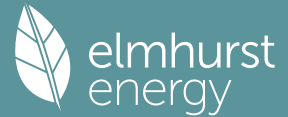


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Plot Reference	79596-01			Issued on Date	18/03/2026
Assessment Reference	001	Plot Type Ref	GF Flat		
Plot Address	20 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2
SAP Rating	82 B	DER	6.41	TER	15.20
Environmental	96 A	% DER < TER			57.83
CO ₂ Emissions (t/year)	0.22	DFEE	36.11	TFEE	41.13
Compliance Check	See BREL	% DFEE < TFEE			12.21
% DPER < TPER	17.51	DPER	66.15	TPER	80.19
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	39.4400 (1b)	2.3500 (2b)	92.6840 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.6840 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.3300	(17)
Infiltration rate	0.1665	(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) =	0.1415 (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	0.1804	0.1769	0.1734	0.1557	0.1521	0.1344	0.1344	0.1309	0.1415	0.1521	0.1592	0.1663 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			39.4400	0.1100	4.3384	75.0000	2958.0000 (28a)
Main	45.8200	10.2000	35.6200	0.1900	6.7678	110.0000	3918.2000 (29a)
Total net area of external elements Aum(A, m ²)			85.2600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.5460	(33)
Main dwelling							
Party Wall 1			27.1100	0.0000	0.0000	110.0000	2982.1001 (32)
Party Ceiling 1			39.4400			20.0000	788.8000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12150.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		308.0730 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	17.8300	0.0930	1.6582
E7 Party floor between dwellings (in blocks of flats)	17.8300	0.0370	0.6597
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.5500	0.1080	1.1394
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7901 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.3361 (37)

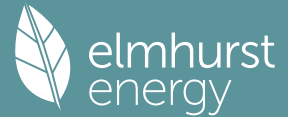
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	(38)
Heat transfer coeff	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	(39)
Average = Sum(39)m / 12 =												43.6290	
HLP	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	(40)
HLP (average)												1.1062	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.3915 (42)
Hot water usage for mixer showers	68.6227	67.5914	66.0886	63.2134	61.0915	58.7253	57.3803	58.8716	60.5065	63.0471	65.9841	68.3597	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807	(42c)
Average daily hot water use (litres/day)												89.5230	(43)
Daily hot water use	97.5034	95.4219	92.8689	88.9435	85.7714	82.3549	81.0099	83.5515	86.2365	89.8274	93.8146	97.2404	(44)
Energy conte	154.4215	135.8795	142.7361	121.7592	115.4648	101.2650	97.9745	103.4542	106.3383	121.8949	133.6561	152.2550	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	23.1632	20.3819	21.4104	18.2639	17.3197	15.1897	14.6962	15.5181	15.9507	18.2842	20.0484	22.8383	(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(64)
12Total per year (kWh/year)												1804.4300	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	51.3451	45.1799	47.4597	40.4849	38.3920	33.6706	32.5765	34.3985	35.3575	40.5301	44.4407	50.6248	(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	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.8964	67.4210	60.8964	62.9263	60.8964	62.9263	60.8964	60.8964	62.9263	60.8964	62.9263	60.8964	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	120.1276	121.3742	118.2329	111.5455	103.1039	95.1700	89.8696	88.6231	91.7644	98.4517	106.8933	114.8273	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	(71)
Water heating gains (Table 5)	69.0123	67.2320	63.7900	56.2291	51.6022	46.7647	43.7856	46.2346	49.1076	54.4759	61.7231	68.0441	(72)
Total internal gains	293.9093	299.9002	286.7923	274.5738	259.4755	248.7340	238.4247	239.6270	247.6712	257.6970	275.4158	287.6407	(73)

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

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East		3.8000			19.6403			0.6800			0.7000			0.7700			24.6190 (76)		
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Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488	(83)						
Total gains	351.5553	408.6882	459.0751	519.6280	557.2202	553.0716	528.3085	489.8477	445.6172	384.7043	346.5061	335.5895	(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	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	
alpha	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	
util living area	0.9941	0.9848	0.9576	0.8670	0.6969	0.5011	0.3629	0.4087	0.6547	0.9205	0.9861	0.9956	(86)
MIT	20.1236	20.3065	20.5538	20.8211	20.9597	20.9952	20.9994	20.9989	20.9785	20.7697	20.3879	20.0779	(87)
Th 2	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	(88)
util rest of house	0.9919	0.9792	0.9428	0.8281	0.6328	0.4244	0.2803	0.3201	0.5688	0.8861	0.9800	0.9939	(89)
MIT 2	18.9988	19.2292	19.5330	19.8361	19.9681	19.9937	19.9956	19.9955	19.9846	19.7909	19.3340	18.9408	(90)
Living area fraction	fLA = Living area / (4) =												
MIT	19.6279	19.8318	20.1040	20.3870	20.5227	20.5539	20.5571	20.5567	20.5405	20.3384	19.9235	19.5768	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.6279	19.8318	20.1040	20.3870	20.5227	20.5539	20.5571	20.5567	20.5405	20.3384	19.9235	19.5768	(93)

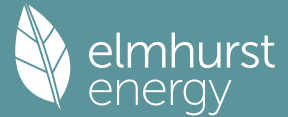
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9909	0.9781	0.9446	0.8443	0.6672	0.4673	0.3266	0.3697	0.6164	0.8992	0.9794	0.9929	(94)
Useful gains	348.3423	399.7428	433.6445	438.6959	371.7933	258.4421	172.5254	181.1011	274.6922	345.9203	339.3709	333.2164	(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	668.7402	651.4577	593.5271	501.1671	384.9261	259.7610	172.6441	181.3529	280.9938	424.8760	559.4758	670.8735	(97)
Space heating kWh	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(98a)
Space heating requirement - total per year (kWh/year)	1049.6666												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	0.0000												
Space heating kWh	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1049.6666												
Space heating per m2	(98c) / (4) =												26.6143 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	51.9083	45.8552	48.5640	42.3117	40.7590	36.4463	35.7534	37.3217	37.8982	42.5993	45.7165	51.2883	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.0701	0.9666	1.0701	1.0356	1.0701	1.0356	1.0701	1.0701	1.0356	1.0701	1.0356	1.0701	(221)
Lighting	11.6778	9.3683	8.4352	6.1800	4.7736	3.9001	4.3546	5.6603	7.3522	9.6464	10.8956	12.0023	(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	1049.6666 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												

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Efficiency of water heater	349.4100	
Water heating fuel used	516.4220 (219)	
Space cooling fuel	0.0000 (221)	
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)		
mechanical ventilation fans (SFP = 0.1114)	12.5997 (230a)	
Total electricity for the above, kWh/year	12.5997 (231)	
Electricity for lighting (calculated in Appendix L)	94.2464 (232)	
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000 (233)	
Wind generation	0.0000 (234)	
Hydro-electric generation (Appendix N)	0.0000 (235a)	
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)	
Appendix Q - special features		
Energy saved or generated	-0.0000 (236)	
Energy used	0.0000 (237)	
Total delivered energy for all uses	1672.9347 (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	1049.6666	0.1569	164.7084	(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)	516.4220	0.1411	72.8614	(264)
Space and water heating			237.5699	(265)
Pumps, fans and electric keep-hot	12.5997	0.1387	1.7477	(267)
Energy for lighting	94.2464	0.1443	13.6027	(268)
Total CO2, kg/year			252.9203	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1049.6666	1.5809	1659.4097	(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)	516.4220	1.5217	785.8420	(278)
Space and water heating			2445.2517	(279)
Pumps, fans and electric keep-hot	12.5997	1.5128	19.0609	(281)
Energy for lighting	94.2464	1.5338	144.5582	(282)
Total Primary energy kWh/year			2608.8708	(286)
Dwelling Primary energy Rate (DPER)			66.1500	(287)

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

1. Overall dwelling characteristics

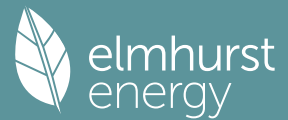
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	39.4400 (1b)	x 2.3500 (2b)	= 92.6840 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	39.4400			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	92.6840 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.2158 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4658	(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) =	0.3959 (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	0.5048	0.4949	0.4850	0.4355	0.4256	0.3761	0.3761	0.3662	0.3959	0.4256	0.4454	0.4652 (22b)

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Effective ac 0.6274 0.6225 0.6176 0.5948 0.5906 0.5707 0.5707 0.5671 0.5784 0.5906 0.5992 0.6082 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type			7.7100	1.1450	8.8282		(27)
GF			39.4400	0.1300	5.1272		(28a)
Main	45.8200	9.8600	35.9600	0.1800	6.4728		(29a)
Total net area of external elements Aum(A, m2)			85.2600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.5782	(33)
Main dwelling							
Party Wall 1			27.1100	0.0000	0.0000		(32)

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

308.0730 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0500	0.3245
E3 Sill	6.4900	0.0500	0.3245
E4 Jamb	20.1000	0.0500	1.0050
E5 Ground floor (normal)	17.8300	0.1600	2.8528
E7 Party floor between dwellings (in blocks of flats)	17.8300	0.0700	1.2481
E16 Corner (normal)	7.7100	0.0900	0.6939
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0900	-0.4626
E18 Party wall between dwellings	5.1400	0.0600	0.3084
P1 Party wall - Ground floor	10.5500	0.0800	0.8440
E25 Staggered party wall between dwellings	5.1400	0.0600	0.3084
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4470 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.0252 (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	19.1898	19.0385	18.8901	18.1935	18.0631	17.4563	17.4563	17.3439	17.6900	18.0631	18.3268	18.6025 (38)
Heat transfer coeff	49.2150	49.0637	48.9154	48.2187	48.0883	47.4816	47.4816	47.3692	47.7153	48.0883	48.3520	48.6277 (39)
Average = Sum(39)m / 12 =												48.2181
HLP	1.2478	1.2440	1.2402	1.2226	1.2193	1.2039	1.2039	1.2010	1.2098	1.2193	1.2260	1.2330 (40)
HLP (average)												1.2226
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

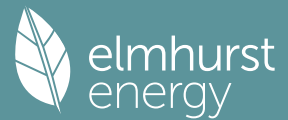
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3915 (42)
Hot water usage for mixer showers	60.9979	60.0812	58.7455	56.1897	54.3036	52.2002	51.0047	52.3303	53.7835	56.0419	58.6526	60.7642 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807 (42c)
Average daily hot water use (litres/day)												82.4932 (43)
Daily hot water use	89.8786	87.9117	85.5257	81.9198	78.9834	75.8299	74.6343	77.0102	79.5136	82.8222	86.4831	89.6449 (44)
Energy conte	142.3458	125.1851	131.4499	112.1440	106.3269	93.2417	90.2637	95.3547	98.0482	112.3889	123.2110	140.3623 (45)
Energy content (annual)										Total = Sum(45)m =		1370.3222
Distribution loss (46)m = 0.15 x (45)m	21.3519	18.7778	19.7175	16.8216	15.9490	13.9863	13.5396	14.3032	14.7072	16.8583	18.4816	21.0543 (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	188.9407	167.2708	178.0448	157.2359	152.9218	138.3335	136.8586	141.9496	143.1401	158.9838	168.3028	186.9572 (62)
WWHRS	-27.8857	-24.6623	-25.8250	-21.3841	-19.9292	-17.0536	-15.9850	-16.9985	-17.6443	-20.8007	-23.5646	-27.3693 (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	161.0549	142.6085	152.2198	135.8518	132.9926	121.2799	120.8736	124.9512	125.4958	138.1831	144.7382	159.5879 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1659.8372 (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	84.6059	75.2926	80.9830	73.3614	72.6296	67.0763	67.2886	68.9814	68.6745	74.6452	77.0411	83.9464 (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	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.1728	67.7270	61.1728	63.2119	61.1728	63.2119	61.1728	61.1728	63.2119	61.1728	63.2119	61.1728 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	120.1276	121.3742	118.2329	111.5455	103.1039	95.1700	89.8696	88.6231	91.7644	98.4517	106.8933	114.8273 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)

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Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613 (71)
Water heating gains (Table 5)	113.7176	112.0426	108.8481	101.8908	97.6204	93.1616	90.4417	92.7169	95.3813	100.3296	107.0016	112.8311 (72)
Total internal gains	341.8910	348.0168	335.1268	323.5212	308.7701	295.4164	285.3571	286.3858	294.2305	306.8271	323.9798	335.7042 (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					1.0300	10.6334	0.6300	0.7000			0.7700	3.3472 (74)
East					4.3800	19.6403	0.6300	0.7000			0.7700	26.2902 (76)
South					0.6900	46.7521	0.6300	0.7000			0.7700	9.8587 (78)
West					1.6100	19.6403	0.6300	0.7000			0.7700	9.6637 (80)
Solar gains	49.1598	92.8762	147.2659	209.6346	254.7723	260.4215	248.0515	214.0847	169.2677	108.4860	60.6455	40.8760 (83)
Total gains	391.0508	440.8930	482.3927	533.1558	563.5424	555.8379	533.4086	500.4705	463.4982	415.3131	384.6252	376.5802 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	68.5789	68.7904	68.9990	69.9959	70.1856	71.0826	71.0826	71.2512	70.7344	70.1856	69.8029	69.4072
alpha	5.5719	5.5860	5.5999	5.6664	5.6790	5.7388	5.7388	5.7501	5.7156	5.6790	5.6535	5.6271
util living area	0.9916	0.9826	0.9599	0.8855	0.7376	0.5388	0.3906	0.4333	0.6779	0.9170	0.9813	0.9931 (86)
MIT	20.0179	20.1926	20.4424	20.7472	20.9283	20.9900	20.9987	20.9976	20.9658	20.7290	20.3312	19.9956 (87)
Th 2	19.8819	19.8850	19.8879	19.9020	19.9046	19.9169	19.9169	19.9192	19.9122	19.9046	19.8993	19.8937 (88)
util rest of house	0.9884	0.9762	0.9452	0.8479	0.6696	0.4515	0.2951	0.3327	0.5852	0.8800	0.9731	0.9904 (89)
MIT 2	18.7778	18.9996	19.3098	19.6733	19.8544	19.9125	19.9166	19.9186	19.8943	19.6657	19.1870	18.7585 (90)
Living area fraction	19.4714	19.6669	19.9433	20.2740	20.4550	20.5152	20.5218	20.5221	20.4937	20.2604	19.8270	19.4505 (92)
MIT	19.4714	19.6669	19.9433	20.2740	20.4550	20.5152	20.5218	20.5221	20.4937	20.2604	19.8270	19.4505 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4714	19.6669	19.9433	20.2740	20.4550	20.5152	20.5218	20.5221	20.4937	20.2604	19.8270	19.4505 (93)

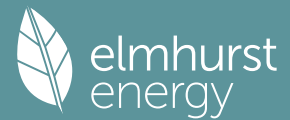
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9868	0.9746	0.9460	0.8617	0.7050	0.5003	0.3486	0.3891	0.6363	0.8935	0.9725	0.9890 (94)
Useful gains	385.9078	429.7027	456.3504	459.4395	397.3033	278.0709	185.9254	194.7297	294.9129	371.0919	374.0420	372.4423 (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	746.6611	724.5171	657.5822	548.4375	421.0159	280.8630	186.2145	195.2621	305.0750	464.5532	615.3748	741.5947 (97)
Space heating kWh	268.4005	198.1153	149.7165	64.0786	17.6421	0.0000	0.0000	0.0000	0.0000	69.5352	173.7596	274.6494 (98a)
Space heating requirement - total per year (kWh/year)												1215.8972
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	268.4005	198.1153	149.7165	64.0786	17.6421	0.0000	0.0000	0.0000	0.0000	69.5352	173.7596	274.6494 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1215.8972
Space heating per m ²										(98c) / (4) =		30.8290 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	268.4005	198.1153	149.7165	64.0786	17.6421	0.0000	0.0000	0.0000	0.0000	69.5352	173.7596	274.6494 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	290.7914	214.6428	162.2064	69.4243	19.1139	0.0000	0.0000	0.0000	0.0000	75.3361	188.2553	297.5616 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	161.0549	142.6085	152.2198	135.8518	132.9926	121.2799	120.8736	124.9512	125.4958	138.1831	144.7382	159.5879 (64)
Efficiency of water heater (217)m	85.1966	84.7972	84.0226	82.4792	80.7586	79.8000	79.8000	79.8000	79.8000	82.6025	84.4707	79.8000 (216)
Fuel for water heating, kWh/month	189.0393	168.1760	181.1653	164.7103	164.6791	151.9799	151.4707	156.5804	157.2629	167.2868	171.3473	187.1651 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	12.7105	10.1968	9.1811	6.7265	5.1957	4.2450	4.7397	6.1609	8.0023	10.4995	11.8592	13.0638 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-19.0264	-27.1280	-39.4602	-44.9629	-49.0575	-46.0722	-45.5724	-42.7745	-37.8725	-31.3554	-21.0510	-16.4196 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-9.8476	-20.8122	-41.5178	-62.5512	-82.8563	-83.2384	-82.1912	-69.4674	-50.8001	-29.7505	-13.1505	-7.7745 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1317.3318 (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												2010.8629 (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)												102.5810 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-974.7104 (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												2542.0653 (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	1317.3318	0.2100	276.6397 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2010.8629	0.2100	422.2812 (264)
Space and water heating			698.9209 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	102.5810	0.1443	14.8056 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-420.7526	0.1343	-56.5023
PV Unit electricity exported	-553.9577	0.1258	-69.7018
Total			-126.2041 (269)
Total CO2, kg/year			599.4517 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.2000 (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	1317.3318	1.1300	1488.5849 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2010.8629	1.1300	2272.2751 (278)
Space and water heating			3760.8600 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	102.5810	1.5338	157.3421 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-420.7526	1.4963	-629.5683
PV Unit electricity exported	-553.9577	0.4619	-255.8528
Total			-885.4211 (283)
Total Primary energy kWh/year			3162.8819 (286)
Target Primary Energy Rate (TPER)			80.1900 (287)

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Plot Reference	79596-01			Issued on Date	18/03/2026
Assessment Reference	001	Plot Type Ref	GF Flat		
Plot Address	20 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2
SAP Rating	82 B	DER	6.41	TER	15.20
Environmental	96 A	% DER < TER			57.83
CO ₂ Emissions (t/year)	0.22	DFEE	36.11	TFEE	41.13
Compliance Check	See BREL	% DFEE < TFEE			12.21
% DPER < TPER	17.51	DPER	66.15	TPER	80.19
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	39.4400 (1b)	2.3500 (2b)	92.6840 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400		92.6840 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.6840 (5)

2. Ventilation rate

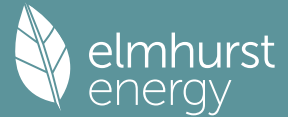
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.2158 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.3300 (17)
Infiltration rate	0.3823 (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) = 0.3249 (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	0.4143	0.4062	0.3981	0.3574	0.3493	0.3087	0.3087	0.3006	0.3249	0.3493	0.3656	0.3818 (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	0.5858	0.5825	0.5792	0.5639	0.5610	0.5476	0.5476	0.5452	0.5528	0.5610	0.5668	0.5729 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			39.4400	0.1100	4.3384	75.0000	2958.0000 (28a)
Main	45.8200	10.2000	35.6200	0.1900	6.7678	110.0000	3918.2000 (29a)
Total net area of external elements Aum(A, m ²)			85.2600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 23.5460		(33)
Main dwelling							
Party Wall 1			27.1100	0.0000	0.0000	110.0000	2982.1001 (32)
Party Ceiling 1			39.4400			20.0000	788.8000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12150.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							308.0730 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.4900	0.0200	0.1298	

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E3 Sill						6.4900		0.0300		0.1947		
E4 Jamb						20.1000		0.0260		0.5226		
E5 Ground floor (normal)						17.8300		0.0930		1.6582		
E7 Party floor between dwellings (in blocks of flats)						17.8300		0.0370		0.6597		
E16 Corner (normal)						7.7100		0.0510		0.3932		
E17 Corner (inverted - internal area greater than external area)						5.1400		-0.0910		-0.4677		
E18 Party wall between dwellings						5.1400		0.0650		0.3341		
P1 Party wall - Ground floor						10.5500		0.1080		1.1394		
E25 Staggered party wall between dwellings						5.1400		0.0440		0.2262		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											4.7901	(36)
Point Thermal Bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	28.3361 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	17.9178	17.8159	17.7160	17.2467	17.1589	16.7502	16.7502	16.6745	16.9076	17.1589	17.3365	17.5222 (38)
Average = Sum(39)m / 12 =	46.2539	46.1520	46.0521	45.5828	45.4950	45.0863	45.0863	45.0106	45.2437	45.4950	45.6726	45.8583 (39)
												45.5824
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1728	1.1702	1.1676	1.1558	1.1535	1.1432	1.1432	1.1412	1.1472	1.1535	1.1580	1.1627 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.1557
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												1.3915 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												20.5716 (42b)
Hot water usage for other uses												28.8807 (42c)
Average daily hot water use (litres/day)												45.3283 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	49.4523	48.0966	46.6162	44.7727	43.1285	41.4196	41.0639	42.5413	44.0567	45.8117	47.6715	49.3828 (44)
Energy conte	78.3204	68.4889	71.6473	61.2916	58.0592	50.9303	49.6632	52.6750	54.3263	62.1660	67.9167	77.3215 (45)
Energy content (annual)												Total = Sum(45)m = 752.8064
Distribution loss (46)m = 0.15 x (45)m												0.0000 (46)
Water storage loss (or HIU loss):												0.0000 (46)
Total storage loss												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												66.5723 (62)
WWHRS												0.0000 (63a)
PV diverter												0.0000 (63b)
Solar input												0.0000 (63c)
FGHRS												0.0000 (63d)
Output from w/h												66.5723 (64)
	66.5723	58.2156	60.9002	52.0978	49.3503	43.2907	42.2137	44.7738	46.1773	52.8411	57.7292	65.7233 (64)
												639.8854 (64)
												640 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 639.8854 (64)
Electric shower(s)												38.0803 (64a)
	38.0803	33.9298	37.0501	35.3565	36.0199	34.3595	35.5048	36.0199	35.3565	37.0501	36.3534	38.0803 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 433.1610 (64a)
Heat gains from water heating, kWh/month												26.1632 (65)
	26.1632	23.0364	24.4876	21.8636	21.3426	19.4126	19.4296	20.1984	20.3834	22.4728	23.5207	25.9509 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	60.8964	67.4210	60.8964	62.9263	60.8964	62.9263	60.8964	60.8964	62.9263	60.8964	62.9263	60.8964 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	120.1276	121.3742	118.2329	111.5455	103.1039	95.1700	89.8696	88.6231	91.7644	98.4517	106.8933	114.8273 (68)
Pumps, fans	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613 (71)
Total internal gains	35.1655	34.2803	32.9134	30.3661	28.6862	26.9619	26.1151	27.1484	28.3103	30.2054	32.6676	34.8802 (72)
	260.0625	266.9485	255.9157	248.7109	236.5595	228.9311	220.7541	220.5409	226.8740	233.4265	246.3602	254.4769 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	1.0800											4.0668 (74)
East	0.7700											5.3554 (76)
South	0.7200											11.9203 (78)
West	1.6800											11.6845 (80)
East	3.8000											24.6190 (76)
Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488 (83)
Total gains	317.7086	375.7364	428.1986	493.7650	534.3042	533.2688	510.6379	470.7615	424.8199	360.4337	317.4505	302.4257 (84)

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7. Mean internal temperature (heating season)											
Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	72.9691	73.1303	73.2890	74.0435	74.1864	74.8589	74.8589	74.9848	74.5984	74.1864	73.8979
alpha	5.8646	5.8754	5.8859	5.9362	5.9458	5.9906	5.9906	5.9990	5.9732	5.9458	5.9265
util living area	0.9968	0.9909	0.9725	0.8987	0.7406	0.5347	0.3877	0.4380	0.6998	0.9443	0.9917
MIT	19.9571	20.1513	20.4244	20.7526	20.9371	20.9922	20.9990	20.9981	20.9658	20.6953	20.2660
Th 2	19.9418	19.9439	19.9460	19.9556	19.9574	19.9657	19.9657	19.9673	19.9625	19.9574	19.9537
util rest of house	0.9955	0.9874	0.9618	0.8644	0.6750	0.4515	0.2970	0.3407	0.6097	0.9168	0.9878
MIT 2	19.0100	19.2038	19.4711	19.7786	19.9229	19.9631	19.9656	19.9669	19.9482	19.7387	19.3265
Living area fraction	fLA = Living area / (4) =										
MIT	19.5397	19.7338	20.0043	20.3234	20.4901	20.5387	20.5436	20.5437	20.5174	20.2738	19.8520
Temperature adjustment	0.0000										
adjusted MIT	19.5397	19.7338	20.0043	20.3234	20.4901	20.5387	20.5436	20.5437	20.5174	20.2738	19.8520
											19.5114 (93)

8. Space heating requirement											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Utilisation	0.9948	0.9865	0.9625	0.8775	0.7097	0.4980	0.3478	0.3953	0.6595	0.9264	0.9873
Useful gains	316.0720	370.6616	412.1411	433.3006	379.1718	265.5862	177.5943	186.0722	280.1674	333.9060	313.4309
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	704.8985	684.6093	621.9013	520.7107	399.9079	267.7537	177.8030	186.5088	290.3473	440.1080	582.4177
Space heating kWh	289.2869	210.9729	156.0616	62.9353	15.4277	0.0000	0.0000	0.0000	0.0000	79.0143	193.6705
Space heating requirement - total per year (kWh/year)											
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
Solar heating contribution - total per year (kWh/year)											
Space heating kWh	289.2869	210.9729	156.0616	62.9353	15.4277	0.0000	0.0000	0.0000	0.0000	79.0143	193.6705
Space heating requirement after solar contribution - total per year (kWh/year)											
Space heating per m2	(98c) / (4) =										
											33.1048 (99)

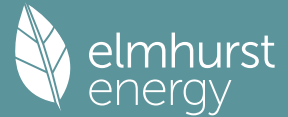
8c. Space cooling requirement											
Calculated for June, July and August. See Table 10b											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	423.8110	333.6385	342.0805	0.0000	0.0000	0.0000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9606	0.9839	0.9735	0.0000	0.0000	0.0000
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	407.1206	328.2523	333.0293	0.0000	0.0000	0.0000
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	602.6256	577.4028	531.9423	0.0000	0.0000	0.0000
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	140.7636	185.3680	147.9913	0.0000	0.0000	0.0000
Cooled fraction	fc = cooled area / (4) =										
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	35.1909	46.3420	36.9978	0.0000	0.0000	0.0000
Space cooling requirement											
Energy for space heating											
Energy for space cooling											
Total											
Fabric Energy Efficiency (DFEE)											

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	39.4400 (1b)	x 2.3500 (2b)	= 92.6840 (1b) - (3b)								
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400										
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 92.6840 (5)								

2. Ventilation rate											
m3 per hour											
Number of open chimneys	0 * 80 =										
Number of open flues	0 * 20 =										
Number of chimneys / flues attached to closed fire	0 * 10 =										
Number of flues attached to solid fuel boiler	0 * 20 =										
Number of flues attached to other heater	0 * 35 =										
Number of blocked chimneys	0 * 20 =										
Number of intermittent extract fans	2 * 10 =										
Number of passive vents	0 * 10 =										
Number of flueless gas fires	0 * 40 =										

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour	(8)
Pressure test	20.0000 / (5) =											0.2158	(8)
Pressure Test Method	Yes											Blower Door	(17)
Measured/design AP50												5.0000	(17)
Infiltration rate												0.4658	(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) =											0.3959	(21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(22)
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)
	0.5048	0.4949	0.4850	0.4355	0.4256	0.3761	0.3761	0.3662	0.3959	0.4256	0.4454	0.4652	(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	0.6274	0.6225	0.6176	0.5948	0.5906	0.5707	0.5707	0.5671	0.5784	0.5906	0.5992	0.6082	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			7.7100	1.1450	8.8282			(27)
GF			39.4400	0.1300	5.1272			(28a)
Main	45.8200	9.8600	35.9600	0.1800	6.4728			(29a)
Total net area of external elements Aum (A, m2)			85.2600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.5782			(33)
Main dwelling								
Party Wall 1			27.1100	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							308.0730	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				6.4900	0.0500		0.3245	
E3 Sill				6.4900	0.0500		0.3245	
E4 Jamb				20.1000	0.0500		1.0050	
E5 Ground floor (normal)				17.8300	0.1600		2.8528	
E7 Party floor between dwellings (in blocks of flats)				17.8300	0.0700		1.2481	
E16 Corner (normal)				7.7100	0.0900		0.6939	
E17 Corner (inverted - internal area greater than external area)				5.1400	-0.0900		-0.4626	
E18 Party wall between dwellings				5.1400	0.0600		0.3084	
P1 Party wall - Ground floor				10.5500	0.0800		0.8440	
E25 Staggered party wall between dwellings				5.1400	0.0600		0.3084	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.4470	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	30.0252	(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	(38)
Heat transfer coeff	19.1898	19.0385	18.8901	18.1935	18.0631	17.4563	17.4563	17.3439	17.6900	18.0631	18.3268	18.6025	(38)
Average = Sum(39)m / 12 =	49.2150	49.0637	48.9154	48.2187	48.0883	47.4816	47.4816	47.3692	47.7153	48.0883	48.3520	48.6277	(39)
												48.2181	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.2478	1.2440	1.2402	1.2226	1.2193	1.2039	1.2039	1.2010	1.2098	1.2193	1.2260	1.2330	(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												1.3915	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	20.5716	20.2661	19.8359	19.0426	18.4486	17.7900	17.4342	17.8614	18.3266	19.0314	19.8410	20.5021	(42b)
Hot water usage for other uses	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807	(42c)
Average daily hot water use (litres/day)												45.3283	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	49.4523	48.0966	46.6162	44.7727	43.1285	41.4196	41.0639	42.5413	44.0567	45.8117	47.6715	49.3828	(44)
Energy content (annual)	78.3204	68.4889	71.6473	61.2916	58.0592	50.9303	49.6632	52.6750	54.3263	62.1660	67.9167	77.3215	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	66.5723	58.2156	60.9002	52.0978	49.3503	43.2907	42.2137	44.7738	46.1773	52.8411	57.7292	65.7233	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	66.5723	58.2156	60.9002	52.0978	49.3503	43.2907	42.2137	44.7738	46.1773	52.8411	57.7292	65.7233	(64)
12Total per year (kWh/year)												640	(64)
Electric shower(s)	38.0803	33.9298	37.0501	35.3565	36.0199	34.3595	35.5048	36.0199	35.3565	37.0501	36.3534	38.0803	(64a)
Heat gains from water heating, kWh/month	26.1632	23.0364	24.4876	21.8636	21.3426	19.4126	19.4296	20.1984	20.3834	22.4728	23.5207	25.9509	(65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.1728	67.7270	61.1728	63.2119	61.1728	63.2119	61.1728	61.1728	63.2119	61.1728	63.2119	61.1728 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	120.1276	121.3742	118.2329	111.5455	103.1039	95.1700	89.8696	88.6231	91.7644	98.4517	106.8933	114.8273 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613 (71)
Water heating gains (Table 5)	35.1655	34.2803	32.9134	30.3661	28.6862	26.9619	26.1151	27.1484	28.3103	30.2054	32.6676	34.8802 (72)
Total internal gains	260.3389	267.2545	256.1921	248.9965	236.8359	229.2167	221.0305	220.8173	227.1596	233.7029	246.6458	254.7533 (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				1.0300	10.6334		0.6300		0.7000		0.7700		3.3472 (74)
East				4.3800	19.6403		0.6300		0.7000		0.7700		26.2902 (76)
South				0.6900	46.7521		0.6300		0.7000		0.7700		9.8587 (78)
West				1.6100	19.6403		0.6300		0.7000		0.7700		9.6637 (80)
Solar gains	49.1598	92.8762	147.2659	209.6346	254.7723	260.4215	248.0515	214.0847	169.2677	108.4860	60.6455	40.8760	(83)
Total gains	309.4988	360.1307	403.4580	458.6310	491.6082	489.6382	469.0820	434.9020	396.4273	342.1889	307.2912	295.6293	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	68.5789	68.7904	68.9990	69.9959	70.1856	71.0826	71.0826	71.2512	70.7344	70.1856	69.8029	69.4072
alpha	5.5719	5.5860	5.5999	5.6664	5.6790	5.7388	5.7388	5.7501	5.7156	5.6790	5.6535	5.6271
util living area	0.9973	0.9932	0.9812	0.9316	0.8073	0.6047	0.4430	0.4963	0.7622	0.9603	0.9935	0.9979 (86)
MIT	19.8390	20.0216	20.2902	20.6453	20.8856	20.9823	20.9974	20.9953	20.9384	20.6103	20.1674	19.8166 (87)
Th 2	19.8819	19.8850	19.8879	19.9020	19.9046	19.9169	19.9169	19.9122	19.9122	19.9046	19.8993	19.8937 (88)
util rest of house	0.9962	0.9904	0.9734	0.9044	0.7435	0.5099	0.3353	0.3824	0.6696	0.9384	0.9903	0.9970 (89)
MIT 2	18.8446	19.0281	19.2942	19.6392	19.8387	19.9106	19.9164	19.9182	19.8851	19.6176	19.1853	18.8317 (90)
Living area fraction	19.4008	19.5838	19.8513	20.2019	20.4242	20.5100	20.5211	20.5207	20.4742	20.1728	19.7346	19.3826 (92)
MIT	19.4008	19.5838	19.8513	20.2019	20.4242	20.5100	20.5211	20.5207	20.4742	20.1728	19.7346	19.3826 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4008	19.5838	19.8513	20.2019	20.4242	20.5100	20.5211	20.5207	20.4742	20.1728	19.7346	19.3826 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9956	0.9895	0.9731	0.9128	0.7755	0.5628	0.3957	0.4463	0.7200	0.9448	0.9897	0.9965 (94)
Useful gains	308.1236	356.3470	392.6126	418.6156	381.2608	275.5902	185.6189	194.1133	285.4181	323.2854	304.1199	294.5991 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	743.1845	720.4419	653.0853	544.9639	419.5345	280.6174	186.1788	195.1925	304.1480	460.3416	610.9102	738.2943 (97)
Space heating kWh	323.6852	244.6718	193.7917	90.9708	28.4756	0.0000	0.0000	0.0000	0.0000	101.9698	220.8891	330.1093 (98a)
Space heating requirement - total per year (kWh/year)												1534.5633
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	323.6852	244.6718	193.7917	90.9708	28.4756	0.0000	0.0000	0.0000	0.0000	101.9698	220.8891	330.1093 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1534.5633
Space heating per m2												38.9088 (99)

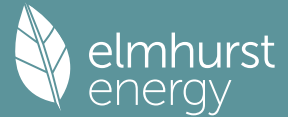
8c. Space cooling requirement

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	446.3267	351.3636	360.0059	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9254	0.9656	0.9484	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	413.0202	339.2816	341.4283	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	551.3191	528.5341	489.7395	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	99.5753	140.8038	110.3435	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	24.8938	35.2010	27.5859	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												87.6806 (107)
Energy for space heating												38.9088 (99)
Energy for space cooling												2.2231 (108)
Total												41.1319 (109)

Fabric Energy Efficiency (TFEE)

41.1 (109)

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Plot Reference	79596-01				Issued on Date	18/03/2026	
Assessment Reference	001		Plot Type Ref	GF Flat			
Plot Address	20 Dalton Avenue, MANCHESTER, M14 7NR				SAP Version	10.2	
SAP Rating	82 B	DER	6.41	TER	15.20		
Environmental	96 A	% DER < TER				57.83	
CO ₂ Emissions (t/year)	0.22	DFEE	36.11	TFEE	41.13		
Compliance Check	See BREL	% DFEE < TFEE				12.21	
% DPER < TPER	17.51	DPER	66.15	TPER	80.19		
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	39.4400 (1b)	2.3500 (2b)	92.6840 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.6840 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.3300	(17)
Infiltration rate		0.1665	(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) =	0.1415	(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	0.1804	0.1769	0.1734	0.1557	0.1521	0.1344	0.1344	0.1309	0.1415	0.1521	0.1592	0.1663 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			39.4400	0.1100	4.3384	75.0000	2958.0000 (28a)
Main	45.8200	10.2000	35.6200	0.1900	6.7678	110.0000	3918.2000 (29a)
Total net area of external elements Aum(A, m ²)			85.2600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.5460	(33)
Main dwelling							
Party Wall 1			27.1100	0.0000	0.0000	110.0000	2982.1001 (32)
Party Ceiling 1			39.4400			20.0000	788.8000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12150.4000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		308.0730	(35)
List of Thermal Bridges			

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	17.8300	0.0930	1.6582
E7 Party floor between dwellings (in blocks of flats)	17.8300	0.0370	0.6597
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.5500	0.1080	1.1394
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7901 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.3361 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	(38)
Heat transfer coeff	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	(39)
Average = Sum(39)m / 12 =													43.6290
HLP	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	(40)
HLP (average)													1.1062
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.3915 (42)
Hot water usage for mixer showers	68.6227	67.5914	66.0886	63.2134	61.0915	58.7253	57.3803	58.8716	60.5065	63.0471	65.9841	68.3597 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807 (42c)
Average daily hot water use (litres/day)												89.5230 (43)
Daily hot water use	97.5034	95.4219	92.8689	88.9435	85.7714	82.3549	81.0099	83.5515	86.2365	89.8274	93.8146	97.2404 (44)
Energy conte	154.4215	135.8795	142.7361	121.7592	115.4648	101.2650	97.9745	103.4542	106.3383	121.8949	133.6561	152.2550 (45)
Energy content (annual)												Total = Sum(45)m = 1487.0990
Distribution loss (46)m = 0.15 x (45)m	23.1632	20.3819	21.4104	18.2639	17.3197	15.1897	14.6962	15.5181	15.9507	18.2842	20.0484	22.8383 (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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064 (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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 1804.4300 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	51.3451	45.1799	47.4597	40.4849	38.3920	33.6706	32.5765	34.3985	35.3575	40.5301	44.4407	50.6248 (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	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.8964	67.4210	60.8964	62.9263	60.8964	62.9263	60.8964	60.8964	62.9263	60.8964	62.9263	60.8964 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	120.1276	121.3742	118.2329	111.5455	103.1039	95.1700	89.8696	88.6231	91.7644	98.4517	106.8933	114.8273 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613 (71)
Water heating gains (Table 5)	69.0123	67.2320	63.7900	56.2291	51.6022	46.7647	43.7856	46.2346	49.1076	54.4759	61.7231	68.0441 (72)
Total internal gains	293.9093	299.9002	286.7923	274.5738	259.4755	248.7340	238.4247	239.6270	247.6712	257.6970	275.4158	287.6407 (73)

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

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East			3.8000			19.6403			0.6800			0.7000			0.7700			24.6190 (76)		
Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488	(83)							
Total gains	351.5553	408.6882	459.0751	519.6280	557.2202	553.0716	528.3085	489.8477	445.6172	384.7043	346.5061	335.5895	(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	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	
alpha	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	
util living area	0.9941	0.9848	0.9576	0.8670	0.6969	0.5011	0.3629	0.4087	0.6547	0.9205	0.9861	0.9956	(86)
MIT	20.1236	20.3065	20.5538	20.8211	20.9597	20.9952	20.9994	20.9989	20.9785	20.7697	20.3879	20.0779	(87)
Th 2	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	(88)
util rest of house	0.9919	0.9792	0.9428	0.8281	0.6328	0.4244	0.2803	0.3201	0.5688	0.8861	0.9800	0.9939	(89)
MIT 2	18.9988	19.2292	19.5330	19.8361	19.9681	19.9937	19.9956	19.9955	19.9846	19.7909	19.3340	18.9408	(90)
Living area fraction	fLA = Living area / (4) =												
MIT	19.6279	19.8318	20.1040	20.3870	20.5227	20.5539	20.5571	20.5567	20.5405	20.3384	19.9235	19.5768	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.6279	19.8318	20.1040	20.3870	20.5227	20.5539	20.5571	20.5567	20.5405	20.3384	19.9235	19.5768	(93)

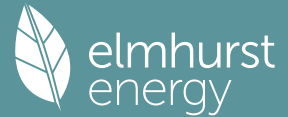
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9909	0.9781	0.9446	0.8443	0.6672	0.4673	0.3266	0.3697	0.6164	0.8992	0.9794	0.9929	(94)
Useful gains	348.3423	399.7428	433.6445	438.6959	371.7933	258.4421	172.5254	181.1011	274.6922	345.9203	339.3709	333.2164	(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	668.7402	651.4577	593.5271	501.1671	384.9261	259.7610	172.6441	181.3529	280.9938	424.8760	559.4758	670.8735	(97)
Space heating kWh	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(98a)
Space heating requirement - total per year (kWh/year)	1049.6666												
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	0.0000												
Space heating kWh	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1049.6666												
Space heating per m2	(98c) / (4) =												26.6143 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	238.3760	169.1524	118.9526	44.9792	9.7708	0.0000	0.0000	0.0000	0.0000	58.7430	158.4756	251.2170	(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	51.9083	45.8552	48.5640	42.3117	40.7590	36.4463	35.7534	37.3217	37.8982	42.5993	45.7165	51.2883	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.0701	0.9666	1.0701	1.0356	1.0701	1.0356	1.0701	1.0701	1.0356	1.0701	1.0356	1.0701	(223)
Lighting	11.6778	9.3683	8.4352	6.1800	4.7736	3.9001	4.3546	5.6603	7.3522	9.6464	10.8956	12.0023	(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	1049.6666 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												

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Efficiency of water heater	349.4100	
Water heating fuel used	516.4220 (219)	
Space cooling fuel	0.0000 (221)	
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)		
mechanical ventilation fans (SFP = 0.1114)	12.5997 (230a)	
Total electricity for the above, kWh/year	12.5997 (231)	
Electricity for lighting (calculated in Appendix L)	94.2464 (232)	
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000 (233)	
Wind generation	0.0000 (234)	
Hydro-electric generation (Appendix N)	0.0000 (235a)	
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)	
Appendix Q - special features		
Energy saved or generated	-0.0000 (236)	
Energy used	0.0000 (237)	
Total delivered energy for all uses	1672.9347 (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	1049.6666	0.1569	164.7084	(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)	516.4220	0.1411	72.8614	(264)
Space and water heating			237.5699	(265)
Pumps, fans and electric keep-hot	12.5997	0.1387	1.7477	(267)
Energy for lighting	94.2464	0.1443	13.6027	(268)
Total CO2, kg/year			252.9203	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1049.6666	1.5809	1659.4097	(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)	516.4220	1.5217	785.8420	(278)
Space and water heating			2445.2517	(279)
Pumps, fans and electric keep-hot	12.5997	1.5128	19.0609	(281)
Energy for lighting	94.2464	1.5338	144.5582	(282)
Total Primary energy kWh/year			2608.8708	(286)
Dwelling Primary energy Rate (DPER)			66.1500	(287)

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

CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

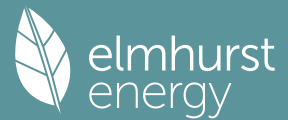
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	39.4400 (1b)	x 2.3500 (2b)	= 92.6840 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	39.4400			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	92.6840 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.2158 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4658	(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) =	0.3959 (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	0.5048	0.4949	0.4850	0.4355	0.4256	0.3761	0.3761	0.3662	0.3959	0.4256	0.4454	0.4652 (22b)

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Effective ac 0.6274 0.6225 0.6176 0.5948 0.5906 0.5707 0.5707 0.5671 0.5784 0.5906 0.5992 0.6082 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type			7.7100	1.1450	8.8282		(27)
GF			39.4400	0.1300	5.1272		(28a)
Main	45.8200	9.8600	35.9600	0.1800	6.4728		(29a)
Total net area of external elements Aum(A, m2)			85.2600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.5782	(33)
Main dwelling							
Party Wall 1			27.1100	0.0000	0.0000		(32)

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

308.0730 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0500	0.3245
E3 Sill	6.4900	0.0500	0.3245
E4 Jamb	20.1000	0.0500	1.0050
E5 Ground floor (normal)	17.8300	0.1600	2.8528
E7 Party floor between dwellings (in blocks of flats)	17.8300	0.0700	1.2481
E16 Corner (normal)	7.7100	0.0900	0.6939
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0900	-0.4626
E18 Party wall between dwellings	5.1400	0.0600	0.3084
P1 Party wall - Ground floor	10.5500	0.0800	0.8440
E25 Staggered party wall between dwellings	5.1400	0.0600	0.3084
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4470 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.0252 (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	19.1898	19.0385	18.8901	18.1935	18.0631	17.4563	17.4563	17.3439	17.6900	18.0631	18.3268	18.6025 (38)
Heat transfer coeff	49.2150	49.0637	48.9154	48.2187	48.0883	47.4816	47.4816	47.3692	47.7153	48.0883	48.3520	48.6277 (39)
Average = Sum(39)m / 12 =												48.2181
HLP	1.2478	1.2440	1.2402	1.2226	1.2193	1.2039	1.2039	1.2010	1.2098	1.2193	1.2260	1.2330 (40)
HLP (average)												1.2226
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

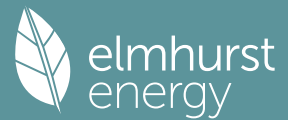
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3915 (42)
Hot water usage for mixer showers	60.9979	60.0812	58.7455	56.1897	54.3036	52.2002	51.0047	52.3303	53.7835	56.0419	58.6526	60.7642 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807 (42c)
Average daily hot water use (litres/day)												82.4932 (43)
Daily hot water use	89.8786	87.9117	85.5257	81.9198	78.9834	75.8299	74.6343	77.0102	79.5136	82.8222	86.4831	89.6449 (44)
Energy conte	142.3458	125.1851	131.4499	112.1440	106.3269	93.2417	90.2637	95.3547	98.0482	112.3889	123.2110	140.3623 (45)
Energy content (annual)										Total = Sum(45)m =		1370.3222
Distribution loss (46)m = 0.15 x (45)m	21.3519	18.7778	19.7175	16.8216	15.9490	13.9863	13.5396	14.3032	14.7072	16.8583	18.4816	21.0543 (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	188.9407	167.2708	178.0448	157.2359	152.9218	138.3335	136.8586	141.9496	143.1401	158.9838	168.3028	186.9572 (62)
WWHRS	-27.8857	-24.6623	-25.8250	-21.3841	-19.9292	-17.0536	-15.9850	-16.9985	-17.6443	-20.8007	-23.5646	-27.3693 (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	161.0549	142.6085	152.2198	135.8518	132.9926	121.2799	120.8736	124.9512	125.4958	138.1831	144.7382	159.5879 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1659.8372 (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	84.6059	75.2926	80.9830	73.3614	72.6296	67.0763	67.2886	68.9814	68.6745	74.6452	77.0411	83.9464 (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	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766	69.5766 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.1728	67.7270	61.1728	63.2119	61.1728	63.2119	61.1728	61.1728	63.2119	61.1728	63.2119	61.1728 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	120.1276	121.3742	118.2329	111.5455	103.1039	95.1700	89.8696	88.6231	91.7644	98.4517	106.8933	114.8273 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577	29.9577 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)

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Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613 (71)
Water heating gains (Table 5)	113.7176	112.0426	108.8481	101.8908	97.6204	93.1616	90.4417	92.7169	95.3813	100.3296	107.0016	112.8311 (72)
Total internal gains	341.8910	348.0168	335.1268	323.5212	308.7701	295.4164	285.3571	286.3858	294.2305	306.8271	323.9798	335.7042 (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					1.0300	10.6334	0.6300	0.7000			0.7700	3.3472 (74)	
East					4.3800	19.6403	0.6300	0.7000			0.7700	26.2902 (76)	
South					0.6900	46.7521	0.6300	0.7000			0.7700	9.8587 (78)	
West					1.6100	19.6403	0.6300	0.7000			0.7700	9.6637 (80)	

Solar gains	49.1598	92.8762	147.2659	209.6346	254.7723	260.4215	248.0515	214.0847	169.2677	108.4860	60.6455	40.8760 (83)	
Total gains	391.0508	440.8930	482.3927	533.1558	563.5424	555.8379	533.4086	500.4705	463.4982	415.3131	384.6252	376.5802 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	68.5789	68.7904	68.9990	69.9959	70.1856	71.0826	71.0826	71.2512	70.7344	70.1856	69.8029	69.4072
alpha	5.5719	5.5860	5.5999	5.6664	5.6790	5.7388	5.7388	5.7501	5.7156	5.6790	5.6535	5.6271
util living area	0.9916	0.9826	0.9599	0.8855	0.7376	0.5388	0.3906	0.4333	0.6779	0.9170	0.9813	0.9931 (86)
MIT	20.0179	20.1926	20.4424	20.7472	20.9283	20.9900	20.9987	20.9976	20.9658	20.7290	20.3312	19.9956 (87)
Th 2	19.8819	19.8850	19.8879	19.9020	19.9046	19.9169	19.9169	19.9192	19.9122	19.9046	19.8993	19.8937 (88)
util rest of house	0.9884	0.9762	0.9452	0.8479	0.6696	0.4515	0.2951	0.3327	0.5852	0.8800	0.9731	0.9904 (89)
MIT 2	18.7778	18.9996	19.3098	19.6733	19.8544	19.9125	19.9166	19.9186	19.8943	19.6657	19.1870	18.7585 (90)
Living area fraction	19.4714	19.6669	19.9433	20.2740	20.4550	20.5152	20.5218	20.5221	20.4937	20.2604	19.8270	19.4505 (92)
MIT	19.4714	19.6669	19.9433	20.2740	20.4550	20.5152	20.5218	20.5221	20.4937	20.2604	19.8270	19.4505 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4714	19.6669	19.9433	20.2740	20.4550	20.5152	20.5218	20.5221	20.4937	20.2604	19.8270	19.4505 (93)

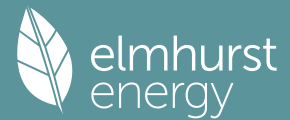
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9868	0.9746	0.9460	0.8617	0.7050	0.5003	0.3486	0.3891	0.6363	0.8935	0.9725	0.9890 (94)
Useful gains	385.9078	429.7027	456.3504	459.4395	397.3033	278.0709	185.9254	194.7297	294.9129	371.0919	374.0420	372.4423 (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	746.6611	724.5171	657.5822	548.4375	421.0159	280.8630	186.2145	195.2621	305.0750	464.5532	615.3748	741.5947 (97)
Space heating kWh	268.4005	198.1153	149.7165	64.0786	17.6421	0.0000	0.0000	0.0000	0.0000	69.5352	173.7596	274.6494 (98a)
Space heating requirement - total per year (kWh/year)												1215.8972
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	268.4005	198.1153	149.7165	64.0786	17.6421	0.0000	0.0000	0.0000	0.0000	69.5352	173.7596	274.6494 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1215.8972
Space heating per m ²										(98c) / (4) =		30.8290 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	268.4005	198.1153	149.7165	64.0786	17.6421	0.0000	0.0000	0.0000	0.0000	69.5352	173.7596	274.6494 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	290.7914	214.6428	162.2064	69.4243	19.1139	0.0000	0.0000	0.0000	0.0000	75.3361	188.2553	297.5616 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	161.0549	142.6085	152.2198	135.8518	132.9926	121.2799	120.8736	124.9512	125.4958	138.1831	144.7382	159.5879 (64)
Efficiency of water heater (217)m	85.1966	84.7972	84.0226	82.4792	80.7586	79.8000	79.8000	79.8000	79.8000	82.6025	84.4707	79.8000 (216)
Fuel for water heating, kWh/month	189.0393	168.1760	181.1653	164.7103	164.6791	151.9799	151.4707	156.5804	157.2629	167.2868	171.3473	187.1651 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	12.7105	10.1968	9.1811	6.7265	5.1957	4.2450	4.7397	6.1609	8.0023	10.4995	11.8592	13.0638 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.0264	-27.1280	-39.4602	-44.9629	-49.0575	-46.0722	-45.5724	-42.7745	-37.8725	-31.3554	-21.0510	-16.4196 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-9.8476	-20.8122	-41.5178	-62.5512	-82.8563	-83.2384	-82.1912	-69.4674	-50.8001	-29.7505	-13.1505	-7.7745 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1317.3318 (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												2010.8629 (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)												102.5810 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-974.7104 (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												2542.0653 (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	1317.3318	0.2100	276.6397 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2010.8629	0.2100	422.2812 (264)
Space and water heating			698.9209 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	102.5810	0.1443	14.8056 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-420.7526	0.1343	-56.5023
PV Unit electricity exported	-553.9577	0.1258	-69.7018
Total			-126.2041 (269)
Total CO2, kg/year			599.4517 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.2000 (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	1317.3318	1.1300	1488.5849 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2010.8629	1.1300	2272.2751 (278)
Space and water heating			3760.8600 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	102.5810	1.5338	157.3421 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-420.7526	1.4963	-629.5683
PV Unit electricity exported	-553.9577	0.4619	-255.8528
Total			-885.4211 (283)
Total Primary energy kWh/year			3162.8819 (286)
Target Primary Energy Rate (TPER)			80.1900 (287)

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Plot Reference	79596-01			Issued on Date	18/03/2026	
Assessment Reference	001	Plot Type Ref	GF Flat			
Plot Address	20 Dalton Avenue, MANCHESTER, M14 7NR			SAP Version	10.2	
SAP Rating	82 B	DER	6.41	TER	15.20	
Environmental	96 A	% DER < TER				57.83
CO ₂ Emissions (t/year)	0.22	DFEE	36.11	TFEE	41.13	
Compliance Check	See BREL	% DFEE < TFEE				12.21
% DPER < TPER	17.51	DPER	66.15	TPER	80.19	
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	39.4400 (1b)	2.3500 (2b)	92.6840 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.6840 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.3300	(17)
Infiltration rate	0.1665	(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) =	0.1415 (21)

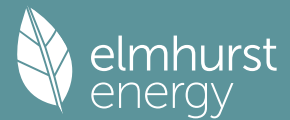
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1804	0.1769	0.1734	0.1557	0.1521	0.1344	0.1344	0.1309	0.1415	0.1521	0.1592	0.1663 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.1500	1.0000	2.1500		(26)
Window			4.2500	1.2357	5.2519		(27)
Glazed Door			3.8000	1.3258	5.0379		(27)
GF			39.4400	0.1100	4.3384	75.0000	2958.0000 (28a)
Main	45.8200	10.2000	35.6200	0.1900	6.7678	110.0000	3918.2000 (29a)
Total net area of external elements Aum(A, m ²)			85.2600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.5460	(33)
Main dwelling							
Party Wall 1			27.1100	0.0000	0.0000	110.0000	2982.1001 (32)
Party Ceiling 1			39.4400			20.0000	788.8000 (32b)
Timber			25.7000			9.0000	231.3000 (32c)
Solid			16.9600			75.0000	1271.9999 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12150.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		308.0730 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	17.8300	0.0930	1.6582
E7 Party floor between dwellings (in blocks of flats)	17.8300	0.0370	0.6597
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.5500	0.1080	1.1394
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.7901 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	28.3361 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929 (38)
Average = Sum(39)m / 12 =	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290 (39)
HLP	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062 (40)
HLP (average)												1.1062
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.3915 (42)											
Hot water usage for mixer showers	68.6227	67.5914	66.0886	63.2134	61.0915	58.7253	57.3803	58.8716	60.5065	63.0471	65.9841	68.3597 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807 (42c)
Average daily hot water use (litres/day)	23.1632	20.3819	21.4104	18.2639	17.3197	15.1897	14.6962	15.5181	15.9507	18.2842	20.0484	22.8383 (43)
Daily hot water use	97.5034	95.4219	92.8689	88.9435	85.7714	82.3549	81.0099	83.5515	86.2365	89.8274	93.8146	97.2404 (44)
Energy content (annual)	154.4215	135.8795	142.7361	121.7592	115.4648	101.2650	97.9745	103.4542	106.3383	121.8949	133.6561	152.2550 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1632	20.3819	21.4104	18.2639	17.3197	15.1897	14.6962	15.5181	15.9507	18.2842	20.0484	22.8383 (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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064 (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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064 (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	51.3451	45.1799	47.4597	40.4849	38.3920	33.6706	32.5765	34.3985	35.3575	40.5301	44.4407	50.6248 (65)

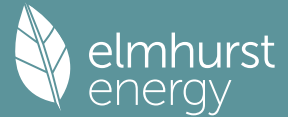
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.3415	11.8498	9.6369	7.2958	5.4537	4.6042	4.9750	6.4667	8.6796	11.0208	12.8629	13.7123 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2950	181.1555	176.4670	166.4859	153.8864	142.0448	134.1338	132.2733	136.9617	146.9429	159.5423	171.3840 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613 (71)
Water heating gains (Table 5)	69.0123	67.2320	63.7900	56.2291	51.6022	46.7647	43.7856	46.2346	49.1076	54.4759	61.7231	68.0441 (72)
Total internal gains	334.2202	332.8087	322.4653	302.5821	283.5137	265.9851	255.4658	257.5460	267.3203	285.0110	306.6997	325.7118 (73)

6. Solar gains

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

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Solar gains	57.6460	108.7880	172.2829	245.0541	297.7447	304.3377	289.8838	250.2206	197.9459	127.0073	71.0903	47.9488 (83)
Total gains	391.8662	441.5967	494.7482	547.6362	581.2584	570.3227	545.3496	507.7666	465.2663	412.0182	377.7901	373.6606 (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	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594
alpha	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573
util living area	0.9897	0.9779	0.9421	0.8440	0.6731	0.4865	0.3516	0.3945	0.6307	0.8982	0.9788	0.9922 (86)
MIT	20.2122	20.3744	20.6150	20.8481	20.9665	20.9959	20.9995	20.9991	20.9824	20.8065	20.4529	20.1626 (87)
Th 2	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958 (88)
util rest of house	0.9860	0.9702	0.9232	0.8021	0.6095	0.4117	0.2716	0.3088	0.5463	0.8581	0.9700	0.9893 (89)
MIT 2	19.1105	19.3129	19.6040	19.8628	19.9731	19.9940	19.9957	19.9955	19.9868	19.8285	19.4138	19.0480 (90)
Living area fraction									fLA =	Living area / (4) =		0.5593 (91)
MIT	19.7267	19.9066	20.1695	20.4139	20.5287	20.5544	20.5572	20.5568	20.5436	20.3756	19.9950	19.6714 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7267	19.9066	20.1695	20.4139	20.5287	20.5544	20.5572	20.5568	20.5436	20.3756	19.9950	19.6714 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9847	0.9694	0.9269	0.8206	0.6439	0.4535	0.3164	0.3568	0.5932	0.8747	0.9700	0.9881 (94)
Useful gains	385.8847	428.0686	458.5600	449.3658	374.3011	258.6640	172.5476	181.1528	275.9877	360.3880	366.4461	369.2223 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	673.0516	654.7245	596.3852	502.3400	385.1877	259.7845	172.6467	181.3588	281.1296	426.4974	562.5951	675.0018 (97)
Space heating kWh	213.6522	152.3127	102.5419	38.1414	8.0997	0.0000	0.0000	0.0000	0.0000	49.1854	141.2273	227.5000 (98a)
Space heating requirement - total per year (kWh/year)												932.6606
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	213.6522	152.3127	102.5419	38.1414	8.0997	0.0000	0.0000	0.0000	0.0000	49.1854	141.2273	227.5000 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												932.6606
Space heating per m2										(98c) / (4) =		23.6476 (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	213.6522	152.3127	102.5419	38.1414	8.0997	0.0000	0.0000	0.0000	0.0000	49.1854	141.2273	227.5000 (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)	213.6522	152.3127	102.5419	38.1414	8.0997	0.0000	0.0000	0.0000	0.0000	49.1854	141.2273	227.5000 (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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	51.9083	45.8552	48.5640	42.3117	40.7590	36.4463	35.7534	37.3217	37.8982	42.5993	45.7165	51.2883 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	1.0701	0.9666	1.0701	1.0356	1.0701	1.0356	1.0701	1.0701	1.0356	1.0701	1.0356	1.0701 (231)
Lighting	11.6778	9.3683	8.4352	6.1800	4.7736	3.9001	4.3546	5.6603	7.3522	9.6464	10.8956	12.0023 (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												932.6606 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												349.4100

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Water heating fuel used	516.4220 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114) mechanical ventilation fans (SFP = 0.1114)	12.5997 (230a)
Total electricity for the above, kWh/year	12.5997 (231)
Electricity for lighting (calculated in Appendix L)	94.2464 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1555.9287 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	932.6606	16.4900	153.7957 (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)	516.4220	16.4900	85.1580 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	12.5997	16.4900	2.0777 (249)
Energy for lighting	94.2464	16.4900	15.5412 (250)
Additional standing charges			0.0000 (251)
Total energy cost			256.5726 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 1.0939 (257)
SAP value	82.2684
SAP rating (Section 12)	82 (258)
SAP band	B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	932.6606	0.1571	146.5047 (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)	516.4220	0.1411	72.8614 (264)
Space and water heating			219.3661 (265)
Pumps, fans and electric keep-hot	12.5997	0.1387	1.7477 (267)
Energy for lighting	94.2464	0.1443	13.6027 (268)
Total CO2, kg/year			234.7165 (272)
CO2 emissions per m2			5.9500 (273)
EI value			96.2752
EI rating			96 (274)
EI band			A

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

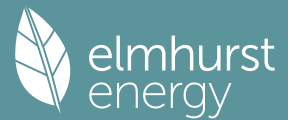
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	39.4400 (1b)	x 2.3500 (2b)	= 92.6840 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	92.6840 (5)

2. Ventilation rate

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

Full SAP Calculation Printout



Pressure Test Method												Blower Door
Measured/design AP50												3.3300 (17)
Infiltration rate												0.1665 (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) = 0.1415 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Adj infiltr rate	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
	0.1521	0.1486	0.1486	0.1380	0.1415	0.1203	0.1168	0.1168	0.1203	0.1344	0.1344	0.1380 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

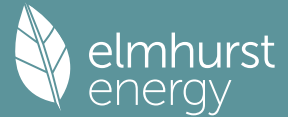
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Door			2.1500	1.0000	2.1500		(26)					
Window			4.2500	1.2357	5.2519		(27)					
Glazed Door			3.8000	1.3258	5.0379		(27)					
GF			39.4400	0.1100	4.3384	75.0000	2958.0000 (28a)					
Main	45.8200	10.2000	35.6200	0.1900	6.7678	110.0000	3918.2000 (29a)					
Total net area of external elements Aum(A, m2)			85.2600				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.5460		(33)					
Main dwelling												
Party Wall 1			27.1100	0.0000	0.0000	110.0000	2982.1001 (32)					
Party Ceiling 1			39.4400			20.0000	788.8000 (32b)					
Timber			25.7000			9.0000	231.3000 (32c)					
Solid			16.9600			75.0000	1271.9999 (32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12150.4000 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							308.0730 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				6.4900	0.0200	0.1298						
E3 Sill				6.4900	0.0300	0.1947						
E4 Jamb				20.1000	0.0260	0.5226						
E5 Ground floor (normal)				17.8300	0.0930	1.6582						
E7 Party floor between dwellings (in blocks of flats)				17.8300	0.0370	0.6597						
E16 Corner (normal)				7.7100	0.0510	0.3932						
E17 Corner (inverted - internal area greater than external area)				5.1400	-0.0910	-0.4677						
E18 Party wall between dwellings				5.1400	0.0650	0.3341						
P1 Party wall - Ground floor				10.5500	0.1080	1.1394						
E25 Staggered party wall between dwellings				5.1400	0.0440	0.2262						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7901 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	28.3361 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929 (38)
Average = Sum(39)m / 12 =	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290 (39)
												43.6290
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062 (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												1.3915 (42)
Hot water usage for mixer showers												
Hot water usage for baths	68.6227	67.5914	66.0886	63.2134	61.0915	58.7253	57.3803	58.8716	60.5065	63.0471	65.9841	68.3597 (42a)
Hot water usage for other uses	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Average daily hot water use (litres/day)	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807 (42c)
												89.5230 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	97.5034	95.4219	92.8689	88.9435	85.7714	82.3549	81.0099	83.5515	86.2365	89.8274	93.8146	97.2404 (44)
Energy content (annual)	154.4215	135.8795	142.7361	121.7592	115.4648	101.2650	97.9745	103.4542	106.3383	121.8949	133.6561	152.2550 (45)
Distribution loss (46)m = 0.15 x (45)m	23.1632	20.3819	21.4104	18.2639	17.3197	15.1897	14.6962	15.5181	15.9507	18.2842	20.0484	22.8383 (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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064 (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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064 (64)

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Electric shower(s)											Total per year (kWh/year) = Sum(64)m = 1804.4300 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
51.3451	45.1799	47.4597	40.4849	38.3920	33.6706	32.5765	34.3985	35.3575	40.5301	44.4407	50.6248 (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	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.3415	11.8498	9.6369	7.2958	5.4537	4.6042	4.9750	6.4667	8.6796	11.0208	12.8629	13.7123 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2950	181.1555	176.4670	166.4859	153.8864	142.0448	134.1338	132.2733	136.9617	146.9429	159.5423	171.3840 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613 (71)
Water heating gains (Table 5)	69.0123	67.2320	63.7900	56.2291	51.6022	46.7647	43.7856	46.2346	49.1076	54.4759	61.7231	68.0441 (72)
Total internal gains	334.2202	332.8087	322.4653	302.5821	283.5137	265.9851	255.4658	257.5460	267.3203	285.0110	306.6997	325.7118 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
North					1.0800	9.3942	0.7300	0.7000			0.7700	3.5928 (74)	
East					0.7700	17.3606	0.7300	0.7000			0.7700	4.7338 (76)	
South					0.7200	41.2355	0.7300	0.7000			0.7700	10.5138 (78)	
West					1.6800	17.3606	0.7300	0.7000			0.7700	10.3283 (80)	
East					3.8000	17.3606	0.6800	0.7000			0.7700	21.7615 (76)	
Solar gains	50.9301	98.6013	163.1566	236.7253	280.5512	292.0481	272.8938	232.5520	192.6214	121.1034	64.5477	43.3264	(83)
Total gains	385.1503	431.4100	485.6219	539.3074	564.0649	558.0332	528.3597	490.0980	459.9417	406.1144	371.2475	369.0382	(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	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594
alpha	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573
util living area	0.9879	0.9748	0.9325	0.8145	0.6196	0.4210	0.3136	0.3557	0.5957	0.8814	0.9751	0.9906 (86)
MIT	20.2759	20.4290	20.6651	20.8858	20.9809	20.9984	20.9998	20.9995	20.9879	20.8391	20.5055	20.2313 (87)
Th 2	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958 (88)
util rest of house	0.9834	0.9657	0.9101	0.7658	0.5498	0.3434	0.2308	0.2666	0.5078	0.8348	0.9643	0.9870 (89)
MIT 2	19.1914	19.3814	19.6637	19.9014	19.9844	19.9952	19.9957	19.9957	19.9902	19.8631	19.4793	19.1354 (90)
Living area fraction									fLA = Living area / (4) =			0.5593 (91)
MIT	19.7980	19.9674	20.2238	20.4520	20.5418	20.5564	20.5573	20.5572	20.5483	20.4090	20.0533	19.7484 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7980	19.9674	20.2238	20.4520	20.5418	20.5564	20.5573	20.5572	20.5483	20.4090	20.0533	19.7484 (93)

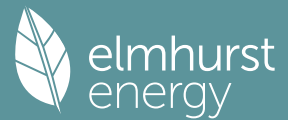
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9822	0.9654	0.9158	0.7890	0.5883	0.3868	0.2772	0.3165	0.5569	0.8556	0.9651	0.9858 (94)
Useful gains	378.3076	416.4747	444.7183	425.5126	331.8526	215.8542	146.4377	155.1066	256.1249	347.4805	358.2806	363.8082 (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	641.2589	622.4704	563.8528	464.7362	337.7664	216.2410	146.4769	155.1959	259.5163	401.7779	534.5993	643.4561 (97)
Space heating kWh	195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580 (98a)
Space heating requirement - total per year (kWh/year)												830.7465
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	195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												830.7465
Space heating per m2										(98c) / (4) =		21.0636 (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	195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580 (98)

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Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580	(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(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	51.9083	45.8552	48.5640	42.3117	40.7590	36.4463	35.7534	37.3217	37.8982	42.5993	45.7165	51.2883	(217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.0701	0.9666	1.0701	1.0356	1.0701	1.0356	1.0701	1.0701	1.0356	1.0701	1.0356	1.0701	(231)
Lighting	11.6778	9.3683	8.4352	6.1800	4.7736	3.9001	4.3546	5.6603	7.3522	9.6464	10.8956	12.0023	(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												830.7465	(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												516.4220	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)													
mechanical ventilation fans (SFP = 0.1114)												12.5997	(230a)
Total electricity for the above, kWh/year												12.5997	(231)
Electricity for lighting (calculated in Appendix L)												94.2464	(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												1454.0146	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	830.7465	28.4300	236.1812	(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)	516.4220	28.4300	146.8188	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	12.5997	28.4300	3.5821	(249)
Energy for lighting	94.2464	28.4300	26.7942	(250)
Additional standing charges			0.0000	(251)
Total energy cost			413.3763	(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	830.7465	0.1574	130.7947	(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)	516.4220	0.1411	72.8614	(264)
Space and water heating			203.6561	(265)
Pumps, fans and electric keep-hot	12.5997	0.1387	1.7477	(267)
Energy for lighting	94.2464	0.1443	13.6027	(268)
Total CO2, kg/year			219.0065	(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	830.7465	1.5828	1314.9285	(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)	516.4220	1.5217	785.8420	(278)
Space and water heating			2100.7705	(279)
Pumps, fans and electric keep-hot	12.5997	1.5128	19.0609	(281)
Energy for lighting	94.2464	1.5338	144.5582	(282)
Total Primary energy kWh/year			2264.3895	(286)

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SAP 10 EPC IMPROVEMENTS

001

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

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

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

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

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

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

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

Electricity	Current £413	Potential £413	Saving £0
Space heating	£240	£240	£0
Water heating	£147	£147	£0
Lighting	£27	£27	£0
Total cost of fuels	£413	£413	£0
Total cost of uses	£414	£414	£0
Delivered energy	37 kWh/m²	37 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	6 kg/m²	6 kg/m²	0 kg/m²
Primary energy	57 kWh/m²	57 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

Main dwelling	Area (m²)	Storey height (m)	Volume (m³)
Ground floor	39.4400 (1b)	x 2.3500 (2b)	= 92.6840 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 92.6840 (5)

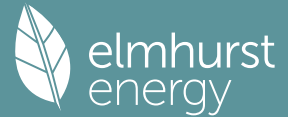
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.3300 (17)
Infiltration rate 0.1665 (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) = 0.1415 (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	0.1804	0.1769	0.1734	0.1557	0.1521	0.1344	0.1344	0.1309	0.1415	0.1521	0.1592	0.1663 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)

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Effective ac 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Door			2.1500	1.0000	2.1500			(26)
Window			4.2500	1.2357	5.2519			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			39.4400	0.1100	4.3384	75.0000	2958.0000	(28a)
Main	45.8200	10.2000	35.6200	0.1900	6.7678	110.0000	3918.2000	(29a)
Total net area of external elements Aum(A, m2)			85.2600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.5460			(33)
Main dwelling								
Party Wall 1			27.1100	0.0000	0.0000	110.0000	2982.1001	(32)
Party Ceiling 1			39.4400			20.0000	788.8000	(32b)
Timber			25.7000			9.0000	231.3000	(32c)
Solid			16.9600			75.0000	1271.9999	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 12150.4000 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 308.0730 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.4900	0.0200	0.1298
E3 Sill	6.4900	0.0300	0.1947
E4 Jamb	20.1000	0.0260	0.5226
E5 Ground floor (normal)	17.8300	0.0930	1.6582
E7 Party floor between dwellings (in blocks of flats)	17.8300	0.0370	0.6597
E16 Corner (normal)	7.7100	0.0510	0.3932
E17 Corner (inverted - internal area greater than external area)	5.1400	-0.0910	-0.4677
E18 Party wall between dwellings	5.1400	0.0650	0.3341
P1 Party wall - Ground floor	10.5500	0.1080	1.1394
E25 Staggered party wall between dwellings	5.1400	0.0440	0.2262

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.7901 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 28.3361 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	(38)
Heat transfer coeff	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	(39)
Average = Sum(39)m / 12 =													43.6290

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	(40)
HLP (average)													1.1062
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3915 (42)
Hot water usage for mixer showers													
68.6227	67.5914	66.0886	63.2134	61.0915	58.7253	57.3803	58.8716	60.5065	63.0471	65.9841	68.3597		(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(42b)
Hot water usage for other uses													
28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807		(42c)
Average daily hot water use (litres/day)													89.5230 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.5034	95.4219	92.8689	88.9435	85.7714	82.3549	81.0099	83.5515	86.2365	89.8274	93.8146	97.2404	(44)
Energy conte	154.4215	135.8795	142.7361	121.7592	115.4648	101.2650	97.9745	103.4542	106.3383	121.8949	133.6561	152.2550	(45)
Energy content (annual)													1487.0990
Distribution loss (46)m = 0.15 x (45)m													
23.1632	20.3819	21.4104	18.2639	17.3197	15.1897	14.6962	15.5181	15.9507	18.2842	20.0484	22.8383		(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													
181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064		(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(64)
													1804.4300 (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)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
51.3451	45.1799	47.4597	40.4849	38.3920	33.6706	32.5765	34.3985	35.3575	40.5301	44.4407	50.6248		(65)

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

Metabolic gains (Table 5), Watts													
(66)m	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
13.3415	11.8498	9.6369	7.2958	5.4537	4.6042	4.9750	6.4667	8.6796	11.0208	12.8629	13.7123		(67)

6. Solar gains

7. Mean internal temperature (heating season)

21.0000 (85)

8. Space heating requirement

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

0.0000 (201)

1.0000 (202)

0.0000 (203)

1.0000 (204)

0.0000 (205)

100.0000 (206)

0.0000 (207)

0.0000 (208)

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Fuel for water heating, kWh/month	51.9083	45.8552	48.5640	42.3117	40.7590	36.4463	35.7534	37.3217	37.8982	42.5993	45.7165	51.2883	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.0701	0.9666	1.0701	1.0356	1.0701	1.0356	1.0701	1.0701	1.0356	1.0701	1.0356	1.0701	(231)
Lighting	11.6778	9.3683	8.4352	6.1800	4.7736	3.9001	4.3546	5.6603	7.3522	9.6464	10.8956	12.0023	(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												932.6606	(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												516.4220	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)													
mechanical ventilation fans (SFP = 0.1114)												12.5997	(230a)
Total electricity for the above, kWh/year												12.5997	(231)
Electricity for lighting (calculated in Appendix L)												94.2464	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1555.9287	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	932.6606	16.4900	153.7957	(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)	516.4220	16.4900	85.1580	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	12.5997	16.4900	2.0777	(249)
Energy for lighting	94.2464	16.4900	15.5412	(250)
Additional standing charges			0.0000	(251)
Total energy cost			256.5726	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.0939	(257)
SAP value		82.2684	
SAP rating (Section 12)		82	(258)
SAP band		B	

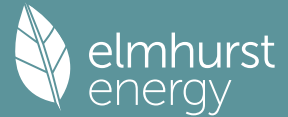
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	932.6606	0.1571	146.5047	(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)	516.4220	0.1411	72.8614	(264)
Space and water heating			219.3661	(265)
Pumps, fans and electric keep-hot	12.5997	0.1387	1.7477	(267)
Energy for lighting	94.2464	0.1443	13.6027	(268)
Total CO2, kg/year			234.7165	(272)
CO2 emissions per m2			5.9500	(273)
EI value			96.2752	
EI rating			96	(274)
EI band			A	

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

1. Overall dwelling characteristics

Full SAP Calculation Printout



Main dwelling		Area (m2)	Storey height (m)	Volume (m3)	
Ground floor		39.4400 (1b)	x 2.3500 (2b)	= 92.6840 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.4400				(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n)	=	92.6840 (5)	

2. Ventilation rate

													m3 per hour
Number of open chimneys													0 * 80 = 0.0000 (6a)
Number of open flues													0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire													0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler													0 * 20 = 0.0000 (6d)
Number of flues attached to other heater													0 * 35 = 0.0000 (6e)
Number of blocked chimneys													0 * 20 = 0.0000 (6f)
Number of intermittent extract fans													0 * 10 = 0.0000 (7a)
Number of passive vents													0 * 10 = 0.0000 (7b)
Number of flueless gas fires													0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans													Air changes per hour
Pressure test													0.0000 / (5) = 0.0000 (8)
Pressure Test Method													Yes
Measured/design AP50													Blower Door
Infiltration rate													3.3300 (17)
Number of sides sheltered													0.1665 (18)
													2 (19)
Shelter factor													(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor													(21) = (18) x (20) = 0.1415 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate													
	0.1521	0.1486	0.1486	0.1380	0.1415	0.1203	0.1168	0.1168	0.1203	0.1344	0.1344	0.1380	(22b)
Mechanical extract ventilation - decentralised													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

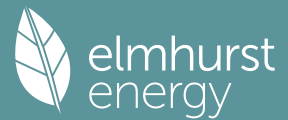
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Door			2.1500	1.0000	2.1500			(26)
Window			4.2500	1.2357	5.2519			(27)
Glazed Door			3.8000	1.3258	5.0379			(27)
GF			39.4400	0.1100	4.3384	75.0000	2958.0000	(28a)
Main	45.8200	10.2000	35.6200	0.1900	6.7678	110.0000	3918.2000	(29a)
Total net area of external elements Aum(A, m2)			85.2600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.5460			(33)
Main dwelling								
Party Wall 1			27.1100	0.0000	0.0000	110.0000	2982.1001	(32)
Party Ceiling 1			39.4400			20.0000	788.8000	(32b)
Timber			25.7000			9.0000	231.3000	(32c)
Solid			16.9600			75.0000	1271.9999	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 12150.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								308.0730 (35)
List of Thermal Bridges								
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					6.4900	0.0200	0.1298	
E3 Sill					6.4900	0.0300	0.1947	
E4 Jamb					20.1000	0.0260	0.5226	
E5 Ground floor (normal)					17.8300	0.0930	1.6582	
E7 Party floor between dwellings (in blocks of flats)					17.8300	0.0370	0.6597	
E16 Corner (normal)					7.7100	0.0510	0.3932	
E17 Corner (inverted - internal area greater than external area)					5.1400	-0.0910	-0.4677	
E18 Party wall between dwellings					5.1400	0.0650	0.3341	
P1 Party wall - Ground floor					10.5500	0.1080	1.1394	
E25 Staggered party wall between dwellings					5.1400	0.0440	0.2262	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.7901 (36)
Point Thermal bridges								0.0000
Total fabric heat loss							(33) + (36) + (36a) =	28.3361 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	15.2929	(38)
Heat transfer coeff													
	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	43.6290	(39)
Average = Sum(39)m / 12 =													43.6290
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	1.1062	(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													1.3915 (42)
Hot water usage for mixer showers													
	68.6227	67.5914	66.0886	63.2134	61.0915	58.7253	57.3803	58.8716	60.5065	63.0471	65.9841	68.3597	(42a)
Hot water usage for baths													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
	28.8807	27.8305	26.7803	25.7301	24.6799	23.6297	23.6297	24.6799	25.7301	26.7803	27.8305	28.8807	(42c)
Average daily hot water use (litres/day)													89.5230 (43)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.5034	95.4219	92.8689	88.9435	85.7714	82.3549	81.0099	83.5515	86.2365	89.8274	93.8146	97.2404	(44)
Energy conte	154.4215	135.8795	142.7361	121.7592	115.4648	101.2650	97.9745	103.4542	106.3383	121.8949	133.6561	152.2550	(45)
Energy content (annual)	Total = Sum(45)m = 1487.0990												
Distribution loss	(46)m = 0.15 x (45)m												
	23.1632	20.3819	21.4104	18.2639	17.3197	15.1897	14.6962	15.5181	15.9507	18.2842	20.0484	22.8383	(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													
	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(64)
	Total per year (kWh/year) = Sum(64)m = 1804.4300 (64)												
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)												
Heat gains from water heating, kWh/month	51.3451	45.1799	47.4597	40.4849	38.3920	33.6706	32.5765	34.3985	35.3575	40.5301	44.4407	50.6248	(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	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	83.4919	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.3415	11.8498	9.6369	7.2958	5.4537	4.6042	4.9750	6.4667	8.6796	11.0208	12.8629	13.7123	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2950	181.1555	176.4670	166.4859	153.8864	142.0448	134.1338	132.2733	136.9617	146.9429	159.5423	171.3840	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	44.7407	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	-55.6613	(71)
Water heating gains (Table 5)	69.0123	67.2320	63.7900	56.2291	51.6022	46.7647	43.7856	46.2346	49.1076	54.4759	61.7231	68.0441	(72)
Total internal gains	334.2202	332.8087	322.4653	302.5821	283.5137	265.9851	255.4658	257.5460	267.3203	285.0110	306.6997	325.7118	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				1.0800	9.3942		0.7300		0.7000		0.7700		3.5928 (74)
East				0.7700	17.3606		0.7300		0.7000		0.7700		4.7338 (76)
South				0.7200	41.2355		0.7300		0.7000		0.7700		10.5138 (78)
West				1.6800	17.3606		0.7300		0.7000		0.7700		10.3283 (80)
East				3.8000	17.3606		0.6800		0.7000		0.7700		21.7615 (76)
Solar gains	50.9301	98.6013	163.1566	236.7253	280.5512	292.0481	272.8938	232.5520	192.6214	121.1034	64.5477		43.3264 (83)
Total gains	385.1503	431.4100	485.6219	539.3074	564.0649	558.0332	528.3597	490.0980	459.9417	406.1144	371.2475		369.0382 (84)

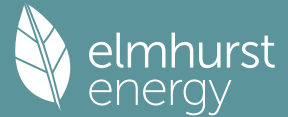
7. Mean internal temperature (heating season)

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	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	77.3594	
alpha	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	6.1573	
util living area	0.9879	0.9748	0.9325	0.8145	0.6196	0.4210	0.3136	0.3557	0.5957	0.8814	0.9751	0.9906	(86)
MIT	20.2759	20.4290	20.6651	20.8858	20.9809	20.9984	20.9998	20.9995	20.9879	20.8391	20.5055	20.2313	(87)
Th 2	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	19.9958	(88)
util rest of house	0.9834	0.9657	0.9101	0.7658	0.5498	0.3434	0.2308	0.2666	0.5078	0.8348	0.9643	0.9870	(89)
MIT 2	19.1914	19.3814	19.6637	19.9014	19.9844	19.9952	19.9957	19.9957	19.9902	19.8631	19.4793	19.1354	(90)
Living area fraction	19.7980	19.9674	20.2238	20.4520	20.5418	20.5564	20.5573	20.5572	20.5483	20.4090	20.0533	19.7484	(92)
MIT	19.7980	19.9674	20.2238	20.4520	20.5418	20.5564	20.5573	20.5572	20.5483	20.4090	20.0533	19.7484	(92)
Temperature adjustment													0.0000
adjusted MIT	19.7980	19.9674	20.2238	20.4520	20.5418	20.5564	20.5573	20.5572	20.5483	20.4090	20.0533	19.7484	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9822	0.9654	0.9158	0.7890	0.5883	0.3868	0.2772	0.3165	0.5569	0.8556	0.9651	0.9858	(94)
Useful gains	378.3076	416.4747	444.7183	425.5126	331.8526	215.8542	146.4377	155.1066	256.1249	347.4805	358.2806	363.8082	(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	641.2589	622.4704	563.8528	464.7362	337.7664	216.2410	146.4769	155.1959	259.5163	401.7779	534.5993	643.4561	(97)
Space heating kWh													

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Space heating requirement - total per year (kWh/year)	195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580	(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)	195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												830.7465	
Space heating per m2										(98c) / (4) =		21.0636	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580	(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)	195.6358	138.4291	88.6361	28.2410	4.3999	0.0000	0.0000	0.0000	0.0000	40.3973	126.9495	208.0580	(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	181.3729	160.2227	169.6875	147.8412	142.4162	127.3470	124.9259	130.4056	132.4203	148.8463	159.7381	179.2064	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	51.9083	45.8552	48.5640	42.3117	40.7590	36.4463	35.7534	37.3217	37.8982	42.5993	45.7165	51.2883	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.0701	0.9666	1.0701	1.0356	1.0701	1.0356	1.0701	1.0701	1.0356	1.0701	1.0356	1.0701	(231)
Lighting	11.6778	9.3683	8.4352	6.1800	4.7736	3.9001	4.3546	5.6603	7.3522	9.6464	10.8956	12.0023	(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													830.7465 (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													516.4220 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 2.3400, total flow = 21.0000, SFP = 0.1114)													
mechanical ventilation fans (SFP = 0.1114)													12.5997 (230a)
Total electricity for the above, kWh/year													12.5997 (231)
Electricity for lighting (calculated in Appendix L)													94.2464 (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													1454.0146 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	830.7465	28.4300	236.1812	(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)	516.4220	28.4300	146.8188	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	12.5997	28.4300	3.5821	(249)
Energy for lighting	94.2464	28.4300	26.7942	(250)
Additional standing charges			0.0000	(251)
Total energy cost			413.3763	(255)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	830.7465	0.1574	130.7947 (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)	516.4220	0.1411	72.8614 (264)
Space and water heating			203.6561 (265)
Pumps, fans and electric keep-hot	12.5997	0.1387	1.7477 (267)
Energy for lighting	94.2464	0.1443	13.6027 (268)
Total CO2, kg/year			219.0065 (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	830.7465	1.5828	1314.9285 (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)	516.4220	1.5217	785.8420 (278)
Space and water heating			2100.7705 (279)
Pumps, fans and electric keep-hot	12.5997	1.5128	19.0609 (281)
Energy for lighting	94.2464	1.5338	144.5582 (282)
Total Primary energy kWh/year			2264.3895 (286)