	9.0000	81.2700 (30)
Total net area of external elements A _{um} (A, m ²)			130.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.3774		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			46.0500			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10245.9100 (34)

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

208.9297 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	9.2100	0.0200	0.1842
E2 Other lintels (including other steel lintels)	9.2100	0.0300	0.2763
E3 Sill	24.9000	0.0260	0.6474
E4 Jamb	4.0200	0.0930	0.3739
E5 Ground floor (normal)	26.7900	0.0370	0.9912
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E16 Corner (normal)	4.8000	-0.0910	-0.4368
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0650	0.3705
E18 Party wall between dwellings	4.0200	0.1080	0.4342
P1 Party wall - Ground floor	4.8000	0.0440	0.2112
E25 Staggered party wall between dwellings	14.7100	0.0970	1.4269
E10 Eaves (insulation at ceiling level)	1.0100	0.0170	0.0172
E11 Eaves (insulation at rafter level)	12.0800	0.0970	1.1718
E12 Gable (insulation at ceiling level)	6.9600	0.0610	0.4246
E13 Gable (insulation at rafter level)	4.0500	0.1010	0.4091
P4 Party wall - Roof (insulation at ceiling level)	4.3600	0.0460	0.2006
P5 Party wall - Roof (insulation at rafter level)			

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

Point Thermal bridges	(36a) =	7.6047 (36)
Total fabric heat loss	(33) + (36) + (36a) =	40.9821 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	(38)
Heat transfer coeff	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	(39)
Average = Sum(39)m / 12 =												60.6240	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	(40)
HLP (average)												1.2362	(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													1.6619 (42)
Hot water usage for mixer showers													
75.1953	74.0653	72.4186	69.2679	66.9428	64.3499	62.8761	64.5103	66.3017	69.0857	72.3041	74.9072	74.9072	(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													
31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493	31.6493	(42c)
Average daily hot water use (litres/day)												98.0996	(43)
Daily hot water use													
106.8446	104.5636	101.7661	97.4645	93.9886	90.2448	88.7709	91.5560	94.4983	98.4332	102.8024	106.5565	106.5565	(44)
Energy conte	169.2157	148.8972	156.4106	133.4241	126.5267	110.9665	107.3608	113.3655	116.5259	133.5730	146.4609	166.8417	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.3823	22.3346	23.4616	20.0136	18.9790	16.6450	16.1041	17.0048	17.4789	20.0359	21.9691	25.0262	25.0262	(46)
Water storage loss (or HIU loss):													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	193.7931	(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													
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	193.7931	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
56.2642	49.5083	52.0065	44.3635	42.0701	36.8963	35.6975	37.6940	38.7449	44.4130	48.6983	55.4748	55.4748	(65)

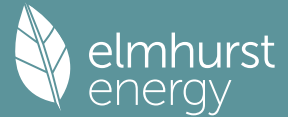
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
16.0032	14.2139	11.5595	8.7513	6.5417	5.5228	5.9676	7.7569	10.4113	13.2195	15.4291	16.4480	16.4480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
216.0311	218.2728	212.6237	200.5975	185.4166	171.1486	161.6168	159.3750	165.0241	177.0503	192.2313	206.4992	206.4992	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	(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)													
-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	(71)
Water heating gains (Table 5)													
75.6239	73.6731	69.9013	61.6160	56.5459	51.2449	47.9804	50.6640	53.8123	59.6949	67.6365	74.5630	74.5630	(72)
Total internal gains													
387.5289	386.0305	373.9552	350.8355	328.3748	307.7870	295.4354	297.6666	309.1183	329.8354	355.1675	377.3809	377.3809	(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					2.9800	19.6403	0.7300		0.7000		0.7700	20.7261 (76)
South					0.7200	46.7521	0.7300		0.7000		0.7700	11.9203 (78)
West					2.8700	19.6403	0.7300		0.7000		0.7700	19.9610 (80)
East					3.8000	19.6403	0.6800		0.7000		0.7700	24.6190 (76)

Solar gains	81.2933	155.0470	248.4649	356.1610	433.9103	443.7275	422.5886	364.2121	286.5487	181.8975	100.5757	67.3951 (83)
Total gains	468.8222	541.0775	622.4201	706.9965	762.2851	751.5144	718.0240	661.8787	595.6671	511.7329	455.7431	444.7760 (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	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465
alpha	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298
util living area	0.9772	0.9590	0.9154	0.8196	0.6692	0.4994	0.3676	0.4144	0.6442	0.8789	0.9621	0.9813 (86)
MIT	19.6322	19.8720	20.2369	20.6198	20.8676	20.9687	20.9930	20.9886	20.9147	20.5541	20.0026	19.5638 (87)
Th 2	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911 (88)
util rest of house	0.9714	0.9489	0.8953	0.7805	0.6079	0.4195	0.2769	0.3178	0.5602	0.8416	0.9509	0.9765 (89)
MIT 2	18.3402	18.6391	19.0851	19.5285	19.7861	19.8736	19.8888	19.8870	19.8360	19.4714	18.8079	18.2542 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.9562	19.2269	19.6342	20.0488	20.3017	20.3957	20.4153	20.4122	20.3503	19.9876	19.3775	18.8786 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.9562	19.2269	19.6342	20.0488	20.3017	20.3957	20.4153	20.4122	20.3503	19.9876	19.3775	18.8786 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9650	0.9414	0.8899	0.7865	0.6315	0.4565	0.3201	0.3637	0.5965	0.8453	0.9444	0.9706 (94)
Useful gains	452.4058	509.3862	553.9183	556.0751	481.4135	343.0930	229.8344	240.7580	355.3090	432.5769	430.3916	431.7144 (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	888.5168	868.5529	796.2483	675.8836	521.4695	351.3598	231.2962	243.2368	378.9176	569.1106	744.3095	889.8744 (97)
Space heating kWh	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710 (98a)
Space heating requirement - total per year (kWh/year)												1530.6569
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	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1530.6569
Space heating per m2	(98c) / (4) =											31.2124 (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	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710 (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)	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710 (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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931 (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	56.1424	49.5808	52.4776	45.6501	43.9249	39.2228	38.4397	40.1582	40.8139	45.9416	49.3812	55.4629 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	2.0616	1.8621	2.0616	1.9951	2.0616	1.9951	2.0616	2.0616	1.9951	2.0616	1.9951	2.0616 (231)
Lighting	14.0075	11.2374	10.1180	7.4129	5.7259	4.6781	5.2234	6.7895	8.8189	11.5709	13.0693	14.3969 (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												1530.6569	(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												557.1963	(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)												24.2743	(230a)
Total electricity for the above, kWh/year												24.2743	(231)
Electricity for lighting (calculated in Appendix L)												113.0489	(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												2225.1763	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1530.6569	16.4900	252.4053	(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)	557.1963	16.4900	91.8817	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	24.2743	16.4900	4.0028	(249)
Energy for lighting	113.0489	16.4900	18.6418	(250)
Additional standing charges			0.0000	(251)
Total energy cost			366.9316	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.4047	(257)
SAP value		77.2303	
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	1530.6569	0.1561	238.8660	(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)	557.1963	0.1411	78.6349	(264)
Space and water heating			317.5009	(265)
Pumps, fans and electric keep-hot	24.2743	0.1387	3.3671	(267)
Energy for lighting	113.0489	0.1443	16.3164	(268)
Total CO2, kg/year			337.1845	(272)
CO2 emissions per m2			6.8800	(273)
EI value			95.1954	
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	46.0500 (1c)	x 2.4000 (2c)	= 110.5200	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.0400			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.0415	(5)

2. Ventilation rate

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

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 2.5200 (17)
 Infiltration rate 0.1260 (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) = 0.1071 (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	0.1151	0.1125	0.1125	0.1044	0.1071	0.0910	0.0884	0.0884	0.0910	0.1017	0.1017	0.1044	(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			7.6500	1.2357	9.4534			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500	(28a)
Main	75.7500	13.6000	62.1500	0.1900	11.8085	110.0000	6836.5000	(29a)
PIJ	42.8100		42.8100	0.0800	3.4248	9.0000	385.2900	(30)
PIR	9.0300		9.0300	0.1300	1.1739	9.0000	81.2700	(30)
Total net area of external elements Aum(A, m2)			130.5800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.3774			(33)
Main dwelling								
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000	(32)
Party Floor 1			46.0500			0.0000	0.0000	(32a)
Timber			43.2000			9.0000	388.8000	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							(28)...(30) + (32) + (32a)...(32e) = 10245.9100	(34)
List of Thermal Bridges							208.9297	(35)

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

	Length	Psi-value	Total
K1 Element	9.2100	0.0200	0.1842
E2 Other lintels (including other steel lintels)	9.2100	0.0300	0.2763
E3 Sill	24.9000	0.0260	0.6474
E4 Jamb	4.0200	0.0930	0.3739
E5 Ground floor (normal)	26.7900	0.0370	0.9912
E6 Party floor between dwellings (in blocks of flats)	17.7000	0.0510	0.9027
E7 Party wall 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)	14.7100	0.0970	1.4269
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172
E12 Gable (insulation at ceiling level)	12.0800	0.0970	1.1718
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246
P4 Party wall - Roof (insulation at ceiling level)	4.0500	0.1010	0.4091
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.6047 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 40.9821 (37)

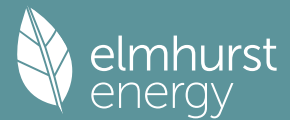
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
 (38)m Jan 19.6418 Feb 19.6418 Mar 19.6418 Apr 19.6418 May 19.6418 Jun 19.6418 Jul 19.6418 Aug 19.6418 Sep 19.6418 Oct 19.6418 Nov 19.6418 Dec 19.6418 (38)
 Heat transfer coeff 60.6240 60.6240 60.6240 60.6240 60.6240 60.6240 60.6240 60.6240 60.6240 60.6240 60.6240 60.6240 (39)
 Average = Sum(39)m / 12 = 60.6240

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	(40)
HLP (average)													1.2362
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy													1.6619 (42)
Hot water usage for mixer showers	75.1953	74.0653	72.4186	69.2679	66.9428	64.3499	62.8761	64.5103	66.3017	69.0857	72.3041	74.9072	(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	31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493	(42c)
Average daily hot water use (litres/day)													98.0996 (43)
Daily hot water use	106.8446	104.5636	101.7661	97.4645	93.9886	90.2448	88.7709	91.5560	94.4983	98.4332	102.8024	106.5565	(44)
Energy conte	169.2157	148.8972	156.4106	133.4241	126.5267	110.9665	107.3608	113.3655	116.5259	133.5730	146.4609	166.8417	(45)
Energy content (annual)													Total = Sum(45)m = 1629.5685
Distribution loss (46)m = 0.15 x (45)m	25.3823	22.3346	23.4616	20.0136	18.9790	16.6450	16.1041	17.0048	17.4789	20.0359	21.9691	25.0262	(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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	(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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	(64)
													(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													(64a)
Heat gains from water heating, kWh/month	56.2642	49.5083	52.0065	44.3635	42.0701	36.8963	35.6975	37.6940	38.7449	44.4130	48.6983	55.4748	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.0032	14.2139	11.5595	8.7513	6.5417	5.5228	5.9676	7.7569	10.4113	13.2195	15.4291	16.4480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	216.0311	218.2728	212.6237	200.5975	185.4166	171.1486	161.6168	159.3750	165.0241	177.0503	192.2313	206.4992	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	(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)	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	(71)
Water heating gains (Table 5)	75.6239	73.6731	69.9013	61.6160	56.5459	51.2449	47.9804	50.6640	53.8123	59.6949	67.6365	74.5630	(72)
Total internal gains	387.5289	386.0305	373.9552	350.8355	328.3748	307.7870	295.4354	297.6666	309.1183	329.8354	355.1675	377.3809	(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				2.9800	17.3606		0.7300		0.7000		0.7700		18.3204 (76)
South				0.7200	41.2355		0.7300		0.7000		0.7700		10.5138 (78)
West				2.8700	17.3606		0.7300		0.7000		0.7700		17.6441 (80)
East				3.8000	17.3606		0.6800		0.7000		0.7700		21.7615 (76)
Solar gains	71.8326	140.5462	235.3239	344.0714	408.8605	425.8116	397.8249	338.5049	278.8606	173.4616	91.3320		60.9068 (83)
Total gains	459.3615	526.5767	609.2791	694.9068	737.2353	733.5986	693.2603	636.1714	587.9789	503.2970	446.4995		438.2877 (84)

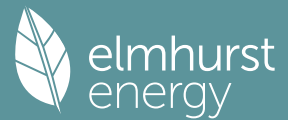
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	
alpha	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	
util living area	0.9749	0.9559	0.9069	0.7956	0.6246	0.4373	0.3299	0.3768	0.6141	0.8655	0.9582	0.9790	(86)
MIT	19.7265	19.9532	20.3140	20.6888	20.9095	20.9838	20.9960	20.9931	20.9336	20.6089	20.0810	19.6653	(87)
Th 2	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	(88)
util rest of house	0.9682	0.9444	0.8839	0.7507	0.5552	0.3514	0.2349	0.2745	0.5243	0.8230	0.9452	0.9733	(89)
MIT 2	18.4600	18.7417	19.1794	19.6058	19.8259	19.8838	19.8901	19.8892	19.8516	19.5344	18.9065	18.3834	(90)
Living area fraction	19.0638	19.3193	19.7203	20.1221	20.3425	20.4082	20.4173	20.4155	20.3674	20.0467	19.4665	18.9945	(91)
MIT	19.0638	19.3193	19.7203	20.1221	20.3425	20.4082	20.4173	20.4155	20.3674	20.0467	19.4665	18.9945	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0638	19.3193	19.7203	20.1221	20.3425	20.4082	20.4173	20.4155	20.3674	20.0467	19.4665	18.9945	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9617	0.9372	0.8799	0.7607	0.5844	0.3920	0.2803	0.3233	0.5644	0.8298	0.9391	0.9673	(94)
Ext temp.	441.7707	493.5182	536.0817	528.6462	430.8232	287.5724	194.3022	205.6991	331.8420	417.6157	419.2968	423.9531	(95)
Heat loss rate W	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)
Space heating kWh	846.5431	825.6553	752.9696	625.7683	457.2568	291.4914	195.0483	207.0583	349.6457	536.3211	707.2669	848.4046	(97)
Space heating requirement - total per year (kWh/year)	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													(98c) / (4) =
Space heating per m ²													28.2780 (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	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919	(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)	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919	(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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	(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	56.1424	49.5808	52.4776	45.6501	43.9249	39.2228	38.4397	40.1582	40.8139	45.9416	49.3812	55.4629	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	2.0616	1.8621	2.0616	1.9951	2.0616	1.9951	2.0616	2.0616	1.9951	2.0616	1.9951	2.0616	(231)
Lighting	14.0075	11.2374	10.1180	7.4129	5.7259	4.6781	5.2234	6.7895	8.8189	11.5709	13.0693	14.3969	(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												1386.7531	(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												557.1963	(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)												24.2743	(230a)
Total electricity for the above, kWh/year												24.2743	(231)
Electricity for lighting (calculated in Appendix L)												113.0489	(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												2081.2725	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1386.7531	28.4300	394.2539 (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)	557.1963	28.4300	158.4109 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	24.2743	28.4300	6.9012 (249)
Energy for lighting	113.0489	28.4300	32.1398 (250)
Additional standing charges			0.0000 (251)
Total energy cost			591.7058 (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	1386.7531	0.1564	216.8767 (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)	557.1963	0.1411	78.6349 (264)
Space and water heating			295.5116 (265)
Pumps, fans and electric keep-hot	24.2743	0.1387	3.3671 (267)
Energy for lighting	113.0489	0.1443	16.3164 (268)
Total CO2, kg/year			315.1952 (272)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	1386.7531	1.5790	2189.6405 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	557.1963	1.5218	847.9659 (278)
Space and water heating			3037.6064 (279)
Pumps, fans and electric keep-hot	24.2743	1.5128	36.7221 (281)
Energy for lighting	113.0489	1.5338	173.3981 (282)
Total Primary energy kWh/year			3247.7267 (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: (none)	SAP change	Cost change	CO ₂ change
---------------------------------	------------	-------------	------------------------

Recommended measures (none)	Typical annual savings		Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m ²	

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	£592	£592	£0
Space heating	£401	£401	£0
Water heating	£158	£158	£0
Lighting	£32	£32	£0
Total cost of fuels	£592	£592	£0
Total cost of uses	£591	£591	£0
Delivered energy	42 kWh/m ²	42 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO ₂ emissions per m ²	6 kg/m ²	6 kg/m ²	0 kg/m ²
Primary energy	66 kWh/m ²	66 kWh/m ²	0 kWh/m ²

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

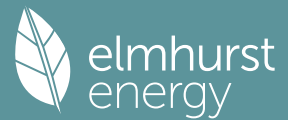
1. Overall dwelling characteristics

	Area (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	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.0415 (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

Full SAP Calculation Printout



Pressure Test Method												Blower Door
Measured/design AP50												2.5200 (17)
Infiltration rate												0.1260 (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) = 0.1071 (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)
	0.1366	0.1339	0.1312	0.1178	0.1151	0.1017	0.1017	0.0991	0.1071	0.1151	0.1205	0.1258 (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			7.6500	1.2357	9.4534		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	75.7500	13.6000	62.1500	0.1900	11.8085	110.0000	6836.5000 (29a)
PIJ	42.8100		42.8100	0.0800	3.4248	9.0000	385.2900 (30)
PIR	9.0300		9.0300	0.1300	1.1739	9.0000	81.2700 (30)
Total net area of external elements Aum(A, m2)			130.5800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.3774		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			46.0500			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 10245.9100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.9297 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.2100	0.0200	0.1842	
E3 Sill				9.2100	0.0300	0.2763	
E4 Jamb				24.9000	0.0260	0.6474	
E5 Ground floor (normal)				4.0200	0.0930	0.3739	
E7 Party floor between dwellings (in blocks of flats)				26.7900	0.0370	0.9912	
E16 Corner (normal)				17.7000	0.0510	0.9027	
E17 Corner (inverted - internal area greater than external area)				4.8000	-0.0910	-0.4368	
E18 Party wall between dwellings				5.7000	0.0650	0.3705	
P1 Party wall - Ground floor				4.0200	0.1080	0.4342	
E25 Staggered party wall between dwellings				4.8000	0.0440	0.2112	
E10 Eaves (insulation at ceiling level)				14.7100	0.0970	1.4269	
E11 Eaves (insulation at rafter level)				1.0100	0.0170	0.0172	
E12 Gable (insulation at ceiling level)				12.0800	0.0970	1.1718	
E13 Gable (insulation at rafter level)				6.9600	0.0610	0.4246	
P4 Party wall - Roof (insulation at ceiling level)				4.0500	0.1010	0.4091	
P5 Party wall - Roof (insulation at rafter level)				4.3600	0.0460	0.2006	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.6047 (36)
Point Thermal Bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 40.9821 (37)

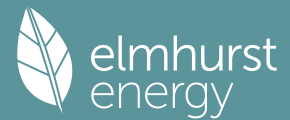
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418 (38)
Average = Sum(39)m / 12 =	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362 (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												1.6619 (42)
Hot water usage for mixer showers	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	75.1953	74.0653	72.4186	69.2679	66.9428	64.3499	62.8761	64.5103	66.3017	69.0857	72.3041	74.9072 (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	31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493 (42c)
Average daily hot water use (litres/day)												98.0996 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	106.8446	104.5636	101.7661	97.4645	93.9886	90.2448	88.7709	91.5560	94.4983	98.4332	102.8024	106.5565 (44)
Energy conte	169.2157	148.8972	156.4106	133.4241	126.5267	110.9665	107.3608	113.3655	116.5259	133.5730	146.4609	166.8417 (45)
Energy content (annual)												Total = Sum(45)m = 1629.5685
Distribution loss (46)m = 0.15 x (45)m	25.3823	22.3346	23.4616	20.0136	18.9790	16.6450	16.1041	17.0048	17.4789	20.0359	21.9691	25.0262 (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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WHRHS	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931 (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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931 (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	56.2642	49.5083	52.0065	44.3635	42.0701	36.8963	35.6975	37.6940	38.7449	44.4130	48.6983	55.4748 (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)	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.0032	14.2139	11.5595	8.7513	6.5417	5.5228	5.9676	7.7569	10.4113	13.2195	15.4291	16.4480 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	216.0311	218.2728	212.6237	200.5975	185.4166	171.1486	161.6168	159.3750	165.0241	177.0503	192.2313	206.4992 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331 (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)	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750 (71)
Water heating gains (Table 5)	75.6239	73.6731	69.9013	61.6160	56.5459	51.2449	47.9804	50.6640	53.8123	59.6949	67.6365	74.5630 (72)
Total internal gains	387.5289	386.0305	373.9552	350.8355	328.3748	307.7870	295.4354	297.6666	309.1183	329.8354	355.1675	377.3809 (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						2.9800	19.6403	0.7300	0.7000	0.7700	20.7261 (76)	
South						0.7200	46.7521	0.7300	0.7000	0.7700	11.9203 (78)	
West						2.8700	19.6403	0.7300	0.7000	0.7700	19.9610 (80)	
East						3.8000	19.6403	0.6800	0.7000	0.7700	24.6190 (76)	
Solar gains	81.2933	155.0470	248.4649	356.1610	433.9103	443.7275	422.5886	364.2121	286.5487	181.8975	100.5757	67.3951 (83)
Total gains	468.8222	541.0775	622.4201	706.9965	762.2851	751.5144	718.0240	661.8787	595.6671	511.7329	455.7431	444.7760 (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	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465
alpha	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298
util living area	0.9772	0.9590	0.9154	0.8196	0.6692	0.4994	0.3676	0.4144	0.6442	0.8789	0.9621	0.9813 (86)
MIT	19.6322	19.8720	20.2369	20.6198	20.8676	20.9687	20.9930	20.9886	20.9147	20.5541	20.0026	19.5638 (87)
Th 2	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911 (88)
util rest of house	0.9714	0.9489	0.8953	0.7805	0.6079	0.4195	0.2769	0.3178	0.5602	0.8416	0.9509	0.9765 (89)
MIT 2	18.3402	18.6391	19.0851	19.5285	19.7861	19.8736	19.8888	19.8870	19.8360	19.4714	18.8079	18.2542 (90)
Living area fraction	18.9562	19.2269	19.6342	20.0488	20.3017	20.3957	20.4153	20.4122	20.3503	19.9876	19.3775	18.8786 (91)
MIT	18.9562	19.2269	19.6342	20.0488	20.3017	20.3957	20.4153	20.4122	20.3503	19.9876	19.3775	18.8786 (92)
Temperature adjustment	18.9562	19.2269	19.6342	20.0488	20.3017	20.3957	20.4153	20.4122	20.3503	19.9876	19.3775	18.8786 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9650	0.9414	0.8899	0.7865	0.6315	0.4565	0.3201	0.3637	0.5965	0.8453	0.9444	0.9706 (94)
Useful gains	452.4058	509.3862	553.9183	556.0751	481.4135	343.0930	229.8344	240.7580	355.3090	432.5769	430.3916	431.7144 (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	888.5168	868.5529	796.2483	675.8836	521.4695	351.3598	231.2962	243.2368	378.9176	569.1106	744.3095	889.8744 (97)
Space heating kWh	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710 (98a)
Space heating requirement - total per year (kWh/year)												1530.6569
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	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1530.6569
Space heating per m2												31.2124 (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	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710	(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)	324.4666	241.3600	180.2935	86.2622	29.8017	0.0000	0.0000	0.0000	0.0000	101.5811	226.0209	340.8710	(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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	(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	56.1424	49.5808	52.4776	45.6501	43.9249	39.2228	38.4397	40.1582	40.8139	45.9416	49.3812	55.4629	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	2.0616	1.8621	2.0616	1.9951	2.0616	1.9951	2.0616	2.0616	1.9951	2.0616	1.9951	2.0616	(231)
Lighting	14.0075	11.2374	10.1180	7.4129	5.7259	4.6781	5.2234	6.7895	8.8189	11.5709	13.0693	14.3969	(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												1530.6569	(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												557.1963	(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)												24.2743	(230a)
Total electricity for the above, kWh/year												24.2743	(231)
Electricity for lighting (calculated in Appendix L)												113.0489	(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												2225.1763	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1530.6569	16.4900	252.4053	(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)	557.1963	16.4900	91.8817	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	24.2743	16.4900	4.0028	(249)
Energy for lighting	113.0489	16.4900	18.6418	(250)
Additional standing charges			0.0000	(251)
Total energy cost			366.9316	(255)

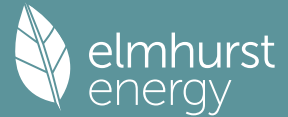
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.4047	(257)
SAP value		77.2303	
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	1530.6569	0.1561	238.8660	(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)	557.1963	0.1411	78.6349	(264)
Space and water heating			317.5009	(265)
Pumps, fans and electric keep-hot	24.2743	0.1387	3.3671	(267)

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Energy for lighting 113.0489 0.1443 16.3164 (268)
Total CO2, kg/year 337.1845 (272)
CO2 emissions per m2 6.8800 (273)
EI value 95.1954
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	46.0500 (1c)	x 2.4000 (2c)	= 110.5200 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	119.0415 (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)

Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.5200 (17)
Infiltration rate 0.1260 (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) = 0.1071 (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	0.1151	0.1125	0.1125	0.1044	0.1071	0.0910	0.0884	0.0884	0.0910	0.1017	0.1017	0.1044 (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)

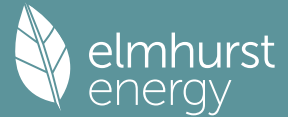
3. Heat losses and heat loss parameter

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			7.6500	1.2357	9.4534		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			2.9900	0.1100	0.3289	75.0000	224.2500 (28a)
Main	75.7500	13.6000	62.1500	0.1900	11.8085	110.0000	6836.5000 (29a)
PIJ	42.8100		42.8100	0.0800	3.4248	9.0000	385.2900 (30)
PIR	9.0300		9.0300	0.1300	1.1739	9.0000	81.2700 (30)
Total net area of external elements Aum(A, m2)			130.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.3774		(33)
Main dwelling							
Party Wall 1			21.1800	0.0000	0.0000	110.0000	2329.8000 (32)
Party Floor 1			46.0500			0.0000	0.0000 (32d)
Timber			43.2000			9.0000	388.8000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10245.9100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							208.9297 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2100	0.0200	0.1842
E3 Sill	9.2100	0.0300	0.2763
E4 Jamb	24.9000	0.0260	0.6474
E5 Ground floor (normal)	4.0200	0.0930	0.3739
E7 Party floor between dwellings (in blocks of flats)	26.7900	0.0370	0.9912
E16 Corner (normal)	17.7000	0.0510	0.9027
E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0910	-0.4368
E18 Party wall between dwellings	5.7000	0.0650	0.3705
P1 Party wall - Ground floor	4.0200	0.1080	0.4342
E25 Staggered party wall between dwellings	4.8000	0.0440	0.2112
E10 Eaves (insulation at ceiling level)	14.7100	0.0970	1.4269
E11 Eaves (insulation at rafter level)	1.0100	0.0170	0.0172
E12 Gable (insulation at ceiling level)	12.0800	0.0970	1.1718
E13 Gable (insulation at rafter level)	6.9600	0.0610	0.4246

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P4 Party wall - Roof (insulation at ceiling level)	4.0500	0.1010	0.4091	
P5 Party wall - Roof (insulation at rafter level)	4.3600	0.0460	0.2006	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.6047 (36)
Point Thermal bridges				0.0000
Total fabric heat loss			(33) + (36) + (36a) =	40.9821 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418	19.6418 (38)
Average = Sum(39)m / 12 =	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240	60.6240 (39)
												60.6240
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362	1.2362 (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												1.6619 (42)
Hot water usage for mixer showers												
75.1953	74.0653	72.4186	69.2679	66.9428	64.3499	62.8761	64.5103	66.3017	69.0857	72.3041	74.9072	(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												
31.6493	30.4984	29.3475	28.1966	27.0457	25.8949	25.8949	27.0457	28.1966	29.3475	30.4984	31.6493	(42c)
Average daily hot water use (litres/day)												98.0996 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	106.8446	104.5636	101.7661	97.4645	93.9886	90.2448	88.7709	91.5560	94.4983	98.4332	102.8024	106.5565 (44)
Energy conte	169.2157	148.8972	156.4106	133.4241	126.5267	110.9665	107.3608	113.3655	116.5259	133.5730	146.4609	166.8417 (45)
Energy content (annual)										Total = Sum(45)m =		1629.5685
Distribution loss (46)m = 0.15 x (45)m												
25.3823	22.3346	23.4616	20.0136	18.9790	16.6450	16.1041	17.0048	17.4789	20.0359	21.9691	25.0262	(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	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month												
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												
196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931	(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												
56.2642	49.5083	52.0065	44.3635	42.0701	36.8963	35.6975	37.6940	38.7449	44.4130	48.6983	55.4748	(65)

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

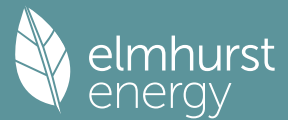
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125	99.7125 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
16.0032	14.2139	11.5595	8.7513	6.5417	5.5228	5.9676	7.7569	10.4113	13.2195	15.4291	16.4480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
216.0311	218.2728	212.6237	200.5975	185.4166	171.1486	161.6168	159.3750	165.0241	177.0503	192.2313	206.4992	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	46.6331	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	-66.4750	(71)
Water heating gains (Table 5)												
75.6239	73.6731	69.9013	61.6160	56.5459	51.2449	47.9804	50.6640	53.8123	59.6949	67.6365	74.5630	(72)
Total internal gains												
387.5289	386.0305	373.9552	350.8355	328.3748	307.7870	295.4354	297.6666	309.1183	329.8354	355.1675	377.3809	(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				2.9800	17.3606	0.7300	0.7000		0.7700		18.3204 (76)	
South				0.7200	41.2355	0.7300	0.7000		0.7700		10.5138 (78)	
West				2.8700	17.3606	0.7300	0.7000		0.7700		17.6441 (80)	
East				3.8000	17.3606	0.6800	0.7000		0.7700		21.7615 (76)	
Solar gains	71.8326	140.5462	235.3239	344.0714	408.8605	425.8116	397.8249	338.5049	278.8606	173.4616	91.3320	60.9068 (83)
Total gains	459.3615	526.5767	609.2791	694.9068	737.2353	733.5986	693.2603	636.1714	587.9789	503.2970	446.4995	438.2877 (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	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465	46.9465
alpha	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298	4.1298
util living area	0.9749	0.9559	0.9069	0.7956	0.6246	0.4373	0.3299	0.3768	0.6141	0.8655	0.9582	0.9790 (86)
MIT	19.7265	19.9532	20.3140	20.6888	20.9095	20.9838	20.9960	20.9931	20.9336	20.6089	20.0810	19.6653 (87)
Th 2	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911	19.8911 (88)
util rest of house	0.9682	0.9444	0.8839	0.7507	0.5552	0.3514	0.2349	0.2745	0.5243	0.8230	0.9452	0.9733 (89)
MIT 2	18.4600	18.7417	19.1794	19.6058	19.8259	19.8838	19.8901	19.8892	19.8516	19.5344	18.9065	18.3834 (90)
Living area fraction									fLA = Living area /	(4) =		0.4768 (91)
MIT	19.0638	19.3193	19.7203	20.1221	20.3425	20.4082	20.4173	20.4155	20.3674	20.0467	19.4665	18.9945 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0638	19.3193	19.7203	20.1221	20.3425	20.4082	20.4173	20.4155	20.3674	20.0467	19.4665	18.9945 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9617	0.9372	0.8799	0.7607	0.5844	0.3920	0.2803	0.3233	0.5644	0.8298	0.9391	0.9673 (94)
Useful gains	441.7707	493.5182	536.0817	528.6462	430.8232	287.5724	194.3022	205.6991	331.8420	417.6157	419.2968	423.9531 (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	846.5431	825.6553	752.9696	625.7683	457.2568	291.4914	195.0483	207.0583	349.6457	536.3211	707.2669	848.4046 (97)
Space heating kWh	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919 (98a)
Space heating requirement - total per year (kWh/year)												1386.7531
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	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1386.7531
Space heating per m2										(98c) / (4) =		28.2780 (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	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919 (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)	301.1506	223.1961	161.3646	69.9279	19.6666	0.0000	0.0000	0.0000	0.0000	88.3168	207.3385	315.7919 (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	196.1671	173.2404	183.3620	159.5061	153.4781	137.0485	134.3122	140.3169	142.6079	160.5244	172.5429	193.7931 (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	56.1424	49.5808	52.4776	45.6501	43.9249	39.2228	38.4397	40.1582	40.8139	45.9416	49.3812	55.4629 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	2.0616	1.8621	2.0616	1.9951	2.0616	1.9951	2.0616	2.0616	1.9951	2.0616	1.9951	2.0616 (231)	
Lighting	14.0075	11.2374	10.1180	7.4129	5.7259	4.6781	5.2234	6.7895	8.8189	11.5709	13.0693	14.3969 (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													1386.7531 (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													557.1963 (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)													24.2743 (230a)
Total electricity for the above, kWh/year													24.2743 (231)
Electricity for lighting (calculated in Appendix L)													113.0489 (232)

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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	2081.2725 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1386.7531	28.4300	394.2539 (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)	557.1963	28.4300	158.4109 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	24.2743	28.4300	6.9012 (249)
Energy for lighting	113.0489	28.4300	32.1398 (250)
Additional standing charges			0.0000 (251)
Total energy cost			591.7058 (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	1386.7531	0.1564	216.8767 (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)	557.1963	0.1411	78.6349 (264)
Space and water heating			295.5116 (265)
Pumps, fans and electric keep-hot	24.2743	0.1387	3.3671 (267)
Energy for lighting	113.0489	0.1443	16.3164 (268)
Total CO2, kg/year			315.1952 (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	1386.7531	1.5790	2189.6405 (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)	557.1963	1.5218	847.9659 (278)
Space and water heating			3037.6064 (279)
Pumps, fans and electric keep-hot	24.2743	1.5128	36.7221 (281)
Energy for lighting	113.0489	1.5338	173.3981 (282)
Total Primary energy kWh/year			3247.7267 (286)