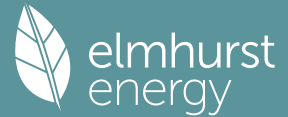


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Property Reference	78274				Issued on Date	02/12/2024
Assessment Reference	001	Prop Type Ref		Det		
Property	Plot 1, Berry Brow, Manchester, M40 1GR					
SAP Rating	83 B	DER	3.57	TER	9.60	
Environmental	96 A	% DER < TER				62.81
CO ₂ Emissions (t/year)	0.53	DFEE	41.41	TFEE	42.32	
Compliance Check	See BREL	% DFEE < TFEE				2.15
% DPER < TPER	26.59	DPER	36.93	TPER	50.31	
Assessor Details	Mr. Daniel Goddard				Assessor ID	CP52-0001
Client	-, -					

SAP 10 WORKSHEET FOR New Build (As Designed) (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)
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	401.7270 (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	5.0000 (17)
Infiltration rate	0.2500 (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) = 0.2125 (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	0.2709	0.2656	0.2603	0.2338	0.2284	0.2019	0.2019	0.1966	0.2125	0.2284	0.2391	0.2497 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5209	0.5156	0.5103	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
Window (Uw = 1.20)			19.8400	1.1450	22.7176		(27)
Door			2.1500	1.0000	2.1500		(26)
French Door (Uw = 1.20)			16.6300	1.1450	19.0420		(27)
GF			78.7700	0.1100	8.6647	75.0000	5907.7500 (28a)
Main	194.5140	38.6200	155.8940	0.1800	28.0609	110.0000	17148.3400 (29a)
PIJ	78.7700		78.7700	0.1000	7.8770	9.0000	708.9300 (30)
Total net area of external elements Aum(A, m ²)			352.0540				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	88.5122		(33)
Solid			182.4000			75.0000	13680.0000 (32c)
FF			78.7700			18.0000	1417.8600 (32d)
GF			78.7700			9.0000	708.9300 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	39571.8100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							251.1858 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	24.8800	0.0260	0.6469
E3 Sill	24.8800	0.0220	0.5474
E4 Jamb	46.0700	0.0170	0.7832
E5 Ground floor (normal)	38.1400	0.0740	2.8224
E10 Eaves (insulation at ceiling level)	38.1400	0.0600	2.2884
E16 Corner (normal)	30.6000	0.0460	1.4076
E17 Corner (inverted - internal area greater than external area)	10.2000	-0.0880	-0.8976
E6 Intermediate floor within a dwelling	38.1400	0.0010	0.0381

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal Bridges (36a) = 7.6363 (36)
 Total fabric heat loss (33) + (36) + (36a) = 96.1485 (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	69.0606	68.3564	67.6521	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	(38)
Heat transfer coeff	165.2091	164.5049	163.8006	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	(39)
Average = Sum(39)m / 12 =												162.9513	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0487	1.0442	1.0397	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	(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													2.9454 (42)
Hot water usage for mixer showers													
73.6048	72.4987	70.8868	67.8028	65.5269	62.9888	61.5462	63.1459	64.8994	67.6245	70.7748	73.3228	73.3228	(42a)
Hot water usage for baths													
31.7757	31.3038	30.6392	29.4139	28.4964	27.4791	26.9295	27.5894	28.3079	29.3966	30.6471	31.6683	31.6683	(42b)
Hot water usage for other uses													
44.7940	43.1652	41.5363	39.9074	38.2785	36.6497	36.6497	38.2785	39.9074	41.5363	43.1652	44.7940	44.7940	(42c)
Average daily hot water use (litres/day)												138.0441	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
150.1746	146.9677	143.0624	137.1242	132.3019	127.1176	125.1254	129.0138	133.1147	138.5574	144.5870	149.7852	149.7852	(44)
Energy conte	237.8398	209.2800	219.8815	187.7161	178.1038	156.3059	151.3283	159.7461	164.1438	188.0210	205.9907	234.5273	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
35.6760	31.3920	32.9822	28.1574	26.7156	23.4459	22.6992	23.9619	24.6216	28.2032	30.8986	35.1791	35.1791	(46)
Water storage loss:													
Store volume												236.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7614	(55)
Total storage loss													
23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	(56)
If cylinder contains dedicated solar storage													
23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	(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													
284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	281.3931	(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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	(64)
Total per year (kWh/year)												2844.6914	(64)
Electric shower(s)												2845	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
116.5744	103.4499	110.6033	98.6988	96.7121	88.2549	87.8093	90.6082	90.8610	100.0096	104.7751	115.4730	115.4730	(65)

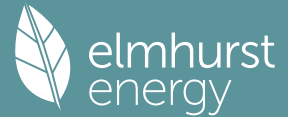
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
165.7463	183.5048	165.7463	171.2711	165.7463	171.2711	165.7463	165.7463	171.2711	165.7463	171.2711	165.7463	165.7463	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
328.6105	332.0205	323.4275	305.1341	282.0420	260.3386	245.8395	242.4295	251.0225	269.3159	292.4080	314.1113	314.1113	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	(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)													
-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	(71)
Water heating gains (Table 5)													
156.6860	153.9433	148.6603	137.0817	129.9894	122.5763	118.0233	121.7852	126.1958	134.4215	145.5210	155.2056	155.2056	(72)
Total internal gains	718.2241	736.6499	705.0153	680.6682	644.9590	621.3673	596.7903	597.1423	615.6707	636.6650	676.3814	702.2445	(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	2.0700	10.6334	0.3000	0.0000	0.7700	5.0846 (74)
East	5.8300	19.6403	0.3000	0.0000	0.7700	26.4501 (76)
West	11.9400	19.6403	0.3000	0.0000	0.7700	54.1706 (80)
East	13.2700	19.6403	0.3000	0.0000	0.7700	60.2047 (76)
South	3.3600	46.7521	0.3000	0.0000	0.7700	36.2871 (78)

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Solar gains	182.1971	344.6301	545.8967	773.7513	935.7870	954.1517	909.8339	788.5933	626.5842	402.5517	224.8778	151.4021 (83)
Total gains	900.4211	1081.2800	1250.9120	1454.4196	1580.7460	1575.5190	1506.6242	1385.7356	1242.2550	1039.2167	901.2592	853.6466 (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	66.5349	66.8197	67.1070	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718
alpha	5.4357	5.4546	5.4738	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115
util living area	0.9985	0.9955	0.9856	0.9424	0.8266	0.6355	0.4703	0.5308	0.7998	0.9724	0.9962	0.9989 (86)
Living	19.7155	19.9134	20.2099	20.5879	20.8587	20.9735	20.9957	20.9919	20.9118	20.5297	20.0577	19.7001
Non living	18.5344	18.7900	19.1690	19.6395	19.9404	20.0427	20.0562	20.0547	19.9978	19.5780	18.9833	18.5253
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.3429	19.9134	20.2099	20.5879	20.8587	20.9735	20.9957	20.9919	20.9118	20.5297	20.0577	19.8819 (87)
Th 2	20.0430	20.0467	20.0503	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575 (88)
util rest of house	0.9979	0.9940	0.9806	0.9228	0.7755	0.5521	0.3717	0.4264	0.7249	0.9593	0.9946	0.9985 (89)
MIT 2	19.4416	18.7900	19.1690	19.6395	19.9404	20.0427	20.0562	20.0547	19.9978	19.5780	18.9833	18.8014 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	19.6886	19.0979	19.4543	19.8995	20.1921	20.2978	20.3137	20.3116	20.2483	19.8389	19.2778	19.0975 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.6886	19.0979	19.4543	19.8995	20.1921	20.2978	20.3137	20.3116	20.2483	19.8389	19.2778	19.0975 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9977	0.9919	0.9765	0.9189	0.7834	0.5741	0.3988	0.4551	0.7415	0.9553	0.9928	0.9979 (94)
Useful gains	898.3568	1072.5184	1221.4885	1336.5171	1238.4269	904.5093	600.8897	630.6618	921.1580	992.8056	894.7761	851.8731 (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	2542.3397	2335.6279	2121.9248	1786.6837	1379.4000	925.5141	603.2260	635.3701	998.6897	1500.7028	1978.0763	2419.8598 (97)
Space heating kWh	1223.1233	848.8096	669.9246	324.1199	104.8839	0.0000	0.0000	0.0000	0.0000	377.8755	779.9761	1166.5821 (98a)
Space heating requirement - total per year (kWh/year)	5495.2951											
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	1223.1233	848.8096	669.9246	324.1199	104.8839	0.0000	0.0000	0.0000	0.0000	377.8755	779.9761	1166.5821 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	5495.2951											
Space heating per m2	(98c) / (4) = 34.8819 (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 %)	232.8620 (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	1223.1233	848.8096	669.9246	324.1199	104.8839	0.0000	0.0000	0.0000	0.0000	377.8755	779.9761	1166.5821 (98)
Space heating efficiency (main heating system 1)	232.8620	232.8620	232.8620	232.8620	232.8620	0.0000	0.0000	0.0000	0.0000	232.8620	232.8620	232.8620 (210)
Space heating fuel (main heating system)	525.2568	364.5119	287.6917	139.1897	45.0413	0.0000	0.0000	0.0000	0.0000	162.2745	334.9522	500.9758 (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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (64)
Water heating requirement	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (64)
Efficiency of water heater (217)m	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984 (216)
Fuel for water heating, kWh/month	100.1080	88.4711	93.7935	81.9520	79.1037	70.9075	69.6889	72.6487	73.6635	82.5908	88.3777	98.9433 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	6.5228	5.8916	6.5228	6.3124	6.5228	6.3124	6.5228	6.5228	6.3124	6.5228	6.3124	6.5228 (231)
Lighting	36.9713	29.6598	26.7053	19.5655	15.1129	12.3474	13.7865	17.9202	23.2766	30.5402	34.4951	37.9989 (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	2359.8939 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	284.3984											

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Water heating fuel used	1000.2487 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 5.7980, total flow = 37.0000, SFP = 0.1567) mechanical ventilation fans (SFP = 0.1567)	76.8011 (230a)
Total electricity for the above, kWh/year	76.8011 (231)
Electricity for lighting (calculated in Appendix L)	298.3797 (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	3735.3233 (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	2359.8939	0.1560	368.1113 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	1000.2487	0.1410	141.0573 (264)	
Space and water heating			509.1687 (265)	
Pumps, fans and electric keep-hot	76.8011	0.1387	10.6533 (267)	
Energy for lighting	298.3797	0.1443	43.0654 (268)	
Total CO2, kg/year			562.8873 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5700 (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	2359.8939	1.5775	3722.6477 (275)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1000.2487	1.5215	1521.8336 (278)	
Space and water heating			5244.4812 (279)	
Pumps, fans and electric keep-hot	76.8011	1.5128	116.1847 (281)	
Energy for lighting	298.3797	1.5338	457.6647 (282)	
Total Primary energy kWh/year			5818.3306 (286)	
Dwelling Primary energy Rate (DPER)			36.9300 (287)	

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

1. Overall dwelling characteristics

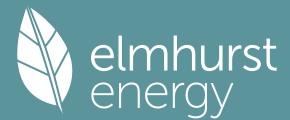
	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)	
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 401.7270 (5)	

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	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.0996 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3496	(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) =	0.2971 (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	0.3788	0.3714	0.3640	0.3268	0.3194	0.2823	0.2823	0.2748	0.2971	0.3194	0.3343	0.3491 (22b)
Effective ac	0.5718	0.5690	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5559	0.5609 (25)

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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	
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type (Uw = 1.20)			36.4700	1.1450	41.7595			(27)
GF			78.7700	0.1300	10.2401			(28a)
Main	194.5140	38.6200	155.8940	0.1800	28.0609			(29a)
PIJ	78.7700		78.7700	0.1100	8.6647			(30)
Total net area of external elements Aum(A, m2)			352.0540					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	90.8753		(33)

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

251.1858 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	24.8800	0.0500	1.2440	
E3 Sill	24.8800	0.0500	1.2440	
E4 Jamb	46.0700	0.0500	2.3035	
E5 Ground floor (normal)	38.1400	0.1600	6.1024	
E10 Eaves (insulation at ceiling level)	38.1400	0.0600	2.2884	
E16 Corner (normal)	30.6000	0.0900	2.7540	
E17 Corner (inverted - internal area greater than external area)	10.2000	-0.0900	-0.9180	
E6 Intermediate floor within a dwelling	38.1400	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				15.0183 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		105.8936 (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	75.7985	75.4291	75.0670	73.3662	73.0479	71.5666	71.5666	71.2923	72.1372	73.0479	73.6917	74.3647	(38)
Average = Sum(39)m / 12 =	181.6920	181.3226	180.9605	179.2597	178.9415	177.4602	177.4602	177.1858	178.0307	178.9415	179.5852	180.2583	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1533	1.1510	1.1487	1.1379	1.1358	1.1264	1.1264	1.1247	1.1301	1.1358	1.1399	1.1442	(40)
HLP (average)												1.1379	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

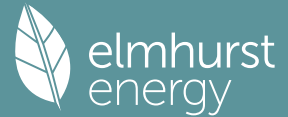
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9454 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													
Daily hot water use													
Energy conte													
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:													
Store volume													236.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8255 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9858 (55)
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS													
PV diverter													
Solar input													
FGHRS													
Output from w/h													
12Total per year (kWh/year)													
Electric shower(s)													
Heat gains from water heating, kWh/month													

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

Metabolic gains (Table 5), Watts													
(66)m													
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
Pumps, fans													
Losses e.g. evaporation (negative values) (Table 5)													
Water heating gains (Table 5)													
Total internal gains													

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728.7031 747.1289 715.4944 691.1473 655.4380 628.8464 604.2694 604.6214 623.1498 647.1441 686.8605 712.7236 (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					2.0700	10.6334	0.6300	0.7000				0.7700	6.7269 (74)	
East					19.1000	19.6403	0.6300	0.7000				0.7700	114.6443 (76)	
South					3.3600	46.7521	0.6300	0.7000				0.7700	48.0078 (78)	
West					11.9400	19.6403	0.6300	0.7000				0.7700	71.6677 (80)	
Solar gains	241.0467	455.9457	722.2214	1023.6730	1238.0462	1262.3427	1203.7103	1043.3089	828.9709	532.5759	297.5133	200.3050	(83)	
Total gains	969.7498	1203.0746	1437.7158	1714.8203	1893.4843	1891.1891	1807.9796	1647.9303	1452.1207	1179.7200	984.3738	913.0286	(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	60.4989	60.6222	60.7435	61.3198	61.4288	61.9416	61.9416	62.0375	61.7431	61.4288	61.2086	60.9801	
alpha	5.0333	5.0415	5.0496	5.0880	5.0953	5.1294	5.1294	5.1358	5.1162	5.0953	5.0806	5.0653	
util living area	0.9978	0.9932	0.9777	0.9167	0.7777	0.5822	0.4286	0.4878	0.7595	0.9617	0.9946	0.9984 (86)	
MIT	19.5999	19.8313	20.1740	20.5944	20.8697	20.9764	20.9959	20.9924	20.9146	20.5063	19.9696	19.5635 (87)	
Th 2	19.9575	19.9594	19.9613	19.9700	19.9717	19.9793	19.9793	19.9807	19.9764	19.9717	19.9684	19.9649 (88)	
util rest of house	0.9971	0.9910	0.9702	0.8903	0.7191	0.4972	0.3309	0.3832	0.6770	0.9440	0.9924	0.9978 (89)	
MIT 2	18.3249	18.6214	19.0554	19.5709	19.8683	19.9667	19.9781	19.9782	19.9212	19.4804	18.8058	18.2837 (90)	
Living area fraction	18.6744	18.9530	19.3620	19.8515	20.1428	20.2435	20.2571	20.2561	20.1935	19.7616	19.1248	18.6345 (92)	
MIT	18.6744	18.9530	19.3620	19.8515	20.1428	20.2435	20.2571	20.2561	20.1935	19.7616	19.1248	18.6345 (93)	
Temperature adjustment												0.0000	
adjusted MIT	18.6744	18.9530	19.3620	19.8515	20.1428	20.2435	20.2571	20.2561	20.1935	19.7616	19.1248	18.6345 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9957	0.9879	0.9645	0.8867	0.7296	0.5198	0.3578	0.4120	0.6960	0.9394	0.9899	0.9968 (94)	
Useful gains	965.5758	1188.4752	1386.6860	1520.5290	1381.4799	983.0430	646.8055	678.8865	1010.6398	1108.2401	974.3938	910.0789 (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	2611.7117	2548.1330	2327.5160	1963.1544	1510.7620	1001.4882	648.9809	683.2543	1084.8307	1639.3908	2159.4746	2601.9305 (97)	
Space heating kWh	1224.7251	913.6900	699.9775	318.6902	96.1859	0.0000	0.0000	0.0000	0.0000	395.1762	853.2581	1258.7376 (98a)	
Space heating requirement - total per year (kWh/year)												5760.4407	
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	1224.7251	913.6900	699.9775	318.6902	96.1859	0.0000	0.0000	0.0000	0.0000	395.1762	853.2581	1258.7376 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												5760.4407	
Space heating per m2												36.5649 (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	1224.7251	913.6900	699.9775	318.6902	96.1859	0.0000	0.0000	0.0000	0.0000	395.1762	853.2581	1258.7376 (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)	1326.8962	989.9133	758.3721	345.2765	104.2101	0.0000	0.0000	0.0000	0.0000	428.1432	924.4400	1363.7461 (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	258.0121	228.1333	242.5405	213.9976	207.8770	187.8129	185.8609	193.0558	194.9380	216.7427	229.6410	255.3228 (64)	
Efficiency of water heater	87.0908	86.8431	86.2955	84.9510	82.4432	79.8000	79.8000	79.8000	79.8000	85.3889	86.7258	79.8000 (216)	
Fuel for water heating, kWh/month	296.2564	262.6959	281.0581	251.9070	252.1456	235.3545	232.9084	241.9245	244.2832	253.8300	264.7897	292.9941 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	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	34.4388	27.6281	24.8760	18.2252	14.0777	11.5016	12.8422	16.6927	21.6822	28.4482	32.1322	35.3960 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-68.0742	-93.2382	-130.2106	-142.0357	-149.4680	-138.0645	-136.1746	-130.2107	-119.3540	-104.3226	-73.7830	-59.1640 (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)													

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(233b)m	-47.2606	-98.2552	-193.2498	-287.4207	-377.4516	-378.4566	-374.1674	-318.1309	-234.8420	-139.7601	-62.8322	-37.4773	(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												6240.9975	(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												3110.1474	(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)												277.9408	(232)
Energy saving/generation technologies (Appendices M, N and Q)													
PV generation												-3893.4046	(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												5821.6811	(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	6240.9975	0.2100	1310.6095 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3110.1474	0.2100	653.1309 (264)
Space and water heating			1963.7404 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	277.9408	0.1443	40.1155 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1344.0999	0.1352	-181.7780
PV Unit electricity exported	-2549.3047	0.1262	-321.6641
Total			-503.4421 (269)
Total CO2, kg/year			1512.3430 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6000 (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	6240.9975	1.1300	7052.3272 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3110.1474	1.1300	3514.4665 (278)
Space and water heating			10566.7937 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	277.9408	1.5338	426.3149 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1344.0999	1.4999	-2015.9698
PV Unit electricity exported	-2549.3047	0.4632	-1180.7588
Total			-3196.7286 (283)
Total Primary energy kWh/year			7926.4809 (286)
Target Primary Energy Rate (TPER)			50.3100 (287)

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

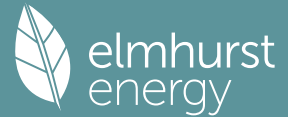
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 401.7270 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.0996 (8)
Pressure Test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Shelter factor
Infiltration rate adjusted to include shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.2971 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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	0.3788	0.3714	0.3640	0.3268	0.3194	0.2823	0.2823	0.2748	0.2971	0.3194	0.3343	0.3491	(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	0.5718	0.5690	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5559	0.5609	(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	
Window (Uw = 1.20)			19.8400	1.1450	22.7176			(27)
Door			2.1500	1.0000	2.1500			(26)
French Door (Uw = 1.20)			16.6300	1.1450	19.0420			(27)
GF			78.7700	0.1100	8.6647	75.0000	5907.7500	(28a)
Main	194.5140	38.6200	155.8940	0.1800	28.0609	110.0000	17148.3400	(29a)
PIJ	78.7700		78.7700	0.1000	7.8770	9.0000	708.9300	(30)
Total net area of external elements Aum(A, m ²)			352.0540					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	88.5122			(33)
Solid			182.4000			75.0000	13680.0000	(32c)
FF			78.7700			18.0000	1417.8600	(32d)
GF			78.7700			9.0000	708.9300	(32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
List of Thermal Bridges
K1 Element
E2 Other lintels (including other steel lintels)
E3 Sill
E4 Jamb
E5 Ground floor (normal)
E10 Eaves (insulation at ceiling level)
E16 Corner (normal)
E17 Corner (inverted - internal area greater than external area)
E6 Intermediate floor within a dwelling
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss

	Length	Psi-value	Total	
K1 Element	24.8800	0.0260	0.6469	
E2 Other lintels (including other steel lintels)	24.8800	0.0220	0.5474	
E3 Sill	46.0700	0.0170	0.7832	
E4 Jamb	38.1400	0.0740	2.8224	
E5 Ground floor (normal)	38.1400	0.0600	2.2884	
E10 Eaves (insulation at ceiling level)	30.6000	0.0460	1.4076	
E16 Corner (normal)	10.2000	-0.0880	-0.8976	
E17 Corner (inverted - internal area greater than external area)	38.1400	0.0010	0.0381	
E6 Intermediate floor within a dwelling				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.6363 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 96.1485 (37)

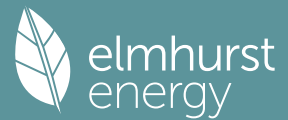
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m
Heat transfer coeff
Average = Sum(39)m / 12 =

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	75.7985	75.4291	75.0670	73.3662	73.0479	71.5666	71.5666	71.2923	72.1372	73.0479	73.6917	74.3647	(38)
Heat transfer coeff	171.9470	171.5776	171.2154	169.5146	169.1964	167.7151	167.7151	167.4408	168.2857	169.1964	169.8402	170.5132	(39)
Average = Sum(39)m / 12 =												169.5131	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9454 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
31.7757	31.3038	30.6392	29.4139	28.4964	27.4791	26.9295	27.5894	28.3079	29.3966	30.6471	31.6683	31.6683	(42b)
Hot water usage for other uses													
44.7940	43.1652	41.5363	39.9074	38.2785	36.6497	36.6497	38.2785	39.9074	41.5363	43.1652	44.7940	44.7940	(42c)
Average daily hot water use (litres/day)													70.1829 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
76.5697	74.4690	72.1755	69.3213	66.7750	64.1287	63.5792	65.8680	68.2154	70.9329	73.8123	76.4623	76.4623	(44)
Energy conte	121.2678	106.0428	110.9311	94.8974	89.8919	78.8537	76.8935	81.5583	84.1164	96.2552	105.1591	119.7215	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													1165.5888
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
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	103.0776	90.1364	94.2914	80.6628	76.4081	67.0257	65.3595	69.3246	71.4989	81.8169	89.3853	101.7633	(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	103.0776	90.1364	94.2914	80.6628	76.4081	67.0257	65.3595	69.3246	71.4989	81.8169	89.3853	101.7633	(64)
12Total per year (kWh/year)													990.7505 (64)
Electric shower(s)	58.9452	52.5207	57.3506	54.7289	55.7559	53.1857	54.9586	55.7559	54.7289	57.3506	56.2721	58.9452	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													670.4983 (64a)

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Heat gains from water heating, kWh/month
40.5057 35.6643 37.9105 33.8479 33.0410 30.0529 30.0795 31.2701 31.5570 34.7919 36.4143 40.1771 (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	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.7463	183.5048	165.7463	171.2711	165.7463	171.2711	165.7463	165.7463	171.2711	165.7463	171.2711	165.7463	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	328.6105	332.0205	323.4275	305.1341	282.0420	260.3386	245.8395	242.4295	251.0225	269.3159	292.4080	314.1113	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	(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)	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	(71)
Water heating gains (Table 5)	54.4431	53.0718	50.9550	47.0110	44.4100	41.7401	40.4295	42.0297	43.8291	46.7633	50.5755	54.0015	(72)
Total internal gains	615.9812	635.7784	607.3100	590.5976	559.3795	540.5311	519.1965	517.3868	533.3040	549.0067	581.4359	601.0404	(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					2.0700	10.6334	0.3000	0.0000			0.7700			5.0846 (74)
East					5.8300	19.6403	0.3000	0.0000			0.7700			26.4501 (76)
West					11.9400	19.6403	0.3000	0.0000			0.7700			54.1706 (80)
East					13.2700	19.6403	0.3000	0.0000			0.7700			60.2047 (76)
South					3.3600	46.7521	0.3000	0.0000			0.7700			36.2871 (78)
Solar gains	182.1971	344.6301	545.8967	773.7513	935.7870	954.1517	909.8339	788.5933	626.5842	402.5517	224.8778	151.4021	(83)	
Total gains	798.1783	980.4085	1153.2067	1364.3489	1495.1665	1494.6829	1429.0304	1305.9801	1159.8882	951.5584	806.3137	752.4425	(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	63.9277	64.0653	64.2008	64.8450	64.9669	65.5407	65.5407	65.6481	65.3185	64.9669	64.7207	64.4652	
alpha	5.2618	5.2710	5.2801	5.3230	5.3311	5.3694	5.3694	5.3765	5.3546	5.3311	5.3147	5.2977	
util living area	0.9991	0.9973	0.9906	0.9586	0.8627	0.6792	0.5091	0.5751	0.8431	0.9823	0.9978	0.9994	(86)
MIT	19.5789	19.7766	20.0809	20.4893	20.8051	20.9599	20.9928	20.9868	20.8739	20.4330	19.9311	19.5500	(87)
Th 2	20.0078	20.0097	20.0116	20.0205	20.0221	20.0299	20.0299	20.0313	20.0269	20.0221	20.0188	20.0153	(88)
util rest of house	0.9988	0.9963	0.9871	0.9432	0.8157	0.5919	0.4007	0.4615	0.7729	0.9732	0.9969	0.9992	(89)
MIT 2	18.7035	18.9022	19.2058	19.6094	19.8926	20.0120	20.0281	20.0276	19.9574	19.5629	19.0638	18.6804	(90)
Living area fraction									FLA = Living area / (4) =			0.2741	(91)
MIT	18.9434	19.1419	19.4457	19.8506	20.1427	20.2718	20.2925	20.2905	20.2086	19.8014	19.3015	18.9188	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9434	19.1419	19.4457	19.8506	20.1427	20.2718	20.2925	20.2905	20.2086	19.8014	19.3015	18.9188	(93)

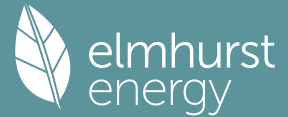
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9984	0.9951	0.9845	0.9400	0.8222	0.6148	0.4306	0.4928	0.7877	0.9705	0.9959	0.9988	(94)
Useful gains	796.8855	975.6277	1135.3478	1282.4499	1229.3638	918.8671	615.3296	643.5773	913.6475	923.5050	803.0415	751.5504	(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	2517.8924	2443.5870	2216.4991	1856.2880	1428.4761	951.2451	619.2872	651.4290	1027.9897	1556.8388	2072.3093	2509.7470	(97)
Space heating kWh	1280.4291	986.4686	804.3766	413.1635	148.1396	0.0000	0.0000	0.0000	0.0000	471.2004	913.8728	1308.0982	(98a)
Space heating requirement - total per year (kWh/year)												6325.7488	
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	1280.4291	986.4686	804.3766	413.1635	148.1396	0.0000	0.0000	0.0000	0.0000	471.2004	913.8728	1308.0982	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6325.7488	
Space heating per m ²										(98c) / (4) =		40.1533	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b													
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1576.5218	1241.0916	1272.5498	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8673	0.9286	0.8950	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1367.2806	1152.4996	1138.9715	0.0000	0.0000	0.0000	0.0000	(102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1674.5759	1600.9927	1460.4921	0.0000	0.0000	0.0000	0.0000	(103)
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	55.3131	83.4197	59.8028	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												198.5357	(107)

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Energy for space heating	40.1533 (99)
Energy for space cooling	1.2602 (108)
Total	41.4135 (109)
Fabric Energy Efficiency (DFEE)	41.4 (109)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 401.7270 (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	4 * 10 = 40.0000 (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) = 40.0000 / (5) = 0.0996 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3496 (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) = 0.2971 (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	0.3788	0.3714	0.3640	0.3268	0.3194	0.2823	0.2823	0.2748	0.2971	0.3194	0.3343	0.3491 (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	0.5718	0.5690	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5559	0.5609 (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
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type (Uw = 1.20)			36.4700	1.1450	41.7595		(27)
GF			78.7700	0.1300	10.2401		(28a)
Main	194.5140	38.6200	155.8940	0.1800	28.0609		(29a)
PIJ	78.7700		78.7700	0.1100	8.6647		(30)
Total net area of external elements Aum(A, m ²)			352.0540				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	90.8753	(33)

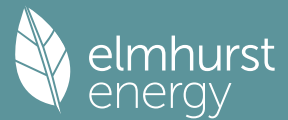
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 251.1858 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	24.8800	0.0500	1.2440
E3 Sill	24.8800	0.0500	1.2440
E4 Jamb	46.0700	0.0500	2.3035
E5 Ground floor (normal)	38.1400	0.1600	6.1024
E10 Eaves (insulation at ceiling level)	38.1400	0.0600	2.2884
E16 Corner (normal)	30.6000	0.0900	2.7540
E17 Corner (inverted - internal area greater than external area)	10.2000	-0.0900	-0.9180
E6 Intermediate floor within a dwelling	38.1400	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			15.0183 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 105.8936 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	75.7985	75.4291	75.0670	73.3662	73.0479	71.5666	71.5666	71.2923	72.1372	73.0479	73.6917	74.3647 (38)
Heat transfer coeff	181.6920	181.3226	180.9605	179.2597	178.9415	177.4602	177.4602	177.1858	178.0307	178.9415	179.5852	180.2583 (39)
Average = Sum(39)m / 12 =												179.2582

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1533	1.1510	1.1487	1.1379	1.1358	1.1264	1.1264	1.1247	1.1301	1.1358	1.1399	1.1442 (40)
HLP (average)												1.1379
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9454 (42)
Hot water usage for mixer showers												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
31.7757	31.3038	30.6392	29.4139	28.4964	27.4791	26.9295	27.5894	28.3079	29.3966	30.6471	31.6683	(42b)
Hot water usage for other uses												
44.7940	43.1652	41.5363	39.9074	38.2785	36.6497	36.6497	38.2785	39.9074	41.5363	43.1652	44.7940	(42c)
Average daily hot water use (litres/day)												70.1829 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	76.5697	74.4690	72.1755	69.3213	66.7750	64.1287	63.5792	65.8680	68.2154	70.9329	73.8123	76.4623 (44)
Energy content (annual)	121.2678	106.0428	110.9311	94.8974	89.8919	78.8537	76.8935	81.5583	84.1164	96.2552	105.1591	119.7215 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1165.5888
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
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												
103.0776	90.1364	94.2914	80.6628	76.4081	67.0257	65.3595	69.3246	71.4989	81.8169	89.3853	101.7633	(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	103.0776	90.1364	94.2914	80.6628	76.4081	67.0257	65.3595	69.3246	71.4989	81.8169	89.3853	101.7633 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 990.7505 (64)
Electric shower(s)	58.9452	52.5207	57.3506	54.7289	55.7559	53.1857	54.9586	55.7559	54.7289	57.3506	56.2721	58.9452 (64a)
												991 (64)
												670.4983 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month	40.5057	35.6643	37.9105	33.8479	33.0410	30.0529	30.0795	31.2701	31.5570	34.7919	36.4143	40.1771 (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	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709	147.2709 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.7463	183.5048	165.7463	171.2711	165.7463	171.2711	165.7463	165.7463	171.2711	165.7463	171.2711	165.7463 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	328.6105	332.0205	323.4275	305.1341	282.0420	260.3386	245.8395	242.4295	251.0225	269.3159	292.4080	314.1113 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271	37.7271 (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)	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168 (71)
Water heating gains (Table 5)	54.4431	53.0718	50.9550	47.0110	44.4100	41.7401	40.4295	42.0297	43.8291	46.7633	50.5755	54.0015 (72)
Total internal gains	615.9812	635.7784	607.3100	590.5976	559.3795	540.5311	519.1965	517.3868	533.3040	549.0067	581.4359	601.0404 (73)

6. Solar gains

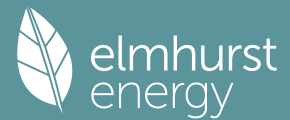
[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
North					2.0700	10.6334	0.6300	0.7000	0.7700	6.7269 (74)		
East					19.1000	19.6403	0.6300	0.7000	0.7700	114.6443 (76)		
South					3.3600	46.7521	0.6300	0.7000	0.7700	48.0078 (78)		
West					11.9400	19.6403	0.6300	0.7000	0.7700	71.6677 (80)		
Solar gains	241.0467	455.9457	722.2214	1023.6730	1238.0462	1262.3427	1203.7103	1043.3089	828.9709	532.5759	297.5133	200.3050 (83)
Total gains	857.0279	1091.7240	1329.5314	1614.2706	1797.4257	1802.8739	1722.9067	1560.6957	1362.2749	1081.5826	878.9492	801.3454 (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	60.4989	60.6222	60.7435	61.3198	61.4288	61.9416	61.9416	62.0375	61.7431	61.4288	61.2086	60.9801
alpha	5.0333	5.0415	5.0496	5.0880	5.0953	5.1294	5.1294	5.1358	5.1162	5.0953	5.0806	5.0653
util living area	0.9988	0.9956	0.9838	0.9318	0.8021	0.6068	0.4489	0.5132	0.7904	0.9726	0.9968	0.9991 (86)
MIT	19.5242	19.7580	20.1077	20.5483	20.8489	20.9716	20.9949	20.9904	20.8968	20.4502	19.8997	19.4883 (87)
Th 2	19.9575	19.9594	19.9613	19.9700	19.9717	19.9793	19.9793	19.9807	19.9764	19.9717	19.9684	19.9649 (88)
util rest of house	0.9983	0.9941	0.9781	0.9088	0.7456	0.5197	0.3471	0.4041	0.7103	0.9592	0.9954	0.9988 (89)
MIT 2	18.6098	18.8442	19.1913	19.6185	19.8765	19.9673	19.9781	19.9782	19.9229	19.5370	18.9931	18.5796 (90)
Living area fraction	fLA = Living area / (4) = 0.2741 (91)											
MIT	18.8605	19.0947	19.4425	19.8734	20.1430	20.2426	20.2568	20.2556	20.1899	19.7873	19.2416	18.8287 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8605	19.0947	19.4425	19.8734	20.1430	20.2426	20.2568	20.2556	20.1899	19.7873	19.2416	18.8287 (93)

8. Space heating requirement

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9977	0.9923	0.9744	0.9063	0.7559	0.5430	0.3751	0.4342	0.7287	0.9561	0.9941	0.9983	(94)
Useful gains	855.0345	1083.3471	1295.4767	1462.9424	1358.5913	978.9198	646.2290	677.6079	992.7382	1034.0571	873.7385	800.0069	(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	2645.5186	2573.8199	2342.0782	1967.0838	1510.8099	1001.3343	648.9382	683.1605	1084.1841	1643.9866	2180.4478	2636.9355	(97)
Space heating kWh	1332.1201	1001.5977	778.6715	362.9818	113.2506	0.0000	0.0000	0.0000	0.0000	453.7875	940.8307	1366.6749	(98a)
Space heating requirement - total per year (kWh/year)												6349.9149	
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	1332.1201	1001.5977	778.6715	362.9818	113.2506	0.0000	0.0000	0.0000	0.0000	453.7875	940.8307	1366.6749	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6349.9149	
Space heating per m2										(98c) / (4) =		40.3067	(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	1668.1255	1313.2051	1346.6123	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9076	0.9524	0.9261	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1514.0660	1250.6349	1247.1188	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2034.7992	1944.4845	1758.2117	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	374.9279	516.2241	380.2531	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	93.7320	129.0560	95.0633	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												317.8513	(107)
Energy for space heating												40.3067	(99)
Energy for space cooling												2.0176	(108)
Total												42.3243	(109)
Fabric Energy Efficiency (TFEE)												42.3	(109)

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

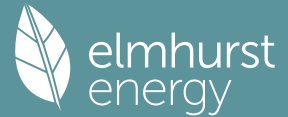
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)	
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	401.7270 (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		5.0000 (17)	
Infiltration rate		0.2500 (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) =	0.2125 (21)	
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 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	0.2709 0.2656 0.2603 0.2338 0.2284 0.2019 0.2019 0.1966 0.2125 0.2284 0.2391 0.2497 (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	0.5209 0.5156 0.5103 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 (25)		

Full SAP Calculation Printout



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	
Window (Uw = 1.20)			19.8400	1.1450	22.7176			(27)
Door			2.1500	1.0000	2.1500			(26)
French Door (Uw = 1.20)			16.6300	1.1450	19.0420			(27)
GF			78.7700	0.1100	8.6647	75.0000	5907.7500	(28a)
Main	194.5140	38.6200	155.8940	0.1800	28.0609	110.0000	17148.3400	(29a)
PIJ	78.7700		78.7700	0.1000	7.8770	9.0000	708.9300	(30)
Total net area of external elements Aum(A, m2)			352.0540					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		88.5122			(33)
Solid			182.4000			75.0000	13680.0000	(32c)
FF			78.7700			18.0000	1417.8600	(32d)
GF			78.7700			9.0000	708.9300	(32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	39571.8100	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							251.1858	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	24.8800	0.0260	0.6469
E3 Sill	24.8800	0.0220	0.5474
E4 Jamb	46.0700	0.0170	0.7832
E5 Ground floor (normal)	38.1400	0.0740	2.8224
E10 Eaves (insulation at ceiling level)	38.1400	0.0600	2.2884
E16 Corner (normal)	30.6000	0.0460	1.4076
E17 Corner (inverted - internal area greater than external area)	10.2000	-0.0880	-0.8976
E6 Intermediate floor within a dwelling	38.1400	0.0010	0.0381
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.6363 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	96.1485 (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	69.0606	68.3564	67.6521	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	(38)
Heat transfer coeff	165.2091	164.5049	163.8006	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	(39)
Average = Sum(39)m / 12 =													162.9513
HLP	1.0487	1.0442	1.0397	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	(40)
HLP (average)													1.0343
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

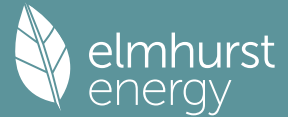
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9454	(42)	
Hot water usage for mixer showers	73.6048	72.4987	70.8868	67.8028	65.5269	62.9888	61.5462	63.1459	64.8994	67.6245	70.7748	73.3228	(42a)		
Hot water usage for baths	31.7757	31.3038	30.6392	29.4139	28.4964	27.4791	26.9295	27.5894	28.3079	29.3966	30.6471	31.6683	(42b)		
Hot water usage for other uses	44.7940	43.1652	41.5363	39.9074	38.2785	36.6497	36.6497	38.2785	39.9074	41.5363	43.1652	44.7940	(42c)		
Average daily hot water use (litres/day)													138.0441	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Energy content (annual)	150.1746	146.9677	143.0624	137.1242	132.3019	127.1176	125.1254	129.0138	133.1147	138.5574	144.5870	149.7852	(44)		
Distribution loss (46)m = 0.15 x (45)m	237.8398	209.2800	219.8815	187.7161	178.1038	156.3059	151.3283	159.7461	164.1438	188.0210	205.9907	234.5273	(45)		
Water storage loss:															
Store volume														236.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):														1.4100	(48)
Temperature factor from Table 2b														0.5400	(49)
Enter (49) or (54) in (55)														0.7614	(55)
Total storage loss	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	(56)		
If cylinder contains dedicated solar storage	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	(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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	(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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	(64)		
Electric shower(s)															
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)		
													0.0000	(64a)	
Heat gains from water heating, kWh/month	116.5744	103.4499	110.6033	98.6988	96.7121	88.2549	87.8093	90.6082	90.8610	100.0096	104.7751	115.4730	(65)		

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

Metabolic gains (Table 5), Watts													
(66)m	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.2387	37.5161	30.5101	23.0981	17.2661	14.5768	15.7507	20.4734	27.4793	34.8913	40.7233	43.4127	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	490.4634	495.5529	482.7276	455.4240	420.9582	388.5651	366.9246	361.8351	374.6604	401.9640	436.4298	468.8229	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	(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)	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	(71)
Water heating gains (Table 5)													

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Total internal gains	156.6860	153.9433	148.6603	137.0817	129.9894	122.5763	118.0233	121.7852	126.1958	134.4215	145.5210	155.2056 (72)
	803.9145	801.5386	776.4243	730.1302	682.7400	640.2445	615.2249	618.6200	642.8619	685.8032	737.2005	781.9675 (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				2.0700	10.6334		0.3000		0.0000		0.7700		5.0846 (74)
East				5.8300	19.6403		0.3000		0.0000		0.7700		26.4501 (76)
West				11.9400	19.6403		0.3000		0.0000		0.7700		54.1706 (80)
East				13.2700	19.6403		0.3000		0.0000		0.7700		60.2047 (76)
South				3.3600	46.7521		0.3000		0.0000		0.7700		36.2871 (78)

Solar gains	182.1971	344.6301	545.8967	773.7513	935.7870	954.1517	909.8339	788.5933	626.5842	402.5517	224.8778	151.4021	(83)
Total gains	986.1115	1146.1688	1322.3210	1503.8815	1618.5270	1594.3962	1525.0588	1407.2133	1269.4461	1088.3549	962.0783	933.3696	(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	66.5349	66.8197	67.1070	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718
alpha	5.4357	5.4546	5.4738	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115
util living area	0.9976	0.9941	0.9816	0.9349	0.8158	0.6291	0.4648	0.5232	0.7892	0.9666	0.9948	0.9982 (86)
Living	19.7740	19.9569	20.2549	20.6124	20.8682	20.9747	20.9959	20.9925	20.9176	20.5584	20.0987	19.7548
Non living	18.6092	18.8453	19.2251	19.6676	19.9492	20.0434	20.0562	20.0549	20.0023	19.6121	19.0354	18.5953
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.3728	19.9569	20.2549	20.6124	20.8682	20.9747	20.9959	20.9925	20.9176	20.5584	20.0987	19.9290 (87)
Th 2	20.0430	20.0467	20.0503	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575 (88)
util rest of house	0.9968	0.9921	0.9754	0.9134	0.7635	0.5461	0.3673	0.4201	0.7133	0.9512	0.9927	0.9976 (89)
MIT 2	19.4714	18.8453	19.2251	19.6676	19.9492	20.0434	20.0562	20.0549	20.0023	19.6121	19.0354	18.8588 (90)
Living area fraction	19.7185	19.1500	19.5073	19.9265	20.2011	20.2987	20.3138	20.3119	20.2532	19.8715	19.3268	0.2741 (91)
MIT	19.7185	19.1500	19.5073	19.9265	20.2011	20.2987	20.3138	20.3119	20.2532	19.8715	19.3268	19.1522 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7185	19.1500	19.5073	19.9265	20.2011	20.2987	20.3138	20.3119	20.2532	19.8715	19.3268	19.1522 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9965	0.9896	0.9708	0.9099	0.7721	0.5680	0.3941	0.4484	0.7305	0.9473	0.9904	0.9968 (94)
Ext temp.	982.6285	1134.2282	1283.7135	1368.4431	1249.7371	905.6886	601.0435	631.0371	927.3738	1031.0522	952.8630	930.4100 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	2547.2701	2344.1931	2130.6096	1791.0751	1380.8626	925.6589	603.2460	635.4179	999.4784	1506.0012	1986.0483	2428.7293 (97)
Space heating requirement - total per year (kWh/year)	1164.0934	813.0964	630.0907	304.2950	97.5574	0.0000	0.0000	0.0000	0.0000	353.3620	743.8934	1114.7495 (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)	1164.0934	813.0964	630.0907	304.2950	97.5574	0.0000	0.0000	0.0000	0.0000	353.3620	743.8934	1114.7495 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5221.1379
Space heating per m2										(98c) / (4) =		33.1417 (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 %)											232.8620 (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	1164.0934	813.0964	630.0907	304.2950	97.5574	0.0000	0.0000	0.0000	0.0000	353.3620	743.8934	1114.7495 (98)
Space heating efficiency (main heating system 1)	232.8620	232.8620	232.8620	232.8620	232.8620	0.0000	0.0000	0.0000	0.0000	232.8620	232.8620	232.8620 (210)
Space heating fuel (main heating system)	499.9071	349.1753	270.5855	130.6761	41.8950	0.0000	0.0000	0.0000	0.0000	151.7474	319.4568	478.7169 (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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (64)
Efficiency of water heater (217)m	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984 (216)
Fuel for water heating, kWh/month	100.1080	88.4711	93.7935	81.9520	79.1037	70.9075	69.6889	72.6487	73.6635	82.5908	88.3777	98.9433 (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	6.5228	5.8916	6.5228	6.3124	6.5228	6.3124	6.5228	6.5228	6.3124	6.5228	6.3124	6.5228 (231)
Lighting	36.9713	29.6598	26.7053	19.5655	15.1129	12.3474	13.7865	17.9202	23.2766	30.5402	34.4951	37.9989 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												

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(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												2242.1601	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												284.3984	
Water heating fuel used												1000.2487	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 5.7980, total flow = 37.0000, SFP = 0.1567)													
mechanical ventilation fans (SFP = 0.1567)												76.8011	(230a)
Total electricity for the above, kWh/year												76.8011	(231)
Electricity for lighting (calculated in Appendix L)												298.3797	(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												3617.5896	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2242.1601	16.4900	369.7322 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1000.2487	16.4900	164.9410 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	76.8011	16.4900	12.6645 (249)
Energy for lighting	298.3797	16.4900	49.2028 (250)
Additional standing charges			0.0000 (251)
Total energy cost			596.5405 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] = 1.0603 (257)$
SAP value	82.8124
SAP rating (Section 12)	83 (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	2242.1601	0.1560	349.8758 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1000.2487	0.1410	141.0573 (264)
Space and water heating			490.9331 (265)
Pumps, fans and electric keep-hot	76.8011	0.1387	10.6533 (267)
Energy for lighting	298.3797	0.1443	43.0654 (268)
Total CO2, kg/year			544.6518 (272)
CO2 emissions per m2			3.4600 (273)
EI value			96.3966
EI rating			96 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	401.7270 (5)

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2. Ventilation rate

													m3 per hour
Number of open chimneys													0 * 80 = 0.0000 (6a)
Number of open flues													0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire													0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler													0 * 20 = 0.0000 (6d)
Number of flues attached to other heater													0 * 35 = 0.0000 (6e)
Number of blocked chimneys													0 * 20 = 0.0000 (6f)
Number of intermittent extract fans													0 * 10 = 0.0000 (7a)
Number of passive vents													0 * 10 = 0.0000 (7b)
Number of flueless gas fires													0 * 40 = 0.0000 (7c)
													Air changes per hour
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =												0.0000 / (5) = 0.0000 (8)
Pressure test													Yes
Pressure Test Method													Blower Door
Measured/design AP50													5.0000 (17)
Infiltration rate													0.2500 (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) = 0.2125 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.5000	4.4000	4.4000	4.0000	4.1000	3.5000	3.4000	3.4000	3.5000	4.0000	4.0000	4.0000	(22)
Adj infilt rate	1.1250	1.1000	1.1000	1.0000	1.0250	0.8750	0.8500	0.8500	0.8750	1.0000	1.0000	1.0000	(22a)
Mechanical extract ventilation - decentralised	0.2391	0.2338	0.2338	0.2125	0.2178	0.1859	0.1806	0.1806	0.1859	0.2125	0.2125	0.2125	(22b)
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						
Window (Uw = 1.20)			19.8400	1.1450	22.7176			(27)					
Door			2.1500	1.0000	2.1500			(26)					
French Door (Uw = 1.20)			16.6300	1.1450	19.0420			(27)					
GF			78.7700	0.1100	8.6647	75.0000	5907.7500	(28a)					
Main	194.5140	38.6200	155.8940	0.1800	28.0609	110.0000	17148.3400	(29a)					
PIJ	78.7700		78.7700	0.1000	7.8770	9.0000	708.9300	(30)					
Total net area of external elements Aum(A, m2)			352.0540					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	88.5122			(33)					
Solid			182.4000			75.0000	13680.0000	(32c)					
FF			78.7700			18.0000	1417.8600	(32d)					
GF			78.7700			9.0000	708.9300	(32e)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		39571.8100	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							251.1858	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				24.8800	0.0260	0.6469							
E3 Sill				24.8800	0.0220	0.5474							
E4 Jamb				46.0700	0.0170	0.7832							
E5 Ground floor (normal)				38.1400	0.0740	2.8224							
E10 Eaves (insulation at ceiling level)				38.1400	0.0600	2.2884							
E16 Corner (normal)				30.6000	0.0460	1.4076							
E17 Corner (inverted - internal area greater than external area)				10.2000	-0.0880	-0.8976							
E6 Intermediate floor within a dwelling				38.1400	0.0010	0.0381							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.6363	(36)					
Point Thermal bridges							(36a) = 0.0000						
Total fabric heat loss							(33) + (36) + (36a) = 96.1485	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 66.2850	Feb 66.2850	Mar 66.2850	Apr 66.2850	May 66.2850	Jun 66.2850	Jul 66.2850	Aug 66.2850	Sep 66.2850	Oct 66.2850	Nov 66.2850	Dec 66.2850	(38)
Heat transfer coeff	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	(39)
Average = Sum(39)m / 12 =												162.4334	
HLP	Jan 1.0311	Feb 1.0311	Mar 1.0311	Apr 1.0311	May 1.0311	Jun 1.0311	Jul 1.0311	Aug 1.0311	Sep 1.0311	Oct 1.0311	Nov 1.0311	Dec 1.0311	(40)
HLP (average)												1.0311	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9454 (42)
Hot water usage for mixer showers													
Hot water usage for baths	73.6048	72.4987	70.8868	67.8028	65.5269	62.9888	61.5462	63.1459	64.8994	67.6245	70.7748	73.3228	(42a)
Hot water usage for other uses	31.7757	31.3038	30.6392	29.4139	28.4964	27.4791	26.9295	27.5894	28.3079	29.3966	30.6471	31.6683	(42b)
Average daily hot water use (litres/day)	44.7940	43.1652	41.5363	39.9074	38.2785	36.6497	36.6497	38.2785	39.9074	41.5363	43.1652	44.7940	(42c)
Daily hot water use	150.1746	146.9677	143.0624	137.1242	132.3019	127.1176	125.1254	129.0138	133.1147	138.5574	144.5870	149.7852	(44)
Energy conte	237.8398	209.2800	219.8815	187.7161	178.1038	156.3059	151.3283	159.7461	164.1438	188.0210	205.9907	234.5273	(45)
Energy content (annual)										Total = Sum(45)m =		2292.8844	
Distribution loss (46)m = 0.15 x (45)m	35.6760	31.3920	32.9822	28.1574	26.7156	23.4459	22.6992	23.9619	24.6216	28.2032	30.8986	35.1791	(46)
Water storage loss:													
Store volume													236.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.4100 (48)

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Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7614 (55)
Total storage loss	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034 (56)
If cylinder contains dedicated solar storage	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034 (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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (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	116.5744	103.4499	110.6033	98.6988	96.7121	88.2549	87.8093	90.6082	90.8610	100.0096	104.7751	115.4730 (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	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.2387	37.5161	30.5101	23.0981	17.2661	14.5768	15.7507	20.4734	27.4793	34.8913	40.7233	43.4127 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	490.4634	495.5529	482.7276	455.4240	420.9582	388.5651	366.9246	361.8351	374.6604	401.9640	436.4298	468.8229 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179 (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)	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168 (71)
Water heating gains (Table 5)	156.6860	153.9433	148.6603	137.0817	129.9894	122.5763	118.0233	121.7852	126.1958	134.4215	145.5210	155.2056 (72)
Total internal gains	803.9145	801.5386	776.4243	730.1302	682.7400	640.2445	615.2249	618.6200	642.8619	685.8032	737.2005	781.9675 (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					2.0700	8.9975	0.3000		0.0000	0.7700		4.3023 (74)
East					5.8300	16.6187	0.3000		0.0000	0.7700		22.3809 (76)
West					11.9400	16.6187	0.3000		0.0000	0.7700		45.8367 (80)
East					13.2700	16.6187	0.3000		0.0000	0.7700		50.9424 (76)
South					3.3600	39.5594	0.3000		0.0000	0.7700		30.7045 (78)

Solar gains	154.1667	306.3379	511.7782	742.8013	872.4264	906.4441	847.2527	728.3186	599.3414	378.1546	197.6199	136.9828 (83)
Total gains	958.0812	1107.8765	1288.2025	1472.9314	1555.1665	1546.6886	1462.4776	1346.9387	1242.2033	1063.9578	934.8204	918.9503 (84)

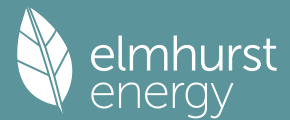
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718
alpha	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115
util living area	0.9976	0.9941	0.9812	0.9297	0.7919	0.5930	0.4627	0.5229	0.7854	0.9656	0.9946	0.9981 (86)
Living	19.8390	20.0074	20.2889	20.6433	20.8967	20.9827	20.9962	20.9928	20.9219	20.5752	20.1361	19.8010
Non living	18.7032	18.9179	19.2737	19.7047	19.9781	20.0490	20.0564	20.0552	20.0065	19.6331	19.0832	18.6546
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4061	20.0074	20.2889	20.6433	20.8967	20.9827	20.9962	20.9928	20.9219	20.5752	20.1361	19.9687 (87)
Th 2	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575 (88)
util rest of house	0.9967	0.9921	0.9747	0.9059	0.7319	0.5039	0.3610	0.4150	0.7067	0.9494	0.9923	0.9974 (89)
MIT 2	19.5176	18.9179	19.2737	19.7047	19.9781	20.0490	20.0564	20.0552	20.0065	19.6331	19.0832	18.9074 (90)
Living area fraction									fLA = Living area / (4) =			0.2741 (91)
MIT	19.7611	19.2165	19.5519	19.9620	20.2299	20.3049	20.3140	20.3122	20.2574	19.8913	19.3718	19.1983 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7611	19.2165	19.5519	19.9620	20.2299	20.3049	20.3140	20.3122	20.2574	19.8913	19.3718	19.1983 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9964	0.9895	0.9701	0.9031	0.7438	0.5280	0.3890	0.4447	0.7249	0.9457	0.9900	0.9966 (94)
Ext temp.	954.6395	1096.2987	1249.7296	1330.1442	1156.6571	816.6078	568.8398	598.9899	900.4701	1006.2129	925.4777	915.8107 (95)
Heat loss rate W	4.8000	5.4000	6.9000	9.4000	12.5000	15.2000	16.8000	16.6000	14.3000	10.9000	7.6000	4.7000 (96)
Space heating kWh	2430.1850	2244.2685	2055.0994	1715.6167	1255.5874	829.2108	570.7919	602.9809	967.6843	1460.4890	1912.1355	2355.0099 (97)
Space heating requirement - total per year (kWh/year)	1097.8059	771.4357	599.1951	277.5402	73.6042	0.0000	0.0000	0.0000	0.0000	337.9814	710.3936	1070.7642 (98a)
Solar heating kWh												4938.7201
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh												

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1097.8059 771.4357 599.1951 277.5402 73.6042 0.0000 0.0000 0.0000 0.0000 337.9814 710.3936 1070.7642 (98c)
 Space heating requirement after solar contribution - total per year (kWh/year) 4938.7201
 Space heating per m2 (98c) / (4) = 31.3490 (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 %)												232.6866 (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	1097.8059	771.4357	599.1951	277.5402	73.6042	0.0000	0.0000	0.0000	0.0000	337.9814	710.3936	1070.7642 (98)
Space heating efficiency (main heating system 1)	232.6866	232.6866	232.6866	232.6866	232.6866	0.0000	0.0000	0.0000	0.0000	232.6866	232.6866	232.6866 (210)
Space heating fuel (main heating system 2)	471.7959	331.5342	257.5116	119.2764	31.6323	0.0000	0.0000	0.0000	0.0000	145.2518	305.3006	460.1744 (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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (64)
Efficiency of water heater (217)m	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026 (216)
Fuel for water heating, kWh/month	100.1066	88.4698	93.7922	81.9508	79.1025	70.9065	69.6879	72.6477	73.6624	82.5896	88.3764	98.9418 (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	6.5228	5.8916	6.5228	6.3124	6.5228	6.3124	6.5228	6.5228	6.3124	6.5228	6.3124	6.5228 (231)
Lighting	36.9713	29.6598	26.7053	19.5655	15.1129	12.3474	13.7865	17.9202	23.2766	30.5402	34.4951	37.9989 (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												2122.4772 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												284.4026
Water heating fuel used												1000.2341 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEVDecentralised, Database: total watage = 5.7980, total flow = 37.0000, SFP = 0.1567)												
mechanical ventilation fans (SFP = 0.1567)												76.8011 (230a)
Total electricity for the above, kWh/year												76.8011 (231)
Electricity for lighting (calculated in Appendix L)												298.3797 (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												3497.8920 (238)

10a. Fuel costs - using BEDF prices (554)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2122.4772	26.0600	553.1176 (240)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1000.2341	26.0600	260.6610 (247)	
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)	
Pumps, fans and electric keep-hot	76.8011	26.0600	20.0144 (249)	
Energy for lighting	298.3797	26.0600	77.7577 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			911.5507 (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	2122.4772	0.1562	331.4425 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	1000.2341	0.1410	141.0553 (264)	
Space and water heating			472.4978 (265)	
Pumps, fans and electric keep-hot	76.8011	0.1387	10.6533 (267)	
Energy for lighting	298.3797	0.1443	43.0654 (268)	
Total CO2, kg/year			526.2165 (272)	

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	2122.4772	1.5781	3349.4961 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	1000.2341	1.5215	1521.8114 (278)
Space and water heating			4871.3075 (279)
Pumps, fans and electric keep-hot	76.8011	1.5128	116.1847 (281)
Energy for lighting	298.3797	1.5338	457.6647 (282)
Total Primary energy kWh/year			5445.1569 (286)

SAP 10 EPC IMPROVEMENTS

001

Current energy efficiency rating: B 83
Current environmental impact rating: A 96

N Solar water heating SAP increase too small
U Solar photovoltaic panels Recommended
V2 Wind turbine Not applicable

Recommended measures:	SAP change	Cost change	CO ₂ change
U Solar photovoltaic panels	+ 5.8	-£ 276	-208 kg (39.4%)

Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ 0.8	-£ 37	-17 kg (3.3%)

	Typical annual savings	Energy efficiency	Environmental impact
Recommended measures			
Solar photovoltaic panels	£276	1.32 kg/m ²	B 89 A 98
Total Savings	£276	1.32 kg/m ²	

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 554 TEST (31 Oct 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £912	Potential £912	Saving £0
Electricity			
Space heating	£573	£573	£0
Water heating	£261	£261	£0
Lighting	£78	£78	£0
Generated (PV)	-£0	-£276	£276
Total cost of fuels	£912	£636	£276
Total cost of uses	£912	£636	£276
Delivered energy	22 kWh/m ²	12 kWh/m ²	10 kWh/m ²
Carbon dioxide emissions	0.5 tonnes	0.3 tonnes	0.2 tonnes
CO ₂ emissions per m ²	3 kg/m ²	2 kg/m ²	1 kg/m ²
Primary energy	35 kWh/m ²	24 kWh/m ²	11 kWh/m ²

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

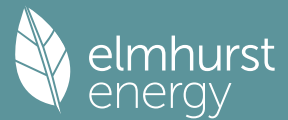
1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 401.7270 (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)
Air changes per hour	

Full SAP Calculation Printout



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 5.0000 (17)
Infiltration rate 0.2500 (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) = 0.2125 (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	0.2709	0.2656	0.2603	0.2338	0.2284	0.2019	0.2019	0.1966	0.2125	0.2284	0.2391	0.2497	(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	0.5209	0.5156	0.5103	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	
Window (Uw = 1.20)			19.8400	1.1450	22.7176			(27)
Door			2.1500	1.0000	2.1500			(26)
French Door (Uw = 1.20)			16.6300	1.1450	19.0420			(27)
GF			78.7700	0.1100	8.6647	75.0000	5907.7500	(28a)
Main	194.5140	38.6200	155.8940	0.1800	28.0609	110.0000	17148.3400	(29a)
PIJ	78.7700		78.7700	0.1000	7.8770	9.0000	708.9300	(30)
Total net area of external elements Aum(A, m2)			352.0540					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	88.5122			(33)
Solid			182.4000			75.0000	13680.0000	(32c)
FF			78.7700			18.0000	1417.8600	(32d)
GF			78.7700			9.0000	708.9300	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 39571.8100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 251.1858 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	24.8800	0.0260	0.6469
E3 Sill	24.8800	0.0220	0.5474
E4 Jamb	46.0700	0.0170	0.7832
E5 Ground floor (normal)	38.1400	0.0740	2.8224
E10 Eaves (insulation at ceiling level)	38.1400	0.0600	2.2884
E16 Corner (normal)	30.6000	0.0460	1.4076
E17 Corner (inverted - internal area greater than external area)	10.2000	-0.0880	-0.8976
E6 Intermediate floor within a dwelling	38.1400	0.0010	0.0381

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.6363 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 96.1485 (37)

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

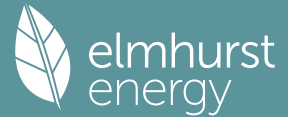
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	69.0606	68.3564	67.6521	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	(38)
Heat transfer coeff	165.2091	164.5049	163.8006	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	(39)
Average = Sum(39)m / 12 =													162.9513

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0487	1.0442	1.0397	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	(40)
HLP (average)													1.0343
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9454 (42)
Hot water usage for mixer showers													
73.6048	72.4987	70.8868	67.8028	65.5269	62.9888	61.5462	63.1459	64.8994	67.6245	70.7748	73.3228	73.3228	(42a)
Hot water usage for baths													
31.7757	31.3038	30.6392	29.4139	28.4964	27.4791	26.9295	27.5894	28.3079	29.3966	30.6471	31.6683	31.6683	(42b)
Hot water usage for other uses													
44.7940	43.1652	41.5363	39.9074	38.2785	36.6497	36.6497	38.2785	39.9074	41.5363	43.1652	44.7940	44.7940	(42c)
Average daily hot water use (litres/day)													138.0441 (43)
Daily hot water use													
150.1746	146.9677	143.0624	137.1242	132.3019	127.1176	125.1254	129.0138	133.1147	138.5574	144.5870	149.7852	149.7852	(44)
Energy conte	237.8398	209.2800	219.8815	187.7161	178.1038	156.3059	151.3283	159.7461	164.1438	188.0210	205.9907	234.5273	(45)
Energy content (annual)													Total = Sum(45)m = 2292.8844
Distribution loss (46)m = 0.15 x (45)m													
35.6760	31.3920	32.9822	28.1574	26.7156	23.4459	22.6992	23.9619	24.6216	28.2032	30.8986	35.1791	35.1791	(46)
Water storage loss:													
Store volume													236.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.4100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7614 (55)
Total storage loss													
23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	(56)
If cylinder contains dedicated solar storage													
23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	(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													
284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	281.3931	(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													
284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	281.3931	(64)
Total per year (kWh/year) = Sum(64)m =													2844.6914 (64)

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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	116.5744	103.4499	110.6033	98.6988	96.7121	88.2549	87.8093	90.6082	90.8610	100.0096	104.7751	115.4730 (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	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.2387	37.5161	30.5101	23.0981	17.2661	14.5768	15.7507	20.4734	27.4793	34.8913	40.7233	43.4127	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	490.4634	495.5529	482.7276	455.4240	420.9582	388.5651	366.9246	361.8351	374.6604	401.9640	436.4298	468.8229	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	(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)	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	(71)
Water heating gains (Table 5)	156.6860	153.9433	148.6603	137.0817	129.9894	122.5763	118.0233	121.7852	126.1958	134.4215	145.5210	155.2056	(72)
Total internal gains	803.9145	801.5386	776.4243	730.1302	682.7400	640.2445	615.2249	618.6200	642.8619	685.8032	737.2005	781.9675	(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					2.0700	10.6334	0.3000	0.0000				0.7700	5.0846 (74)	
East					5.8300	19.6403	0.3000	0.0000				0.7700	26.4501 (76)	
West					11.9400	19.6403	0.3000	0.0000				0.7700	54.1706 (80)	
East					13.2700	19.6403	0.3000	0.0000				0.7700	60.2047 (76)	
South					3.3600	46.7521	0.3000	0.0000				0.7700	36.2871 (78)	
Solar gains	182.1971	344.6301	545.8967	773.7513	935.7870	954.1517	909.8339	788.5933	626.5842	402.5517	224.8778	151.4021	(83)	
Total gains	986.1115	1146.1688	1322.3210	1503.8815	1618.5270	1594.3962	1525.0588	1407.2133	1269.4461	1088.3549	962.0783	933.3696	(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	66.5349	66.8197	67.1070	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	
alpha	5.4357	5.4546	5.4738	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	
util living area	0.9976	0.9941	0.9816	0.9349	0.8158	0.6291	0.4648	0.5232	0.7892	0.9666	0.9948	0.9982	(86)
Living	19.7740	19.9569	20.2549	20.6124	20.8682	20.9747	20.9959	20.9925	20.9176	20.5584	20.0987	19.7548	
Non living	18.6092	18.8453	19.2251	19.6676	19.9492	20.0434	20.0562	20.0549	20.0023	19.6121	19.0354	18.5953	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.3728	19.9569	20.2549	20.6124	20.8682	20.9747	20.9959	20.9925	20.9176	20.5584	20.0987	19.9290	(87)
Th 2	20.0430	20.0467	20.0503	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	(88)
util rest of house	0.9968	0.9921	0.9754	0.9134	0.7635	0.5461	0.3673	0.4201	0.7133	0.9512	0.9927	0.9976	(89)
MIT 2	19.4714	18.8453	19.2251	19.6676	19.9492	20.0434	20.0562	20.0549	20.0023	19.6121	19.0354	18.8588	(90)
Living area fraction									FLA = Living area / (4) =			0.2741	(91)
MIT	19.7185	19.1500	19.5073	19.9265	20.2011	20.2987	20.3138	20.3119	20.2532	19.8715	19.3268	19.1522	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7185	19.1500	19.5073	19.9265	20.2011	20.2987	20.3138	20.3119	20.2532	19.8715	19.3268	19.1522	(93)

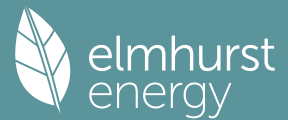
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9965	0.9896	0.9708	0.9099	0.7721	0.5680	0.3941	0.4484	0.7305	0.9473	0.9904	0.9968	(94)
Ext temp.	982.6285	1134.2282	1283.7135	1368.4431	1249.7371	905.6886	601.0435	631.0371	927.3738	1031.0522	952.8630	930.4100	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
2547.2701	2344.1931	2130.6096	1791.0751	1380.8626	925.6589	603.2460	635.4179	999.4784	1506.0012	1986.0483	2428.7293		(97)
Space heating kWh	1164.0934	813.0964	630.0907	304.2950	97.5574	0.0000	0.0000	0.0000	0.0000	353.3620	743.8934	1114.7495	(98a)
Space heating requirement - total per year (kWh/year)												5221.1379	
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	1164.0934	813.0964	630.0907	304.2950	97.5574	0.0000	0.0000	0.0000	0.0000	353.3620	743.8934	1114.7495	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5221.1379	
Space heating per m ²										(98c) / (4) =		33.1417	(99)

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

-----												0.0000 (201)
Fraction of space heat from secondary/supplementary system (Table 11)												
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												232.8620 (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												

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Space heating efficiency (main heating system 1)	1164.0934	813.0964	630.0907	304.2950	97.5574	0.0000	0.0000	0.0000	0.0000	353.3620	743.8934	1114.7495 (98)
Space heating fuel (main heating system)	232.8620	232.8620	232.8620	232.8620	232.8620	0.0000	0.0000	0.0000	0.0000	232.8620	232.8620	232.8620 (210)
Space heating efficiency (main heating system 2)	499.9071	349.1753	270.5855	130.6761	41.8950	0.0000	0.0000	0.0000	0.0000	151.7474	319.4568	478.7169 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (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 requirement	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (64)
Efficiency of water heater (217)m	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984	284.3984 (216)
Fuel for water heating, kWh/month	100.1080	88.4711	93.7935	81.9520	79.1037	70.9075	69.6889	72.6487	73.6635	82.5908	88.3777	98.9433 (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	6.5228	5.8916	6.5228	6.3124	6.5228	6.3124	6.5228	6.5228	6.3124	6.5228	6.3124	6.5228 (231)
Lighting	36.9713	29.6598	26.7053	19.5655	15.1129	12.3474	13.7865	17.9202	23.2766	30.5402	34.4951	37.9989 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-40.2189	-60.7411	-92.4168	-106.8523	-114.9103	-105.1754	-103.7175	-95.8327	-82.2417	-69.5540	-45.1085	-34.1737 (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	-9.8676	-22.8389	-49.9295	-83.9198	-120.7725	-126.5384	-124.9341	-103.9413	-74.2214	-37.2918	-14.3013	-7.7401 (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												2242.1601 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												284.3984
Water heating fuel used												1000.2487 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 5.7980, total flow = 37.0000, SFP = 0.1567)												
mechanical ventilation fans (SFP = 0.1567)												76.8011 (230a)
Total electricity for the above, kWh/year												76.8011 (231)
Electricity for lighting (calculated in Appendix L)												298.3797 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1727.2394 (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												1890.3502 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2242.1601	16.4900	369.7322 (240)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1000.2487	16.4900	164.9410 (247)	
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)	
Pumps, fans and electric keep-hot	76.8011	16.4900	12.6645 (249)	
Energy for lighting	298.3797	16.4900	49.2028 (250)	
Additional standing charges			0.0000 (251)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-950.9429	16.4900	-156.8105	
PV Unit electricity exported	-776.2965	5.5900	-43.3950	
Total			-200.2055 (252)	
Total energy cost			396.3351 (255)	

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		0.7045 (257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	88.5808
SAP rating (Section 12)		89 (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	2242.1601	0.1560	349.8758 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	1000.2487	0.1410	141.0573 (264)	
Space and water heating			490.9331 (265)	
Pumps, fans and electric keep-hot	76.8011	0.1387	10.6533 (267)	
Energy for lighting	298.3797	0.1443	43.0654 (268)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-950.9429	0.1342	-127.6035	

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PV Unit electricity exported -776.2965 0.1227 -95.2564
 Total -222.8599 (269)
 Total CO2, kg/year 321.7919 (272)
 CO2 emissions per m2 2.0400 (273)
 EI value 97.8710
 EI rating 98 (274)
 EI band A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	78.7700 (1b)	x 2.4000 (2b)	= 189.0480 (1b) - (3b)
First floor	78.7700 (1c)	x 2.7000 (2c)	= 212.6790 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 401.7270 (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 5.0000 (17)
 Infiltration rate 0.2500 (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) = 0.2125 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.5000	4.4000	4.4000	4.0000	4.1000	3.5000	3.4000	3.4000	3.5000	4.0000	4.0000	4.0000 (22)
Wind factor	1.1250	1.1000	1.1000	1.0000	1.0250	0.8750	0.8500	0.8500	0.8750	1.0000	1.0000	1.0000 (22a)
Adj infilt rate	0.2391	0.2338	0.2338	0.2125	0.2178	0.1859	0.1806	0.1806	0.1859	0.2125	0.2125	0.2125 (22b)
Mechanical extract ventilation - decentralised												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
Window (Uw = 1.20)			19.8400	1.1450	22.7176		(27)
Door			2.1500	1.0000	2.1500		(26)
French Door (Uw = 1.20)			16.6300	1.1450	19.0420		(27)
GF			78.7700	0.1100	8.6647	75.0000	5907.7500 (28a)
Main	194.5140	38.6200	155.8940	0.1800	28.0609	110.0000	17148.3400 (29a)
PIJ	78.7700		78.7700	0.1000	7.8770	9.0000	708.9300 (30)
Total net area of external elements Aum(A, m2)			352.0540				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	88.5122			(33)
Solid			182.4000			75.0000	13680.0000 (32c)
FF			78.7700			18.0000	1417.8600 (32d)
GF			78.7700			9.0000	708.9300 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 39571.8100 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 251.1858 (35)

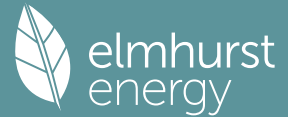
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	24.8800	0.0260	0.6469
E3 Sill	24.8800	0.0220	0.5474
E4 Jamb	46.0700	0.0170	0.7832
E5 Ground floor (normal)	38.1400	0.0740	2.8224
E10 Eaves (insulation at ceiling level)	38.1400	0.0600	2.2884
E16 Corner (normal)	30.6000	0.0460	1.4076
E17 Corner (inverted - internal area greater than external area)	10.2000	-0.0880	-0.8976
E6 Intermediate floor within a dwelling	38.1400	0.0010	0.0381
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.6363 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	96.1485 (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	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850	66.2850 (38)

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Heat transfer coeff	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334	162.4334 (39)
Average = Sum(39)m / 12 =													162.4334
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311	1.0311 (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													2.9454 (42)
Hot water usage for mixer showers													
	73.6048	72.4987	70.8868	67.8028	65.5269	62.9888	61.5462	63.1459	64.8994	67.6245	70.7748	73.3228	(42a)
Hot water usage for baths													
	31.7757	31.3038	30.6392	29.4139	28.4964	27.4791	26.9295	27.5894	28.3079	29.3966	30.6471	31.6683	(42b)
Hot water usage for other uses													
	44.7940	43.1652	41.5363	39.9074	38.2785	36.6497	36.6497	38.2785	39.9074	41.5363	43.1652	44.7940	(42c)
Average daily hot water use (litres/day)													138.0441 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	150.1746	146.9677	143.0624	137.1242	132.3019	127.1176	125.1254	129.0138	133.1147	138.5574	144.5870	149.7852	(44)
Energy conte	237.8398	209.2800	219.8815	187.7161	178.1038	156.3059	151.3283	159.7461	164.1438	188.0210	205.9907	234.5273	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													2292.8844
	35.6760	31.3920	32.9822	28.1574	26.7156	23.4459	22.6992	23.9619	24.6216	28.2032	30.8986	35.1791	(46)
Water storage loss:													
Store volume													236.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.4100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7614 (55)
Total storage loss													
	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	(56)
If cylinder contains dedicated solar storage													
	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	(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													
	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	(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													
	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931	(64)
													2844.6914 (64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
	116.5744	103.4499	110.6033	98.6988	96.7121	88.2549	87.8093	90.6082	90.8610	100.0096	104.7751	115.4730	(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	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	176.7251	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	42.2387	37.5161	30.5101	23.0981	17.2661	14.5768	15.7507	20.4734	27.4793	34.8913	40.7233	43.4127	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	490.4634	495.5529	482.7276	455.4240	420.9582	388.5651	366.9246	361.8351	374.6604	401.9640	436.4298	468.8229	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	55.6179	(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)													
	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	-117.8168	(71)
Water heating gains (Table 5)													
	156.6860	153.9433	148.6603	137.0817	129.9894	122.5763	118.0233	121.7852	126.1958	134.4215	145.5210	155.2056	(72)
Total internal gains													
	803.9145	801.5386	776.4243	730.1302	682.7400	640.2445	615.2249	618.6200	642.8619	685.8032	737.2005	781.9675	(73)

6. Solar gains													

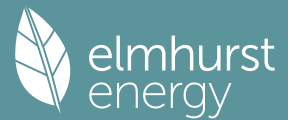
[Jan]													
			Area		Solar flux		g		FF		Access		Gains
			m2		Table 6a		Specific data		Specific data		factor		W
					W/m2		or Table 6b		or Table 6c		Table 6d		
North			2.0700		8.9975		0.3000		0.0000		0.7700		4.3023 (74)
East			5.8300		16.6187		0.3000		0.0000		0.7700		22.3809 (76)
West			11.9400		16.6187		0.3000		0.0000		0.7700		45.8367 (80)
East			13.2700		16.6187		0.3000		0.0000		0.7700		50.9424 (76)
South			3.3600		39.5594		0.3000		0.0000		0.7700		30.7045 (78)

Solar gains	154.1667	306.3379	511.7782	742.8013	872.4264	906.4441	847.2527	728.3186	599.3414	378.1546	197.6199	136.9828	(83)
Total gains	958.0812	1107.8765	1288.2025	1472.9314	1555.1665	1546.6886	1462.4776	1346.9387	1242.2033	1063.9578	934.8204	918.9503	(84)

7. Mean internal temperature (heating season)													

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	67.6718	
alpha	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	5.5115	
util living area													
	0.9976	0.9941	0.9812	0.9297	0.7919	0.5930	0.4627	0.5229	0.7854	0.9656	0.9946	0.9981	(86)

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Living	19.8390	20.0074	20.2889	20.6433	20.8967	20.9827	20.9962	20.9928	20.9219	20.5752	20.1361	19.8010
Non living	18.7032	18.9179	19.2737	19.7047	19.9781	20.0490	20.0564	20.0552	20.0065	19.6331	19.0832	18.6546
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4061	20.0074	20.2889	20.6433	20.8967	20.9827	20.9962	20.9928	20.9219	20.5752	20.1361	19.9687 (87)
Th 2	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575 (88)
util rest of house	0.9967	0.9921	0.9747	0.9059	0.7319	0.5039	0.3610	0.4150	0.7067	0.9494	0.9923	0.9974 (89)
MIT 2	19.5176	18.9179	19.2737	19.7047	19.9781	20.0490	20.0564	20.0552	20.0065	19.6331	19.0832	18.9074 (90)
Living area fraction									FLA = Living area / (4) =			0.2741 (91)
MIT	19.7611	19.2165	19.5519	19.9620	20.2299	20.3049	20.3140	20.3122	20.2574	19.8913	19.3718	19.1983 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7611	19.2165	19.5519	19.9620	20.2299	20.3049	20.3140	20.3122	20.2574	19.8913	19.3718	19.1983 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9964	0.9895	0.9701	0.9031	0.7438	0.5280	0.3890	0.4447	0.7249	0.9457	0.9900	0.9966 (94)
Useful gains	954.6395	1096.2987	1249.7296	1330.1442	1156.6571	816.6078	568.8398	598.9899	900.4701	1006.2129	925.4777	915.8107 (95)
Ext temp.	4.8000	5.4000	6.9000	9.4000	12.5000	15.2000	16.8000	16.6000	14.3000	10.9000	7.6000	4.7000 (96)
Heat loss rate W	2430.1850	2244.2685	2055.0994	1715.6167	1255.5874	829.2108	570.7919	602.9809	967.6843	1460.4890	1912.1355	2355.0099 (97)
Space heating kWh	1097.8059	771.4357	599.1951	277.5402	73.6042	0.0000	0.0000	0.0000	0.0000	337.9814	710.3936	1070.7642 (98a)
Space heating requirement - total per year (kWh/year)												4938.7201
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	1097.8059	771.4357	599.1951	277.5402	73.6042	0.0000	0.0000	0.0000	0.0000	337.9814	710.3936	1070.7642 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4938.7201
Space heating per m2										(98c) / (4) =		31.3490 (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 %)												232.6866 (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	1097.8059	771.4357	599.1951	277.5402	73.6042	0.0000	0.0000	0.0000	0.0000	337.9814	710.3936	1070.7642 (98)
Space heating efficiency (main heating system 1)	232.6866	232.6866	232.6866	232.6866	232.6866	0.0000	0.0000	0.0000	0.0000	232.6866	232.6866	232.6866 (210)
Space heating fuel (main heating system)	471.7959	331.5342	257.5116	119.2764	31.6323	0.0000	0.0000	0.0000	0.0000	145.2518	305.3006	460.1744 (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	284.7056	251.6104	266.7473	233.0701	224.9696	201.6599	198.1941	206.6119	209.4978	234.8868	251.3447	281.3931 (64)
Efficiency of water heater (217)m	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026	284.4026 (216)
Fuel for water heating, kWh/month	100.1066	88.4698	93.7922	81.9508	79.1025	70.9065	69.6879	72.6477	73.6624	82.5896	88.3764	98.9418 (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	6.5228	5.8916	6.5228	6.3124	6.5228	6.3124	6.5228	6.5228	6.3124	6.5228	6.3124	6.5228 (231)
Lighting	36.9713	29.6598	26.7053	19.5655	15.1129	12.3474	13.7865	17.9202	23.2766	30.5402	34.4951	37.9989 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-34.5484	-54.8244	-87.5435	-103.2186	-109.0204	-101.9792	-99.3527	-91.1348	-79.8104	-66.0703	-40.2469	-31.1766 (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	-7.8325	-19.4689	-45.9061	-79.9226	-110.7047	-118.1488	-113.5715	-93.3699	-69.8499	-34.3001	-11.9617	-6.7454 (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												2122.4772 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												284.4026
Water heating fuel used												1000.2341 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEVDecentralised, Database: total watage = 5.7980, total flow = 37.0000, SFP = 0.1567)												
mechanical ventilation fans (SFP = 0.1567)												76.8011 (230a)
Total electricity for the above, kWh/year												76.8011 (231)
Electricity for lighting (calculated in Appendix L)												298.3797 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1610.7083 (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)

Full SAP Calculation Printout



Total delivered energy for all uses

1887.1838 (238)

10a. Fuel costs - using BEDF prices (554)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2122.4772	26.0600	553.1176 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1000.2341	26.0600	260.6610 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	76.8011	26.0600	20.0144 (249)
Energy for lighting	298.3797	26.0600	77.7577 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-898.9261	26.0600	-234.2601
PV Unit electricity exported	-711.7822	5.8100	-41.3545
Total			-275.6147 (252)
Total energy cost			635.9360 (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	2122.4772	0.1562	331.4425 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1000.2341	0.1410	141.0553 (264)
Space and water heating			472.4978 (265)
Pumps, fans and electric keep-hot	76.8011	0.1387	10.6533 (267)
Energy for lighting	298.3797	0.1443	43.0654 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-898.9261	0.1338	-120.3026
PV Unit electricity exported	-711.7822	0.1225	-87.1999
Total			-207.5026 (269)
Total CO2, kg/year			318.7139 (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	2122.4772	1.5781	3349.4961 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1000.2341	1.5215	1521.8114 (278)
Space and water heating			4871.3075 (279)
Pumps, fans and electric keep-hot	76.8011	1.5128	116.1847 (281)
Energy for lighting	298.3797	1.5338	457.6647 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-898.9261	1.4946	-1343.5274
PV Unit electricity exported	-711.7822	0.4496	-320.0038
Total			-1663.5312 (283)
Total Primary energy kWh/year			3781.6257 (286)