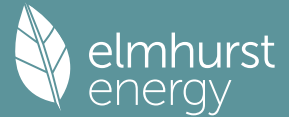


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Property Reference	P23972(2)		Issued on Date	16/10/2023	
Assessment Reference	P23972(2)	Prop Type Ref			
Property	Flat 2, The Western, 205 High Street, Rickmansworth, WD3 1BB				
SAP Rating	95 A	DER	1.34	TER	14.59
Environmental	99 A	% DER < TER	90.82		
CO ₂ Emissions (t/year)	0.05	DFEE	25.26	TFEE	33.84
Compliance Check	See BREL	% DFEE < TFEE	25.36		
% DPER < TPER	76.24	DPER	18.38	TPER	77.39
Assessor Details	Mr. Malcolm Lisle			Assessor ID	P736-0001
Client	SC, Sasha Archibald				

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	49.8400 (1b)	2.4000 (2b)	119.6160 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 119.6160 (5)

2. Ventilation rate

	Value	Reference
Number of open chimneys	0 * 80 = 0.0000	(6a)
Number of open flues	0 * 20 = 0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000	(6d)
Number of flues attached to other heater	0 * 35 = 0.0000	(6e)
Number of blocked chimneys	0 * 20 = 0.0000	(6f)
Number of intermittent extract fans	0 * 10 = 0.0000	(7a)
Number of passive vents	0 * 10 = 0.0000	(7b)
Number of flueless gas fires	0 * 40 = 0.0000	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000	(8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	1.0000	(17)
Infiltration rate	0.0500	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.0463	(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	0.0590	0.0578	0.0567	0.0509	0.0497	0.0439	0.0439	0.0428	0.0463	0.0497	0.0520	0.0543 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.1495	0.1483	0.1472	0.1414	0.1402	0.1344	0.1344	0.1333	0.1367	0.1402	0.1425	0.1448 (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
Windows/Doors (U _w = 1.00)			11.7400	0.9615	11.2885		(27)
Non-Vision Panel			6.6000	1.0000	6.6000		(26)
Cavity Wall	64.4400	18.3400	46.1000	0.1300	5.9930	60.0000	2766.0000 (29a)

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Total net area of external elements Aum(A, m2)	64.4400												(31)
Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	23.8815											(33)
Party Walls	10.6800	0.0000	0.0000	0.0000	180.0000	1922.4000							(32)
Party Floor 1	49.8400				30.0000	1495.2000							(32d)
Party Ceiling	49.8400				20.0000	996.8000							(32b)
Internal Walls	75.8400				9.0000	682.5600							(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 7862.9600 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 157.7640 (35)

List of Thermal Bridges				Length	Psi-value	Total	
K1 Element				9.8000	0.0580	0.5684	
E2 Other lintels (including other steel lintels)				5.4000	0.0450	0.2430	
E3 Sill				27.8000	0.0500	1.3900	
E4 Jamb				53.7000	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)				4.8000	0.0440	0.2112	
E16 Corner (normal)				4.8000	0.0620	0.2976	
E18 Party wall between dwellings							

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.7102 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 26.5917 (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	
	5.9000	5.8544	5.8087	5.5805	5.5349	5.3067	5.3067	5.2610	5.3980	5.5349	5.6262	5.7175	(38)
Heat transfer coeff	32.4917	32.4460	32.4004	32.1722	32.1266	31.8984	31.8984	31.8527	31.9896	32.1266	32.2178	32.3091	(39)
Average = Sum(39)m / 12 =													32.1608

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.6519	0.6510	0.6501	0.6455	0.6446	0.6400	0.6400	0.6391	0.6418	0.6446	0.6464	0.6483	(40)
HLP (average)													0.6453
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6854 (42)													
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	63.6313	62.6863	61.3555	58.9018	57.0645	55.0272	53.9268	55.2482	56.6871	58.8670	61.3713	63.4162	(42b)
Hot water usage for other uses													
	33.5685	32.3478	31.1272	29.9065	28.6858	27.4652	27.4652	28.6858	29.9065	31.1272	32.3478	33.5685	(42c)
Average daily hot water use (litres/day)													89.5131 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	97.1998	95.0341	92.4827	88.8083	85.7503	82.4924	81.3919	83.9341	86.5936	89.9942	93.7191	96.9847	(44)
Energy conte	153.9408	135.3274	142.1425	121.5741	115.4364	101.4340	98.4365	103.9279	106.7785	122.1213	133.5201	151.8546	(45)
Energy content (annual)													Total = Sum(45)m = 1486.4939

Distribution loss (46)m = 0.15 x (45)m 23.0911 20.2991 21.3214 18.2361 17.3155 15.2151 14.7655 15.5892 16.0168 18.3182 20.0280 22.7782 (46)

Water storage loss: Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.8600 (48)

Temperature factor from Table 2b 0.7800 (49)

Enter (49) or (54) in (55) 1.4508 (55)

Total storage loss 44.9748 40.6224 44.9748 43.5240 44.9748 43.5240 44.9748 44.9748 43.5240 44.9748 43.5240 44.9748 44.9748 (56)

If cylinder contains dedicated solar storage 44.9748 40.6224 44.9748 43.5240 44.9748 43.5240 44.9748 44.9748 43.5240 44.9748 43.5240 44.9748 44.9748 (57)

Primary loss 54.8576 49.5488 54.8576 53.0880 54.8576 22.5120 23.2624 23.2624 22.5120 54.8576 53.0880 54.8576 (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 253.7732 225.4986 241.9749 218.1861 215.2688 167.4700 166.6737 172.1651 172.8145 221.9537 230.1321 251.6870 (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 253.7732 225.4986 241.9749 218.1861 215.2688 167.4700 166.6737 172.1651 172.8145 221.9537 230.1321 251.6870 (64)

Total per year (kWh/year) = Sum(64)m = 2537.5975 (64)

12Total per year (kWh/year) 2538 (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)

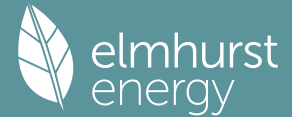
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 95.0714 84.6354 91.1484 82.8938 82.2687 51.7364 51.3400 53.1659 53.5135 84.4914 86.8658 94.3777 (65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	74.3633	82.3308	74.3633	76.8421	74.3633	76.8421	74.3633	74.3633	76.8421	74.3633	76.8421	74.3633	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	146.8184	148.3419	144.5027	136.3295	126.0123	116.3155	109.8375	108.3140	112.1532	120.3264	130.6436	140.3404	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

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Pumps, fans	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156 (71)
Total internal gains	127.7841	125.9455	122.5114	115.1303	110.5762	71.8561	69.0054	71.4596	74.3242	113.5637	120.6470	126.8518	126.8518 (72)
	397.2467	404.8991	389.6582	376.5827	359.2326	313.2946	301.4871	302.4178	311.6004	356.5343	376.4136	389.8364	389.8364 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	2.1000	10.6334	0.5700	0.7000	0.7000	0.7700	6.1744 (74)						
South	5.2300	46.7521	0.5700	0.7000	0.7000	0.7700	67.6096 (78)						
West	4.4100	19.6403	0.5700	0.7000	0.7000	0.7700	23.9493 (80)						
Solar gains	97.7333	169.3767	238.2523	304.1457	347.4083	347.4814	333.9612	301.5409	261.1817	189.0669	117.6193	83.2630	83.2630 (83)
Total gains	494.9800	574.2757	627.9105	680.7284	706.6409	660.7760	635.4483	603.9586	572.7820	545.6012	494.0329	473.0993	473.0993 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)	67.2220	67.3165	67.4114	67.8895	67.9860	68.4724	68.4724	68.5705	68.2770	67.9860	67.7934	67.6018	21.0000 (85)
tau	5.4815	5.4878	5.4941	5.5260	5.5324	5.5648	5.5648	5.5714	5.5518	5.5324	5.5196	5.5068	
util living area	0.8818	0.8032	0.7031	0.5604	0.4207	0.3086	0.2208	0.2425	0.3842	0.5960	0.8022	0.8981	0.8981 (86)
Living	20.6662	20.7837	20.8695	20.9235	20.9401	20.9437	20.9442	20.9442	20.9423	20.9205	20.8090	20.6354	
Non living	19.9989	20.1373	20.2353	20.2974	20.3148	20.3222	20.3226	20.3234	20.3195	20.2963	20.1729	19.9652	
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	20.8292	20.7837	20.8695	20.9235	20.9401	20.9437	20.9442	20.9442	20.9423	20.9205	20.8090	20.6864	20.6864 (87)
Th 2	20.3835	20.3843	20.3851	20.3892	20.3900	20.3941	20.3941	20.3949	20.3925	20.3900	20.3884	20.3868	20.3868 (88)
util rest of house	0.8677	0.7842	0.6797	0.5343	0.3937	0.2795	0.1904	0.2107	0.3507	0.5645	0.7802	0.8854	0.8854 (89)
MIT 2	20.2302	20.1373	20.2353	20.2974	20.3148	20.3222	20.3226	20.3234	20.3195	20.2963	20.1729	20.0412	20.0412 (90)
Living area fraction													fLA = Living area / (4) = 0.4687 (91)
MIT	20.5110	20.4403	20.5326	20.5908	20.6078	20.6135	20.6139	20.6144	20.6114	20.5888	20.4711	20.3436	20.3436 (92)
Temperature adjustment													0.0000
adjusted MIT	20.5110	20.4403	20.5326	20.5908	20.6078	20.6135	20.6139	20.6144	20.6114	20.5888	20.4711	20.3436	20.3436 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8707	0.7860	0.6854	0.5430	0.4034	0.2901	0.2015	0.2222	0.3628	0.5749	0.7832	0.8844	0.8844 (94)
Useful gains	430.9961	451.3778	430.3905	369.6413	285.0286	191.6818	128.0238	134.2160	207.8146	313.6681	386.9485	418.4203	418.4203 (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	4.2000 (96)
Heat loss rate W	526.7212	504.2209	454.6606	376.1200	286.1782	191.8214	128.0376	134.2400	208.2977	320.9070	430.7872	521.5847	521.5847 (97)
Space heating kWh	71.2194	35.5105	18.0570	4.6646	0.8553	0.0000	0.0000	0.0000	0.0000	5.3857	31.5639	76.7543	76.7543 (98a)
Space heating requirement - total per year (kWh/year)													244.0107
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	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)													0.0000
Space heating kWh	71.2194	35.5105	18.0570	4.6646	0.8553	0.0000	0.0000	0.0000	0.0000	5.3857	31.5639	76.7543	76.7543 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)													244.0107
Space heating per m2										(98c) / (4) =			4.8959 (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 %)													266.4612 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	71.2194	35.5105	18.0570	4.6646	0.8553	0.0000	0.0000	0.0000	0.0000	5.3857	31.5639	76.7543	76.7543 (98)
Space heating efficiency (main heating system 1)	266.4612	266.4612	266.4612	266.4612	266.4612	0.0000	0.0000	0.0000	0.0000	266.4612	266.4612	266.4612	266.4612 (210)
Space heating fuel (main heating system)													

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Space heating efficiency (main heating system 2)	26.7279	13.3267	6.7766	1.7506	0.3210	0.0000	0.0000	0.0000	0.0000	0.0000	2.0212	11.8456	28.8051 (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	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	0.0000 (213)
Water heating requirement	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870	(64)
Efficiency of water heater (217)m	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	(216)
Fuel for water heating, kWh/month	147.9648	131.4790	141.0857	127.2154	125.5144	97.6449	97.1806	100.3824	100.7611	129.4121	134.1806	146.7484	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.2878	6.5825	7.2878	7.0527	7.2878	7.0527	7.2878	7.0527	7.2878	7.0527	7.2878	7.0527	(231)
Lighting	14.7679	11.8474	10.6672	7.8153	6.0367	4.9321	5.5069	7.1581	9.2977	12.1990	13.7788	15.1784	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-28.5269	-51.2367	-94.1786	-129.0891	-156.5163	-148.5705	-145.8954	-129.5841	-100.7102	-66.8171	-34.4705	-23.2012	(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	-1.1855	-4.5016	-15.5287	-36.7989	-62.8983	-72.6135	-70.0908	-49.8330	-26.4706	-8.6067	-2.0249	-0.7973	(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													91.5746 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													171.5092
Water heating fuel used													1479.5695 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.5880) mechanical ventilation fans (SFP = 0.5880)													85.8077 (230a)
Total electricity for the above, kWh/year													85.8077 (231)
Electricity for lighting (calculated in Appendix L)													119.1855 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-1460.1462 (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													315.9911 (238)

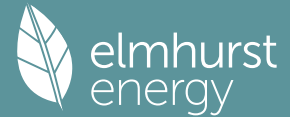
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	91.5746	0.1592	14.5772 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1479.5695	0.1415	209.3221 (264)
Space and water heating			223.8994 (265)
Pumps, fans and electric keep-hot	85.8077	0.1387	11.9026 (267)
Energy for lighting	119.1855	0.1443	17.2022 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1108.7965	0.1310	-145.2738
PV Unit electricity exported	-351.3497	0.1165	-40.9279
Total			-186.2017 (269)
Total CO2, kg/year			66.8024 (272)
EPD Dwelling Carbon Dioxide Emission Rate (DER)			1.3400 (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	91.5746	1.5892	145.5275 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1479.5695	1.5232	2253.6353 (278)
Space and water heating			2399.1628 (279)
Pumps, fans and electric keep-hot	85.8077	1.5128	129.8099 (281)
Energy for lighting	119.1855	1.5338	182.8108 (282)
Energy saving/generation technologies			

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PV Unit electricity used in dwelling	-1108.7965	1.4840	-1645.4848
PV Unit electricity exported	-351.3497	0.4270	-150.0219
Total			-1795.5067 (283)
Total Primary energy kWh/year			916.2768 (286)
Dwelling Primary energy Rate (DPER)			18.3800 (287)

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

1. Overall dwelling characteristics

		Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor		49.8400 (1b)	x 2.4000 (2b)	= 119.6160 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	119.6160 (5)

2. Ventilation rate

			m ³ per hour
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		2 * 10 =	20.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		20.0000 / (5) =	0.1672 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0000 (17)
Infiltration rate			0.4172 (18)
Number of sides sheltered			1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3859 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4920	0.4824	0.4727	0.4245	0.4149	0.3666	0.3666	0.3570	0.3859	0.4149	0.4342	0.4534 (22b)
	0.6211	0.6163	0.6117	0.5901	0.5861	0.5672	0.5672	0.5637	0.5745	0.5861	0.5942	0.6028 (25)

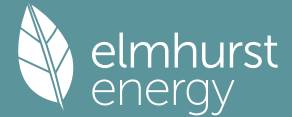
3. Heat losses and heat loss parameter

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			6.6000	1.0000	6.6000		(26)
TER Opening Type (Uw = 1.20)			5.8600	1.1450	6.7099		(27)
Cavity Wall	64.4400	12.4600	51.9800	0.1800	9.3564		(29a)
Total net area of external elements Aum(A, m ²)			64.4400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.6663		(33)
Party Walls			10.6800	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							167.7640 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				9.8000	0.0500		0.4900
E3 Sill				5.4000	0.0500		0.2700
E4 Jamb				27.8000	0.0500		1.3900
E7 Party floor between dwellings (in blocks of flats)				53.7000	0.0700		3.7590
E16 Corner (normal)				4.8000	0.0900		0.4320
E18 Party wall between dwellings				4.8000	0.0600		0.2880
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.6290 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	29.2953 (37)

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

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	24.5149	24.3293	24.1475	23.2932	23.1334	22.3894	22.3894	22.2516	22.6760	23.1334	23.4567	23.7948	(38)
Heat transfer coeff	53.8102	53.6247	53.4428	52.5886	52.4287	51.6847	51.6847	51.5469	51.9713	52.4287	52.7521	53.0901	(39)
Average = Sum(39)m / 12 =												52.5878	
HLP	1.0797	1.0759	1.0723	1.0551	1.0519	1.0370	1.0370	1.0342	1.0428	1.0519	1.0584	1.0652	(40)
HLP (average)												1.0551	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy													1.6854 (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	60.4497	59.5520	58.2877	55.9567	54.2113	52.2758	51.2304	52.4858	53.8527	55.9237	58.3027	60.2454	(42b)
Hot water usage for other uses	31.8901	30.7305	29.5708	28.4112	27.2515	26.0919	26.0919	27.2515	28.4112	29.5708	30.7305	31.8901	(42c)
Average daily hot water use (litres/day)													85.0374 (43)
Daily hot water use	92.3398	90.2824	87.8586	84.3679	81.4628	78.3677	77.3223	79.7374	82.2639	85.4945	89.0332	92.1355	(44)
Energy content (annual)	146.2437	128.5610	135.0353	115.4954	109.6646	96.3623	93.5146	98.7315	101.4396	116.0152	126.8441	144.2619	(45)
Distribution loss (46)m = 0.15 x (45)m	21.9366	19.2841	20.2553	17.3243	16.4497	14.4543	14.0272	14.8097	15.2159	17.4023	19.0266	21.6393	(46)
Water storage loss:													150.0000 (47)
Store volume													1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.7527 (55)
Enter (49) or (54) in (55)													
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	192.8386	170.6467	181.6302	160.5873	156.2595	141.4541	140.1095	145.3264	146.5314	162.6101	171.9359	190.8568	(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	192.8386	170.6467	181.6302	160.5873	156.2595	141.4541	140.1095	145.3264	146.5314	162.6101	171.9359	190.8568	(64)
12Total per year (kWh/year)													1960.7867 (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	85.9020	76.4151	82.1752	74.4757	73.7394	68.1139	68.3695	70.1041	69.8021	75.8510	78.2491	85.2430	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5679	91.4144	82.5679	85.3201	82.5679	85.3201	82.5679	82.5679	85.3201	82.5679	85.3201	82.5679	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	146.8184	148.3419	144.5027	136.3295	126.0123	116.3155	109.8375	108.3140	112.1532	120.3264	130.6436	140.3404	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	(71)
Water heating gains (Table 5)	115.4596	113.7129	110.4505	103.4385	99.1121	94.6027	91.8945	94.2260	96.9474	101.9502	108.6793	114.5739	(72)
Total internal gains	396.1268	404.7502	388.8019	376.3690	358.9731	344.5192	332.5808	333.3887	342.7016	356.1254	375.9240	388.7630	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	1.0500	10.6334	0.6300	0.7000	0.7700	3.4122 (74)
South	2.6100	46.7521	0.6300	0.7000	0.7700	37.2918 (78)
West	2.2000	19.6403	0.6300	0.7000	0.7700	13.2051 (80)

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Solar gains	53.9091	93.4272	131.4200	167.7711	191.6404	191.6834	184.2240	166.3361	144.0691	104.2885	64.8781	45.9273 (83)
Total gains	450.0358	498.1773	520.2219	544.1400	550.6135	536.2026	516.8048	499.7248	486.7707	460.4139	440.8021	434.6904 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.1628	43.3122	43.4595	44.1655	44.3001	44.9379	44.9379	45.0580	44.6901	44.3001	44.0286	43.7483
alpha	3.8775	3.8875	3.8973	3.9444	3.9533	3.9959	3.9959	4.0039	3.9793	3.9533	3.9352	3.9166
util living area	0.9646	0.9465	0.9189	0.8550	0.7470	0.5792	0.4306	0.4616	0.6631	0.8595	0.9414	0.9684 (86)
MIT	19.6260	19.8399	20.1203	20.4908	20.7727	20.9396	20.9854	20.9807	20.8931	20.5546	20.0535	19.6018 (87)
Th 2	20.0175	20.0205	20.0235	20.0376	20.0403	20.0526	20.0526	20.0549	20.0479	20.0403	20.0349	20.0293 (88)
util rest of house	0.9575	0.9360	0.9028	0.8260	0.6976	0.5057	0.3420	0.3722	0.5926	0.8259	0.9283	0.9620 (89)
MIT 2	18.4429	18.7117	19.0611	19.5173	19.8371	20.0117	20.0462	20.0458	19.9686	19.6019	18.9926	18.4210 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	18.9974	19.2405	19.5575	19.9736	20.2756	20.4466	20.4864	20.4840	20.4019	20.0484	19.4899	18.9745 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9974	19.2405	19.5575	19.9736	20.2756	20.4466	20.4864	20.4840	20.4019	20.0484	19.4899	18.9745 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9483	0.9260	0.8938	0.8239	0.7104	0.5372	0.3832	0.4135	0.6200	0.8262	0.9194	0.9533 (94)
Useful gains	426.7586	461.3128	464.9632	448.3031	391.1803	288.0406	198.0291	206.6402	301.8030	380.4023	405.2548	414.3728 (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	790.8719	769.0028	697.8317	582.3423	449.6089	302.1809	200.8677	210.5156	327.5198	495.3690	653.5906	784.3779 (97)
Space heating kWh	270.9003	206.7677	173.2541	96.5083	43.4709	0.0000	0.0000	0.0000	0.0000	85.5352	178.8018	275.2838 (98a)
Space heating requirement - total per year (kWh/year)												1330.5220
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	270.9003	206.7677	173.2541	96.5083	43.4709	0.0000	0.0000	0.0000	0.0000	85.5352	178.8018	275.2838 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1330.5220
Space heating per m2										(98c) / (4) =		26.6959 (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	270.9003	206.7677	173.2541	96.5083	43.4709	0.0000	0.0000	0.0000	0.0000	85.5352	178.8018	275.2838 (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)	293.4998	224.0170	187.7076	104.5593	47.0973	0.0000	0.0000	0.0000	0.0000	92.6709	193.7181	298.2490 (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	192.8386	170.6467	181.6302	160.5873	156.2595	141.4541	140.1095	145.3264	146.5314	162.6101	171.9359	190.8568 (64)
Efficiency of water heater												79.8000 (216)
(217)m	84.8220	84.4914	83.9540	82.9561	81.6000	79.8000	79.8000	79.8000	79.8000	82.6888	84.1477	84.8804 (217)
Fuel for water heating, kWh/month	227.3452	201.9692	216.3449	193.5811	191.4945	177.2608	175.5759	182.1133	183.6234	196.6532	204.3263	224.8537 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	17.1560	13.7632	12.3922	9.0791	7.0129	5.7296	6.3974	8.3156	10.8012	14.1717	16.0069	17.6328 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.1902	-25.1382	-37.4707	-43.7555	-48.6196	-45.9390	-45.4178	-42.1930	-36.7033	-29.5086	-19.2318	-14.7613 (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)

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Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-7.1350	-15.2495	-30.7501	-46.8209	-62.5127	-63.0002	-62.2182	-52.3664	-37.9999	-21.9708	-9.5816	-5.6213 (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												1441.5190 (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												2375.1413 (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)												138.4585 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-821.1556 (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												3219.9632 (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	1441.5190	0.2100	302.7190 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2375.1413	0.2100	498.7797 (264)
Space and water heating			801.4987 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	138.4585	0.1443	19.9838 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-405.9290	0.1338	-54.3127
PV Unit electricity exported	-415.2267	0.1255	-52.1157
Total			-106.4284 (269)
Total CO2, kg/year			726.9834 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.5900 (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	1441.5190	1.1300	1628.9165 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2375.1413	1.1300	2683.9097 (278)
Space and water heating			4312.8261 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	138.4585	1.5338	212.3723 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-405.9290	1.4945	-606.6413
PV Unit electricity exported	-415.2267	0.4607	-191.2934
Total			-797.9347 (283)
Total Primary energy kWh/year			3857.3645 (286)
Target Primary Energy Rate (TPER)			77.3900 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	49.8400 (1b)	x 2.4000 (2b)	= 119.6160 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.6160 (5)

2. Ventilation rate

												m3 per hour		
Number of open chimneys												$0 * 80 = 0.0000$	(6a)	
Number of open flues												$0 * 20 = 0.0000$	(6b)	
Number of chimneys / flues attached to closed fire												$0 * 10 = 0.0000$	(6c)	
Number of flues attached to solid fuel boiler												$0 * 20 = 0.0000$	(6d)	
Number of flues attached to other heater												$0 * 35 = 0.0000$	(6e)	
Number of blocked chimneys												$0 * 20 = 0.0000$	(6f)	
Number of intermittent extract fans												$2 * 10 = 20.0000$	(7a)	
Number of passive vents												$0 * 10 = 0.0000$	(7b)	
Number of flueless gas fires												$0 * 40 = 0.0000$	(7c)	
												Air changes per hour		
Infiltration due to chimneys, flues and fans	$= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =$											$20.0000 / (5) =$	0.1672	(8)
Pressure test												Yes		
Pressure Test Method												Blower Door		
Measured/design AP50												1.0000	(17)	
Infiltration rate												0.2172	(18)	
Number of sides sheltered												1	(19)	
Shelter factor												$(20) = 1 - [0.075 * (19)] =$	0.9250	(20)
Infiltration rate adjusted to include shelter factor												$(21) = (18) * (20) =$	0.2009	(21)
<hr/>														
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	0.2562	0.2511	0.2461	0.2210	0.2160	0.1909	0.1909	0.1858	0.2009	0.2160	0.2260	0.2361	(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	0.5328	0.5315	0.5303	0.5244	0.5233	0.5182	0.5182	0.5173	0.5202	0.5233	0.5255	0.5279	(25)	

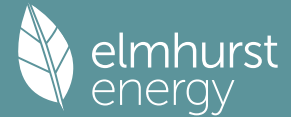
3. Heat losses and heat loss parameter

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						
Windows/Doors (Uw = 1.00)			11.7400	0.9615	11.2885			(27)					
Non-Vision Panel			6.6000	1.0000	6.6000			(26)					
Cavity Wall	64.4400	18.3400	46.1000	0.1300	5.9930	60.0000	2766.0000	(29a)					
Total net area of external elements Aum(A, m2)			64.4400					(31)					
Fabric heat loss, W/K = Sum (A x U)					$(26)...(30) + (32) =$	23.8815		(33)					
Party Walls			10.6800	0.0000	0.0000	180.0000	1922.4000	(32)					
Party Floor 1			49.8400			30.0000	1495.2000	(32d)					
Party Ceiling			49.8400			30.0000	1495.2000	(32b)					
Internal Walls			75.8400			9.0000	682.5600	(32c)					
Heat capacity Cm = Sum(A x k)								$(28)...(30) + (32) + (32a)...(32e) =$	8361.3600 (34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K									167.7640 (35)				
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				9.8000	0.0580	0.5684							
E3 Sill				5.4000	0.0450	0.2430							
E4 Jamb				27.8000	0.0500	1.3900							
E7 Party floor between dwellings (in blocks of flats)				53.7000	0.0000	0.0000							
E16 Corner (normal)				4.8000	0.0440	0.2112							
E18 Party wall between dwellings				4.8000	0.0620	0.2976							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								2.7102	(36)				
Point Thermal bridges								0.0000	(36a)				
Total fabric heat loss								$(33) + (36) + (36a) =$	26.5917	(37)			
<hr/>													
Ventilation heat loss calculated monthly (38)m = $0.33 * (25)m * (5)$													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	21.0317	20.9815	20.9322	20.7006	20.6573	20.4556	20.4556	20.4183	20.5333	20.6573	20.7449	20.8366	(38)
Heat transfer coeff	47.6234	47.5731	47.5238	47.2923	47.2490	47.0473	47.0473	47.0100	47.1250	47.2490	47.3366	47.4282	(39)
Average = Sum(39)m / 12 =													47.2921
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9555	0.9545	0.9535	0.9489	0.9480	0.9440	0.9440	0.9432	0.9455	0.9480	0.9498	0.9516	(40)
HLP (average)													0.9489
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6854	(42)
Hot water usage for mixer showers													0.0000	(42a)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Hot water usage for baths	22.6905	22.3535	21.8789	21.0040	20.3488	19.6223	19.2299	19.7011	20.2142	20.9916	21.8846	22.6138	(42b)	
Hot water usage for other uses														

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Average daily hot water use (litres/day)	31.8901	30.7305	29.5708	28.4112	27.2515	26.0919	26.0919	27.2515	28.4112	29.5708	30.7305	31.8901 (42c)	50.0286 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	54.5806	53.0839	51.4497	49.4151	47.6003	45.7142	45.3218	46.9527	48.6254	50.5624	52.6150	54.5038 (44)	
Energy content (annual)	86.4423	75.5908	79.0763	67.6468	64.0792	56.2109	54.8128	58.1372	59.9599	68.6127	74.9597	85.3399 (45)	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	73.4759	64.2522	67.2149	57.4998	54.4673	47.7793	46.5909	49.4166	50.9660	58.3208	63.7158	72.5389 (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	73.4759	64.2522	67.2149	57.4998	54.4673	47.7793	46.5909	49.4166	50.9660	58.3208	63.7158	72.5389 (64)	
12Total per year (kWh/year)												706.2383 (64)	706 (64)
Electric shower(s)	42.0261	37.4456	40.8892	39.0200	39.7522	37.9198	39.1837	39.7522	39.0200	40.8892	40.1203	42.0261 (64a)	478.0444 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month	28.8755	25.4244	27.0260	24.1300	23.5549	21.4248	21.4437	22.2922	22.4965	24.8025	25.9590	28.6412 (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	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.3633	82.3308	74.3633	76.8421	74.3633	76.8421	74.3633	74.3633	76.8421	74.3633	76.8421	74.3633	74.3633 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	146.8184	148.3419	144.5027	136.3295	126.0123	116.3155	109.8375	108.3140	112.1532	120.3264	130.6436	140.3404	140.3404 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270 (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	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156 (71)
Water heating gains (Table 5)	38.8112	37.8340	36.3253	33.5138	31.6598	29.7566	28.8221	29.9626	31.2451	33.3367	36.0542	38.4963	38.4963 (72)
Total internal gains	308.2737	316.7876	303.4722	294.9663	280.3162	271.1951	261.3038	260.9208	268.5213	276.3072	291.8208	301.4808	301.4808 (73)

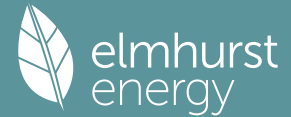
6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W					
North		2.1000	10.6334	0.5700	0.7000	0.7700	6.1744 (74)					
South		5.2300	46.7521	0.5700	0.7000	0.7700	67.6096 (78)					
West		4.4100	19.6403	0.5700	0.7000	0.7700	23.9493 (80)					
Solar gains	97.7333	169.3767	238.2523	304.1457	347.4083	347.4814	333.9612	301.5409	261.1817	189.0669	117.6193	83.2630 (83)
Total gains	406.0071	486.1642	541.7244	599.1119	627.7245	618.6765	595.2649	562.4617	529.7029	465.3741	409.4401	384.7438 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	48.7701	48.8217	48.8723	49.1116	49.1566	49.3673	49.3673	49.4066	49.2860	49.1566	49.0656	48.9708	
alpha	4.2513	4.2548	4.2582	4.2741	4.2771	4.2912	4.2912	4.2938	4.2857	4.2771	4.2710	4.2647	
util living area	0.9711	0.9419	0.8931	0.7913	0.6461	0.4751	0.3453	0.3805	0.5822	0.8319	0.9457	0.9763 (86)	
MIT	19.7757	20.0594	20.3729	20.6999	20.8965	20.9780	20.9955	20.9932	20.9486	20.6811	20.1722	19.7129 (87)	
Th 2	20.1206	20.1214	20.1222	20.1261	20.1269	20.1303	20.1303	20.1309	20.1290	20.1269	20.1254	20.1239 (88)	
util rest of house	0.9654	0.9312	0.8743	0.7585	0.5979	0.4146	0.2782	0.3104	0.5185	0.7968	0.9339	0.9715 (89)	
MIT 2	19.0170	19.2926	19.5916	19.8922	20.0570	20.1190	20.1288	20.1284	20.1000	19.8842	19.4094	18.9582 (90)	
Living area fraction	19.3726	19.6520	19.9578	20.2708	20.4505	20.5216	20.5350	20.5338	20.4977	20.2577	19.7669	19.3119 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.3726	19.6520	19.9578	20.2708	20.4505	20.5216	20.5350	20.5338	20.4977	20.2577	19.7669	19.3119 (93)	

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9594	0.9246	0.8704	0.7642	0.6163	0.4421	0.3096	0.3431	0.5461	0.8025	0.9282	0.9661	(94)
Useful gains	389.5385	449.5094	471.5439	457.8596	386.8565	273.5283	184.2808	192.9970	289.2672	373.4408	380.0455	371.6999	(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	717.8083	701.7987	639.5661	537.7502	413.4519	278.5944	185.1319	194.3281	301.4934	456.3166	599.6081	716.7326	(97)
Space heating kWh	244.2328	169.5384	125.0085	57.5212	19.7870	0.0000	0.0000	0.0000	0.0000	61.6596	158.0851	256.7043	(98a)
Space heating requirement - total per year (kWh/year)												1092.5369	
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	244.2328	169.5384	125.0085	57.5212	19.7870	0.0000	0.0000	0.0000	0.0000	61.6596	158.0851	256.7043	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1092.5369	
Space heating per m2												21.9209	(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	442.2447	348.1500	357.2757	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9429	0.9702	0.9609	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	416.9712	337.7808	343.2978	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	696.5210	670.6390	633.7198	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	201.2759	247.6465	216.0740	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.3190	61.9116	54.0185	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												166.2491	(107)
Energy for space heating												21.9209	(99)
Energy for space cooling												3.3357	(108)
Total												25.2565	(109)
Fabric Energy Efficiency (DFEE)												25.3	(109)

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

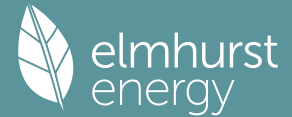
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	49.8400 (1b)	x 2.4000 (2b)	= 119.6160 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	119.6160 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1672 (8)
Pressure test	Yes
Pressure Test Method	Blower Door

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Measured/design AP50 5.0000 (17)
 Infiltration rate 0.4172 (18)
 Number of sides sheltered 1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3859 (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	0.4920	0.4824	0.4727	0.4245	0.4149	0.3666	0.3666	0.3570	0.3859	0.4149	0.4342	0.4534	(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	0.6211	0.6163	0.6117	0.5901	0.5861	0.5672	0.5672	0.5637	0.5745	0.5861	0.5942	0.6028	(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	
TER Opaque door			6.6000	1.0000	6.6000			(26)
TER Opening Type (Uw = 1.20)			5.8600	1.1450	6.7099			(27)
Cavity Wall	64.4400	12.4600	51.9800	0.1800	9.3564			(29a)
Total net area of external elements Aum(A, m2)			64.4400					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 22.6663			(33)
Party Walls			10.6800	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 167.7640 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	9.8000	0.0500	0.4900	
E3 Sill	5.4000	0.0500	0.2700	
E4 Jamb	27.8000	0.0500	1.3900	
E7 Party floor between dwellings (in blocks of flats)	53.7000	0.0700	3.7590	
E16 Corner (normal)	4.8000	0.0900	0.4320	
E18 Party wall between dwellings	4.8000	0.0600	0.2880	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.6290 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 29.2953 (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	24.5149	24.3293	24.1475	23.2932	23.1334	22.3894	22.3894	22.2516	22.6760	23.1334	23.4567	23.7948	(38)
Average = Sum(39)m / 12 =	53.8102	53.6247	53.4428	52.5886	52.4287	51.6847	51.6847	51.5469	51.9713	52.4287	52.7521	53.0901	(39)
													52.5878

HLP 1.0797 (40)

HLP (average) 1.0551 (40)

Days in mont 31 (40)

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6854 (42)

Hot water usage for mixer showers 0.0000 (42a)

Hot water usage for baths 22.6905 (42b)

Hot water usage for other uses 31.8901 (42c)

Average daily hot water use (litres/day) 50.0286 (43)

Daily hot water use 54.5806 (44)

Energy conte 86.4423 (45)

Energy content (annual) 75.5908 (45)

Distribution loss (46)m = 0.15 x (45)m 0.0000 (46)

Water storage loss: Total storage loss 0.0000 (46)

If cylinder contains dedicated solar storage 0.0000 (46)

Primary loss 0.0000 (57)

Combi loss 0.0000 (59)

Total heat required for water heating calculated for each month 73.4759 (61)

WWHRS 0.0000 (62)

PV diverter 0.0000 (63a)

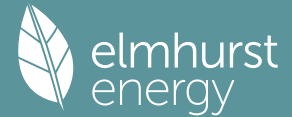
Solar input 0.0000 (63b)

FGHRS 0.0000 (63c)

Output from w/h 73.4759 (64)

Total per year (kWh/year) = Sum(64)m = 706.2383 (64)

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12Total per year (kWh/year)												706 (64)
Electric shower(s)	42.0261	37.4456	40.8892	39.0200	39.7522	37.9198	39.1837	39.7522	39.0200	40.8892	40.1203	42.0261 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												478.0444 (64a)
Heat gains from water heating, kWh/month	28.8755	25.4244	27.0260	24.1300	23.5549	21.4248	21.4437	22.2922	22.4965	24.8025	25.9590	28.6412 (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	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696	84.2696 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5679	91.4144	82.5679	85.3201	82.5679	85.3201	82.5679	82.5679	85.3201	82.5679	85.3201	82.5679 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	146.8184	148.3419	144.5027	136.3295	126.0123	116.3155	109.8375	108.3140	112.1532	120.3264	130.6436	140.3404 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270	31.4270 (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)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156 (71)
Water heating gains (Table 5)	38.8112	37.8340	36.3253	33.5138	31.6598	29.7566	28.8221	29.9626	31.2451	33.3367	36.0542	38.4963 (72)
Total internal gains	316.4783	325.8712	311.6767	303.4443	288.5208	279.6731	269.5084	269.1254	276.9993	284.5118	300.2988	309.6854 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	g	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
North	1.0500	10.6334	0.6300	0.7000	0.7700	3.4122 (74)						
South	2.6100	46.7521	0.6300	0.7000	0.7700	37.2918 (78)						
West	2.2000	19.6403	0.6300	0.7000	0.7700	13.2051 (80)						
Solar gains	53.9091	93.4272	131.4200	167.7711	191.6404	191.6834	184.2240	166.3361	144.0691	104.2885	64.8781	45.9273 (83)
Total gains	370.3874	419.2984	443.0967	471.2154	480.1612	471.3565	453.7324	435.4614	421.0684	388.8003	365.1769	355.6128 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.1628	43.3122	43.4595	44.1655	44.3001	44.9379	44.9379	45.0580	44.6901	44.3001	44.0286	43.7483
alpha	3.8775	3.8875	3.8973	3.9444	3.9533	3.9959	3.9959	4.0039	3.9793	3.9533	3.9352	3.9166
util living area	0.9808	0.9680	0.9482	0.8974	0.8042	0.6405	0.4849	0.5217	0.7305	0.9073	0.9666	0.9834 (86)
MIT	19.4165	19.6456	19.9486	20.3648	20.6978	20.9136	20.9778	20.9702	20.8477	20.4266	19.8692	19.3904 (87)
Th 2	20.0175	20.0205	20.0235	20.0376	20.0403	20.0526	20.0526	20.0549	20.0479	20.0403	20.0349	20.0293 (88)
util rest of house	0.9767	0.9613	0.9368	0.8742	0.7592	0.5645	0.3875	0.4239	0.6615	0.8816	0.9584	0.9798 (89)
MIT 2	18.5859	18.8132	19.1118	19.5204	19.8236	20.0056	20.0448	20.0436	19.9565	19.5870	19.0466	18.5690 (90)
Living area fraction	18.9752	19.2034	19.5040	19.9162	20.2334	20.4312	20.4821	20.4779	20.3742	19.9805	19.4321	18.9540 (92)
Temperature adjustment	fLA = Living area / (4) =											0.4687 (91)
adjusted MIT	18.9752	19.2034	19.5040	19.9162	20.2334	20.4312	20.4821	20.4779	20.3742	19.9805	19.4321	18.9540 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9711	0.9543	0.9295	0.8709	0.7690	0.5962	0.4326	0.4688	0.6867	0.8797	0.9520	0.9747 (94)
Useful gains	359.6777	400.1274	411.8581	410.3655	369.2328	281.0036	196.2764	204.1576	289.1406	342.0465	347.6519	346.6167 (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	789.6749	767.0135	694.9717	579.3246	447.3929	301.3843	200.6447	210.2027	326.0797	491.8086	650.5458	783.2892 (97)
Space heating kWh	319.9179	246.5475	210.6365	121.6505	58.1512	0.0000	0.0000	0.0000	0.0000	111.4229	218.0836	324.8843 (98a)
Space heating requirement - total per year (kWh/year)												1611.2944
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	319.9179	246.5475	210.6365	121.6505	58.1512	0.0000	0.0000	0.0000	0.0000	111.4229	218.0836	324.8843 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1611.2944
Space heating per m ²												(98c) / (4) = 32.3293 (99)

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8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	485.8363	382.4669	391.7567	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8225	0.8888	0.8701	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	399.6217	339.9368	340.8843	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	515.1373	496.3972	476.6964	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction												
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	20.7928	29.1016	25.2610	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												75.1555 (107)
Energy for space heating												32.3293 (99)
Energy for space cooling												1.5079 (108)
Total												33.8373 (109)
Fabric Energy Efficiency (TFEE)												33.8 (109)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	49.8400 (1b)	2.4000 (2b)	119.6160 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 119.6160 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	1.0000 (17)
Infiltration rate	0.0500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.0463 (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	0.0590	0.0578	0.0567	0.0509	0.0497	0.0439	0.0439	0.0428	0.0463	0.0497	0.0520	0.0543 (22b)
Balanced mechanical ventilation with heat recovery												
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)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.9000 (23c)
Effective ac	0.1495	0.1483	0.1472	0.1414	0.1402	0.1344	0.1344	0.1333	0.1367	0.1402	0.1425	0.1448 (25)

3. Heat losses and heat loss parameter

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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					
Windows/Doors (Uw = 1.00)			11.7400	0.9615	11.2885		(27)					
Non-Vision Panel			6.6000	1.0000	6.6000		(26)					
Cavity Wall	64.4400	18.3400	46.1000	0.1300	5.9930	60.0000	2766.0000 (29a)					
Total net area of external elements Aum(A, m2)			64.4400				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 23.8815		(33)					
Party Walls			10.6800	0.0000	0.0000	180.0000	1922.4000 (32)					
Party Floor 1			49.8400			30.0000	1495.2000 (32d)					
Party Ceiling			49.8400			30.0000	1495.2000 (32b)					
Internal Walls			75.8400			9.0000	682.5600 (32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) = 8361.3600	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							167.7640 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				9.8000	0.0580	0.5684						
E3 Sill				5.4000	0.0450	0.2430						
E4 Jamb				27.8000	0.0500	1.3900						
E7 Party floor between dwellings (in blocks of flats)				53.7000	0.0000	0.0000						
E16 Corner (normal)				4.8000	0.0440	0.2112						
E18 Party wall between dwellings				4.8000	0.0620	0.2976						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.7102 (36)					
Point Thermal bridges							0.0000 (36a) =					
Total fabric heat loss							(33) + (36) + (36a) = 26.5917 (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	5.9000	5.8544	5.8087	5.5805	5.5349	5.3067	5.3067	5.2610	5.3980	5.5349	5.6262	5.7175 (38)
Average = Sum(39)m / 12 =	32.4917	32.4460	32.4004	32.1722	32.1266	31.8984	31.8984	31.8527	31.9896	32.1266	32.2178	32.3091 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6519	0.6510	0.6501	0.6455	0.6446	0.6400	0.6400	0.6391	0.6418	0.6446	0.6464	0.6483 (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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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 (42)
Hot water usage for baths	63.6313	62.6863	61.3555	58.9018	57.0645	55.0272	53.9268	55.2482	56.6871	58.8670	61.3713	63.4162 (42b)
Hot water usage for other uses	33.5685	32.3478	31.1272	29.9065	28.6858	27.4652	27.4652	28.6858	29.9065	31.1272	32.3478	33.5685 (42c)
Average daily hot water use (litres/day)												89.5131 (43)
Daily hot water use	97.1998	95.0341	92.4827	88.8083	85.7503	82.4924	81.3919	83.9341	86.5936	89.9942	93.7191	96.9847 (44)
Energy content (annual)	153.9408	135.3274	142.1425	121.5741	115.4364	101.4340	98.4365	103.9279	106.7785	122.1213	133.5201	151.8546 (45)
Distribution loss (46)m = 0.15 x (45)m	23.0911	20.2991	21.3214	18.2361	17.3155	15.2151	14.7655	15.5892	16.0168	18.3182	20.0280	22.7782 (46)
Water storage loss:												150.0000 (47)
Store volume												1.8600 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.7800 (49)
Temperature factor from Table 2b												1.4508 (55)
Enter (49) or (54) in (55)												
Total storage loss	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (56)
If cylinder contains dedicated solar storage	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (62)
MWHR	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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (64)
Total per year (kWh/year) = Sum(64)m =												2537.5975 (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	95.0714	84.6354	91.1484	82.8938	82.2687	51.7364	51.3400	53.1659	53.5135	84.4914	86.8658	94.3777 (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	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	16.8719	14.9855	12.1870	9.2264	6.8968	5.8226	6.2915	8.1779	10.9764	13.9371	16.2666	17.3409 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.1319	221.4058	215.6757	203.4768	188.0780	173.6052	163.9366	161.6627	167.3928	179.5917	194.9905	209.4633 (68)
Pumps, fans	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156 (71)
Total internal gains	127.7841	125.9455	122.5114	115.1303	110.5762	71.8561	69.0054	71.4596	74.3242	113.5637	120.6470	126.8518 (72)
	444.2936	442.8424	430.8796	408.3390	386.0566	331.7895	319.7391	321.8058	333.1991	387.5980	412.4097	434.1615 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
North	2.1000	10.6334	0.5700	0.5700	0.7000	0.7700	6.1744 (74)	
South	5.2300	46.7521	0.5700	0.5700	0.7000	0.7700	67.6096 (78)	
West	4.4100	19.6403	0.5700	0.5700	0.7000	0.7700	23.9493 (80)	

Solar gains	97.7333	169.3767	238.2523	304.1457	347.4083	347.4814	333.9612	301.5409	261.1817	189.0669	117.6193	83.2630 (83)
Total gains	542.0269	612.2191	669.1319	712.4847	733.4648	679.2709	653.7002	623.3467	594.3807	576.6649	530.0290	517.4245 (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	71.4829	71.5835	71.6843	72.1928	72.2953	72.8125	72.8125	72.9169	72.6048	72.2953	72.0905	71.8868
alpha	5.7655	5.7722	5.7790	5.8129	5.8197	5.8542	5.8542	5.8611	5.8403	5.8197	5.8060	5.7925
util living area	0.8527	0.7772	0.6723	0.5389	0.4061	0.3004	0.2147	0.2350	0.3706	0.5690	0.7727	0.8724 (86)
Living	20.7463	20.8305	20.8967	20.9333	20.9443	20.9467	20.9470	20.9470	20.9458	20.9317	20.8513	20.7191
Non living	20.0933	20.1909	20.2654	20.3080	20.3196	20.3259	20.3261	20.3270	20.3235	20.3080	20.2205	20.0646
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	20.8702	20.8305	20.8967	20.9333	20.9443	20.9467	20.9470	20.9470	20.9458	20.9317	20.8513	20.7584 (87)
Th 2	20.3835	20.3843	20.3851	20.3892	20.3900	20.3941	20.3941	20.3949	20.3925	20.3900	20.3884	20.3868 (88)
util rest of house	0.8362	0.7569	0.6485	0.5132	0.3798	0.2720	0.1851	0.2041	0.3383	0.5380	0.7491	0.8573 (89)
MIT 2	20.2678	20.1909	20.2654	20.3080	20.3196	20.3259	20.3261	20.3270	20.3235	20.3080	20.2205	20.1227 (90)
Living area fraction									fLA = Living area / (4) =			0.4687 (91)
MIT	20.5502	20.4907	20.5613	20.6011	20.6124	20.6168	20.6171	20.6176	20.6152	20.6003	20.5162	20.4206 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5502	20.4907	20.5613	20.6011	20.6124	20.6168	20.6171	20.6176	20.6152	20.6003	20.5162	20.4206 (93)

8. Space heating requirement

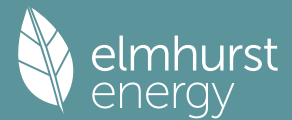
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8408	0.7605	0.6554	0.5222	0.3894	0.2824	0.1960	0.2155	0.3501	0.5488	0.7542	0.8582 (94)
Useful gains	455.7292	465.5900	438.5639	372.0403	285.5916	191.8432	128.1308	134.3279	208.1209	316.4584	399.7221	444.0366 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	527.9951	505.8558	455.5912	376.4501	286.3247	191.9275	128.1382	134.3410	208.4185	321.2758	432.2404	524.0744 (97)
Space heating kWh	53.7659	27.0587	12.6683	3.1751	0.5454	0.0000	0.0000	0.0000	0.0000	3.5841	23.4132	59.5482 (98a)
Space heating requirement - total per year (kWh/year)												183.7588
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	53.7659	27.0587	12.6683	3.1751	0.5454	0.0000	0.0000	0.0000	0.0000	3.5841	23.4132	59.5482 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												183.7588
Space heating per m2										(98c) / (4) =		3.6870 (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 %)												266.4612 (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)	53.7659	27.0587	12.6683	3.1751	0.5454	0.0000	0.0000	0.0000	0.0000	3.5841	23.4132	59.5482 (98)
Space heating fuel (main heating system)	266.4612	266.4612	266.4612	266.4612	266.4612	0.0000	0.0000	0.0000	0.0000	266.4612	266.4612	266.4612 (210)
Space heating efficiency (main heating system 2)	20.1777	10.1548	4.7543	1.1916	0.2047	0.0000	0.0000	0.0000	0.0000	1.3451	8.7867	22.3478 (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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (64)
Efficiency of water heater (217)m	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092 (216)
Fuel for water heating, kWh/month	147.9648	131.4790	141.0857	127.2154	125.5144	97.6449	97.1806	100.3824	100.7611	129.4121	134.1806	146.7484 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.2878	6.5825	7.2878	7.0527	7.2878	7.0527	7.2878	7.2878	7.0527	7.2878	7.0527	7.2878 (231)
Lighting	14.7679	11.8474	10.6672	7.8153	6.0367	4.9321	5.5069	7.1581	9.2977	12.1990	13.7788	15.1784 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-28.5074	-51.1968	-94.0979	-129.0331	-156.4966	-148.5705	-145.8954	-129.5841	-100.7102	-66.7998	-34.4527	-23.1881 (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	-1.2050	-4.5416	-15.6094	-36.8549	-62.9179	-72.6135	-70.0908	-49.8330	-26.4706	-8.6239	-2.0427	-0.8104 (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												68.9627 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												171.5092
Water heating fuel used												1479.5695 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.5880) mechanical ventilation fans (SFP = 0.5880)												85.8077 (230a)
Total electricity for the above, kWh/year												85.8077 (231)
Electricity for lighting (calculated in Appendix L)												119.1855 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1460.1462 (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												293.3792 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	68.9627	16.4900	11.3719 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1479.5695	16.4900	243.9810 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	85.8077	16.4900	14.1497 (249)
Energy for lighting	119.1855	16.4900	19.6537 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1108.5325	16.4900	-182.7970
PV Unit electricity exported	-351.6136	5.5900	-19.6552
Total			-202.4522 (252)
Total energy cost			86.7041 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		0.3291 (257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	94.6650
SAP rating (Section 12)		95 (258)
SAP band		A

 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	68.9627	0.1594	10.9910 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1479.5695	0.1415	209.3221 (264)
Space and water heating			220.3131 (265)
Pumps, fans and electric keep-hot	85.8077	0.1387	11.9026 (267)
Energy for lighting	119.1855	0.1443	17.2022 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1108.5325	0.1310	-145.2342
PV Unit electricity exported	-351.6136	0.1165	-40.9725
Total			-186.2067 (269)
Total CO2, kg/year			63.2112 (272)
CO2 emissions per m2			1.2700 (273)
EI value			99.1069
EI rating			99 (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	49.8400 (1b)	x 2.4000 (2b)	= 119.6160 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.6160 (5)

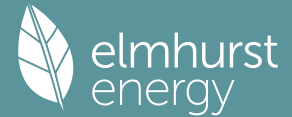
 2. Ventilation rate

		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		1.0000 (17)
Infiltration rate		0.0500 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.0463 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.1000	4.3000	3.9000	3.7000	3.4000	3.5000	3.2000	3.6000	3.9000	3.5000	3.9000 (22)
Wind factor	1.0500	1.0250	1.0750	0.9750	0.9250	0.8500	0.8750	0.8000	0.9000	0.9750	0.8750	0.9750 (22a)
Adj infilt rate	0.0486	0.0474	0.0497	0.0451	0.0428	0.0393	0.0405	0.0370	0.0416	0.0451	0.0405	0.0451 (22b)
Balanced mechanical ventilation with heat recovery												
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)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.9000 (23c)
Effective ac	0.1391	0.1379	0.1402	0.1356	0.1333	0.1298	0.1310	0.1275	0.1321	0.1356	0.1310	0.1356 (25)

 3. Heat losses and heat loss parameter

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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
Windows/Doors (Uw = 1.00)			11.7400	0.9615	11.2885		(27)
Non-Vision Panel			6.6000	1.0000	6.6000		(26)
Cavity Wall	64.4400	18.3400	46.1000	0.1300	5.9930	60.0000	2766.0000 (29a)
Total net area of external elements Aum(A, m2)			64.4400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.8815		(33)
Party Walls			10.6800	0.0000	0.0000	180.0000	1922.4000 (32)
Party Floor 1			49.8400			30.0000	1495.2000 (32d)
Party Ceiling			49.8400			30.0000	1495.2000 (32b)
Internal Walls			75.8400			9.0000	682.5600 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 8361.3600 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 167.7640 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.8000	0.0580	0.5684
E3 Sill	5.4000	0.0450	0.2430
E4 Jamb	27.8000	0.0500	1.3900
E7 Party floor between dwellings (in blocks of flats)	53.7000	0.0000	0.0000
E16 Corner (normal)	4.8000	0.0440	0.2112
E18 Party wall between dwellings	4.8000	0.0620	0.2976

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.7102 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 26.5917 (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	5.4893	5.4436	5.5349	5.3523	5.2610	5.1241	5.1698	5.0328	5.2154	5.3523	5.1698	5.3523 (38)
Average = Sum(39)m / 12 =	32.0809	32.0353	32.1266	31.9440	31.8527	31.7158	31.7614	31.6245	31.8071	31.9440	31.7614	31.9440 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6437	0.6428	0.6446	0.6409	0.6391	0.6364	0.6373	0.6345	0.6382	0.6409	0.6373	0.6409 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

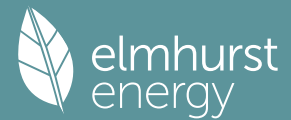
4. Water heating energy requirements (kWh/year)

Assumed occupancy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers												1.6854 (42)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for other uses	63.6313	62.6863	61.3555	58.9018	57.0645	55.0272	53.9268	55.2482	56.6871	58.8670	61.3713	63.4162 (42b)
Average daily hot water use (litres/day)	33.5685	32.3478	31.1272	29.9065	28.6858	27.4652	27.4652	28.6858	29.9065	31.1272	32.3478	33.5685 (42c)
Daily hot water use	97.1998	95.0341	92.4827	88.8083	85.7503	82.4924	81.3919	83.9341	86.5936	89.9942	93.7191	96.9847 (44)
Energy content (annual)	153.9408	135.3274	142.1425	121.5741	115.4364	101.4340	98.4365	103.9279	106.7785	122.1213	133.5201	151.8546 (45)
Distribution loss (46)m = 0.15 x (45)m	23.0911	20.2991	21.3214	18.2361	17.3155	15.2151	14.7655	15.5892	16.0168	18.3182	20.0280	22.7782 (46)
Water storage loss:												150.0000 (47)
Store volume												1.8600 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.7800 (49)
Temperature factor from Table 2b												1.4508 (55)
Enter (49) or (54) in (55)												
Total storage loss	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (56)
If cylinder contains dedicated solar storage	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (62)
WVHRS	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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (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	95.0714	84.6354	91.1484	82.8938	82.2687	51.7364	51.3400	53.1659	53.5135	84.4914	86.8658	94.3777 (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	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.8719	14.9855	12.1870	9.2264	6.8968	5.8226	6.2915	8.1779	10.9764	13.9371	16.2666	17.3409 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.1319	221.4058	215.6757	203.4768	188.0780	173.6052	163.9366	161.6627	167.3928	179.5917	194.9905	209.4633 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977 (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)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156 (71)
Water heating gains (Table 5)	127.7841	125.9455	122.5114	115.1303	110.5762	71.8561	69.0054	71.4596	74.3242	113.5637	120.6470	126.8518 (72)
Total internal gains	444.2936	442.8424	430.8796	408.3390	386.0566	331.7895	319.7391	321.8058	333.1991	387.5980	412.4097	434.1615 (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	2.1000	11.9957	0.5700	0.7000	0.7700	6.9655 (74)
South	5.2300	51.1372	0.5700	0.7000	0.7700	73.9511 (78)
West	4.4100	22.3485	0.5700	0.7000	0.7700	27.2517 (80)

Solar gains	108.1683	171.7409	237.2577	312.1630	348.3019	373.3013	352.9928	322.9980	279.4544	201.1824	129.9448	91.2670 (83)
Total gains	552.4618	614.5833	668.1373	720.5020	734.3585	705.0908	672.7318	644.8037	612.6535	588.7804	542.3545	525.4285 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	72.3982	72.5013	72.2953	72.7085	72.9169	73.2317	73.1264	73.4430	73.0215	72.7085	73.1264	72.7085
tau	5.8265	5.8334	5.8197	5.8472	5.8611	5.8821	5.8751	5.8962	5.8681	5.8472	5.8751	5.8472
alpha	0.8319	0.7631	0.6496	0.5049	0.3680	0.2473	0.1652	0.1766	0.3268	0.5305	0.7386	0.8527 (86)
util living area	20.7810	20.8463	20.9075	20.9381	20.9458	20.9471	20.9472	20.9474	20.9466	20.9372	20.8769	20.7579
Living	20.1409	20.2160	20.2819	20.3170	20.3260	20.3296	20.3288	20.3315	20.3276	20.3165	20.2566	20.1166
Non living	0	0	0	0	0	0	0	0	0	0	0	0
24 / 16	3	0	0	0	0	0	0	0	0	0	0	0
24 / 9	28	0	0	0	0	0	0	0	0	0	0	10
16 / 9	20.8880	20.8463	20.9075	20.9381	20.9458	20.9471	20.9472	20.9474	20.9466	20.9372	20.8769	20.7917 (87)
MIT	20.3908	20.3917	20.3900	20.3933	20.3949	20.3974	20.3966	20.3990	20.3958	20.3933	20.3966	20.3933 (88)
Th 2	0.8141	0.7424	0.6252	0.4794	0.3420	0.2203	0.1368	0.1471	0.2955	0.4996	0.7137	0.8360 (89)
util rest of house	20.2912	20.2160	20.2819	20.3170	20.3260	20.3296	20.3288	20.3315	20.3276	20.3165	20.2566	20.1665 (90)
MIT 2	20.5709	20.5114	20.5751	20.6081	20.6165	20.6191	20.6186	20.6201	20.6177	20.6074	20.5473	20.4595 (92)
Living area fraction	Temperature adjustment											0.0000
MIT	adjusted MIT	20.5114	20.5751	20.6081	20.6165	20.6191	20.6186	20.6201	20.6177	20.6074	20.5473	20.4595 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8195	0.7466	0.6327	0.4885	0.3516	0.2302	0.1472	0.1579	0.3070	0.5106	0.7201	0.8379 (94)
Useful gains	452.7456	458.8351	422.7408	351.9513	258.1638	162.3329	99.0507	101.8337	188.0973	300.6069	390.5286	440.2779 (95)
Ext temp.	4.6000	5.1000	7.0000	9.5000	12.5000	15.5000	17.5000	17.4000	14.7000	11.1000	7.5000	4.6000 (96)
Heat loss rate W	512.3613	493.7087	436.1209	354.8369	258.5328	162.3551	99.0518	101.8353	188.2254	303.7048	414.4018	506.6170 (97)
Space heating kWh	44.3541	23.4350	9.9548	2.0777	0.2745	0.0000	0.0000	0.0000	0.0000	2.3048	17.1887	49.3563 (98a)
Space heating requirement - total per year (kWh/year)												148.9459
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	44.3541	23.4350	9.9548	2.0777	0.2745	0.0000	0.0000	0.0000	0.0000	2.3048	17.1887	49.3563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												148.9459
Space heating per m2										(98c) / (4) =		2.9885 (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 %)												265.5248 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)

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Space heating requirement	44.3541	23.4350	9.9548	2.0777	0.2745	0.0000	0.0000	0.0000	0.0000	2.3048	17.1887	49.3563 (98)
Space heating efficiency (main heating system 1)	265.5248	265.5248	265.5248	265.5248	265.5248	0.0000	0.0000	0.0000	0.0000	265.5248	265.5248	265.5248 (210)
Space heating fuel (main heating system)	16.7043	8.8259	3.7491	0.7825	0.1034	0.0000	0.0000	0.0000	0.0000	0.8680	6.4735	18.5882 (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 requirement	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (64)
Efficiency of water heater (217)m	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152 (216)
Fuel for water heating, kWh/month	147.9596	131.4744	141.0807	127.2110	125.5101	97.6415	97.1772	100.3789	100.7576	129.4076	134.1759	146.7433 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.2878	6.5825	7.2878	7.0527	7.2878	7.0527	7.2878	7.0527	7.2878	7.0527	7.2878	7.2878 (231)
Lighting	14.7679	11.8474	10.6672	7.8153	6.0367	4.9321	5.5069	7.1581	9.2977	12.1990	13.7788	15.1784 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-32.6829	-53.7822	-96.5576	-134.1636	-158.6808	-156.5705	-152.4696	-137.8689	-108.6983	-72.9796	-39.3307	-26.3684 (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	-1.6006	-5.0527	-16.5781	-40.5718	-65.3049	-84.5201	-79.5156	-58.6900	-31.7535	-10.4436	-2.6942	-1.0584 (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												56.0949 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												171.5152
Water heating fuel used												1479.5177 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.5880) mechanical ventilation fans (SFP = 0.5880)												85.8077 (230a)
Total electricity for the above, kWh/year												85.8077 (231)
Electricity for lighting (calculated in Appendix L)												119.1855 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1567.9365 (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												172.6693 (238)

10a. Fuel costs - using BEDF prices (528)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	56.0949	21.5100	12.0660 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1479.5177	21.5100	318.2443 (247)
Energy for instantaneous electric shower(s)	0.0000	21.5100	0.0000 (247a)
Pumps, fans and electric keep-hot	85.8077	21.5100	18.4572 (249)
Energy for lighting	119.1855	21.5100	25.6368 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1170.1531	21.5100	-251.6999
PV Unit electricity exported	-397.7834	5.5900	-22.2361
Total			-273.9360 (252)
Total energy cost			100.4683 (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	56.0949	0.1597	8.9595 (261)
Total CO2 associated with community systems			0.0000 (373)

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Water heating (other fuel)	1479.5177	0.1415	209.3148 (264)
Space and water heating			218.2743 (265)
Pumps, fans and electric keep-hot	85.8077	0.1387	11.9026 (267)
Energy for lighting	119.1855	0.1443	17.2022 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1170.1531	0.1311	-153.4143
PV Unit electricity exported	-397.7834	0.1160	-46.1374
Total			-199.5517 (269)
Total CO2, kg/year			47.8274 (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	56.0949	1.5912	89.2562 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1479.5177	1.5232	2253.5564 (278)
Space and water heating			2342.8126 (279)
Pumps, fans and electric keep-hot	85.8077	1.5128	129.8099 (281)
Energy for lighting	119.1855	1.5338	182.8108 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1170.1531	1.4843	-1736.9103
PV Unit electricity exported	-397.7834	0.4250	-169.0734
Total			-1905.9837 (283)
Total Primary energy kWh/year			749.4496 (286)

 SAP 10 EPC IMPROVEMENTS

P23972(2)

Current energy efficiency rating: A 95
 Current environmental impact rating: A 99

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

Recommended measures: (none)	SAP change	Cost change	CO2 change
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Recommended measures (none)	Typical annual savings		Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m ²	

Potential energy efficiency rating: A 95
 Potential environmental impact rating: A 99

Fuel prices for cost data on this page from database revision number 528 TEST (04 Oct 2023)
 Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£374	£374	£0
Space heating	£31	£31	£0
Water heating	£318	£318	£0
Lighting	£26	£26	£0
Generated (PV)	-£274	-£274	£0
Total cost of fuels	£100	£100	£0
Total cost of uses	£101	£101	£0
Delivered energy	3 kWh/m ²	3 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.0 tonnes	0.0 tonnes	0.0 tonnes
CO2 emissions per m ²	1 kg/m ²	1 kg/m ²	0 kg/m ²
Primary energy	15 kWh/m ²	15 kWh/m ²	0 kWh/m ²

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

Full SAP Calculation Printout



1. Overall dwelling characteristics

		Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor		49.8400 (1b)	x 2.4000 (2b)	= 119.6160 (1b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 119.6160 (5)

2. Ventilation rate

			m ³ per hour
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		0 * 10 =	0.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			1.0000 (17)
Infiltration rate			0.0500 (18)
Number of sides sheltered			1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.0463 (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	0.0590	0.0578	0.0567	0.0509	0.0497	0.0439	0.0439	0.0428	0.0463	0.0497	0.0520	0.0543 (22b)
Balanced mechanical ventilation with heat recovery												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)												81.9000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.1495	0.1483	0.1472	0.1414	0.1402	0.1344	0.1344	0.1333	0.1367	0.1402	0.1425	0.1448 (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
Windows/Doors (Uw = 1.00)			11.7400	0.9615	11.2885		(27)
Non-Vision Panel			6.6000	1.0000	6.6000		(26)
Cavity Wall	64.4400	18.3400	46.1000	0.1300	5.9930	60.0000	2766.0000 (29a)
Total net area of external elements Aum(A, m ²)			64.4400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.8815		(33)
Party Walls			10.6800	0.0000	0.0000	180.0000	1922.4000 (32)
Party Floor 1			49.8400			30.0000	1495.2000 (32d)
Party Ceiling			49.8400			30.0000	1495.2000 (32b)
Internal Walls			75.8400			9.0000	682.5600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	8361.3600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		167.7640 (35)

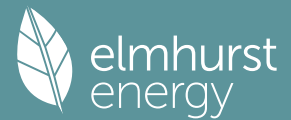
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.8000	0.0580	0.5684
E3 Sill	5.4000	0.0450	0.2430
E4 Jamb	27.8000	0.0500	1.3900
E7 Party floor between dwellings (in blocks of flats)	53.7000	0.0000	0.0000
E16 Corner (normal)	4.8000	0.0440	0.2112
E18 Party wall between dwellings	4.8000	0.0620	0.2976
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			2.7102 (36)
Point Thermal bridges			0.0000 (36a)
Total fabric heat loss			(33) + (36) + (36a) = 26.5917 (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	5.9000	5.8544	5.8087	5.5805	5.5349	5.3067	5.3067	5.2610	5.3980	5.5349	5.6262	5.7175 (38)
Average = Sum(39)m / 12 =	32.4917	32.4460	32.4004	32.1722	32.1266	31.8984	31.8984	31.8527	31.9896	32.1266	32.2178	32.3091 (39)
												32.1608

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6519	0.6510	0.6501	0.6455	0.6446	0.6400	0.6400	0.6391	0.6418	0.6446	0.6464	0.6483 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6854 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	63.6313	62.6863	61.3555	58.9018	57.0645	55.0272	53.9268	55.2482	56.6871	58.8670	61.3713	63.4162 (42b)
Hot water usage for other uses	33.5685	32.3478	31.1272	29.9065	28.6858	27.4652	27.4652	28.6858	29.9065	31.1272	32.3478	33.5685 (42c)
Average daily hot water use (litres/day)												89.5131 (43)
Daily hot water use	97.1998	95.0341	92.4827	88.8083	85.7503	82.4924	81.3919	83.9341	86.5936	89.9942	93.7191	96.9847 (44)
Energy content (annual)	153.9408	135.3274	142.1425	121.5741	115.4364	101.4340	98.4365	103.9279	106.7785	122.1213	133.5201	151.8546 (45)
Distribution loss (46) _m = 0.15 x (45) _m	23.0911	20.2991	21.3214	18.2361	17.3155	15.2151	14.7655	15.5892	16.0168	18.3182	20.0280	22.7782 (46)
Water storage loss:												150.0000 (47)
Store volume												1.8600 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.7800 (49)
Temperature factor from Table 2b												1.4508 (55)
Enter (49) or (54) in (55)												1.4508 (55)
Total storage loss	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (56)
If cylinder contains dedicated solar storage	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (62)
MWHRs	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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (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	95.0714	84.6354	91.1484	82.8938	82.2687	51.7364	51.3400	53.1659	53.5135	84.4914	86.8658	94.3777 (65)

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

Metabolic gains (Table 5), Watts	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.8719	14.9855	12.1870	9.2264	6.8968	5.8226	6.2915	8.1779	10.9764	13.9371	16.2666	17.3409 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.1319	221.4058	215.6757	203.4768	188.0780	173.6052	163.9366	161.6627	167.3928	179.5917	194.9905	209.4633 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977 (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)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156 (71)
Water heating gains (Table 5)	127.7841	125.9455	122.5114	115.1303	110.5762	71.8561	69.0054	71.4596	74.3242	113.5637	120.6470	126.8518 (72)
Total internal gains	444.2936	442.8424	430.8796	408.3390	386.0566	331.7895	319.7391	321.8058	333.1991	387.5980	412.4097	434.1615 (73)

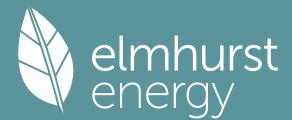
6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
North	2.1000	10.6334	0.5700	0.7000	0.7700	6.1744 (74)						
South	5.2300	46.7521	0.5700	0.7000	0.7700	67.6096 (78)						
West	4.4100	19.6403	0.5700	0.7000	0.7700	23.9493 (80)						
Solar gains	97.7333	169.3767	238.2523	304.1457	347.4083	347.4814	333.9612	301.5409	261.1817	189.0669	117.6193	83.2630 (83)
Total gains	542.0269	612.2191	669.1319	712.4847	733.4648	679.2709	653.7002	623.3467	594.3807	576.6649	530.0290	517.4245 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	71.4829	71.5835	71.6843	72.1928	72.2953	72.8125	72.8125	72.9169	72.6048	72.2953	72.0905	71.8868
alpha	5.7655	5.7722	5.7790	5.8129	5.8197	5.8542	5.8542	5.8611	5.8403	5.8197	5.8060	5.7925
util living area	0.8527	0.7772	0.6723	0.5389	0.4061	0.3004	0.2147	0.2350	0.3706	0.5690	0.7727	0.8724 (86)
Living	20.7463	20.8305	20.8967	20.9333	20.9443	20.9467	20.9470	20.9470	20.9458	20.9317	20.8513	20.7191
Non living	20.0933	20.1909	20.2654	20.3080	20.3196	20.3259	20.3261	20.3270	20.3235	20.3080	20.2205	20.0646
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	20.8702	20.8305	20.8967	20.9333	20.9443	20.9467	20.9470	20.9470	20.9458	20.9317	20.8513	20.7584 (87)
Th 2	20.3835	20.3843	20.3851	20.3892	20.3900	20.3941	20.3941	20.3949	20.3925	20.3900	20.3884	20.3868 (88)
util rest of house	0.8362	0.7569	0.6485	0.5132	0.3798	0.2720	0.1851	0.2041	0.3383	0.5380	0.7491	0.8573 (89)
MIT 2	20.2678	20.1909	20.2654	20.3080	20.3196	20.3259	20.3261	20.3270	20.3235	20.3080	20.2205	20.1227 (90)
Living area fraction	20.5502	20.4907	20.5613	20.6011	20.6124	20.6168	20.6171	20.6176	20.6152	20.6003	20.5162	20.4206 (91)
MIT	20.5502	20.4907	20.5613	20.6011	20.6124	20.6168	20.6171	20.6176	20.6152	20.6003	20.5162	20.4206 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5502	20.4907	20.5613	20.6011	20.6124	20.6168	20.6171	20.6176	20.6152	20.6003	20.5162	20.4206 (93)

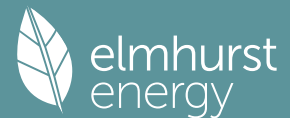
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8408	0.7605	0.6554	0.5222	0.3894	0.2824	0.1960	0.2155	0.3501	0.5488	0.7542	0.8582 (94)
Useful gains	455.7292	465.5900	438.5639	372.0403	285.5916	191.8432	128.1308	134.3279	208.1209	316.4584	399.7221	444.0366 (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	527.9951	505.8558	455.5912	376.4501	286.3247	191.9275	128.1382	134.3410	208.4185	321.2758	432.2404	524.0744 (97)
Space heating kWh	53.7659	27.0587	12.6683	3.1751	0.5454	0.0000	0.0000	0.0000	0.0000	3.5841	23.4132	59.5482 (98a)
Space heating requirement - total per year (kWh/year)												183.7588
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	53.7659	27.0587	12.6683	3.1751	0.5454	0.0000	0.0000	0.0000	0.0000	3.5841	23.4132	59.5482 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												183.7588
Space heating per m2										(98c) / (4) =		3.6870 (99)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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 %)												266.4612 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	53.7659	27.0587	12.6683	3.1751	0.5454	0.0000	0.0000	0.0000	0.0000	3.5841	23.4132	59.5482 (98)
Space heating efficiency (main heating system 1)	266.4612	266.4612	266.4612	266.4612	266.4612	0.0000	0.0000	0.0000	0.0000	266.4612	266.4612	266.4612 (210)
Space heating fuel (main heating system)	20.1777	10.1548	4.7543	1.1916	0.2047	0.0000	0.0000	0.0000	0.0000	1.3451	8.7867	22.3478 (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 requirement	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (64)
Efficiency of water heater (217)m	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092	171.5092 (216)
Fuel for water heating, kWh/month	147.9648	131.4790	141.0857	127.2154	125.5144	97.6449	97.1806	100.3824	100.7611	129.4121	134.1806	146.7484 (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 (234a)m	7.2878	6.5825	7.2878	7.0527	7.2878	7.0527	7.2878	7.2878	7.0527	7.2878	7.0527	7.2878 (231)
Lighting (233a)m	14.7679	11.8474	10.6672	7.8153	6.0367	4.9321	5.5069	7.1581	9.2977	12.1990	13.7788	15.1784 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-28.5074	-51.1968	-94.0979	-129.0331	-156.4966	-148.5705	-145.8954	-129.5841	-100.7102	-66.7998	-34.4527	-23.1881 (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)	-1.2050	-4.5416	-15.6094	-36.8549	-62.9179	-72.6135	-70.0908	-49.8330	-26.4706	-8.6239	-2.0427	-0.8104 (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)

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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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													68.9627	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													171.5092	
Water heating fuel used													1479.5695	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.5880)														
mechanical ventilation fans (SFP = 0.5880)													85.8077	(230a)
Total electricity for the above, kWh/year													85.8077	(231)
Electricity for lighting (calculated in Appendix L)													119.1855	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1460.1462	(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													293.3792	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	68.9627	16.4900	11.3719 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1479.5695	16.4900	243.9810 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	85.8077	16.4900	14.1497 (249)
Energy for lighting	119.1855	16.4900	19.6537 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1108.5325	16.4900	-182.7970
PV Unit electricity exported	-351.6136	5.5900	-19.6552
Total			-202.4522 (252)
Total energy cost			86.7041 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.3291 (257)
SAP value		94.6650
SAP rating (Section 12)		95 (258)
SAP band		A

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	68.9627	0.1594	10.9910 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1479.5695	0.1415	209.3221 (264)
Space and water heating			220.3131 (265)
Pumps, fans and electric keep-hot	85.8077	0.1387	11.9026 (267)
Energy for lighting	119.1855	0.1443	17.2022 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1108.5325	0.1310	-145.2342
PV Unit electricity exported	-351.6136	0.1165	-40.9725
Total			-186.2067 (269)
Total CO2, kg/year			63.2112 (272)
CO2 emissions per m2			1.2700 (273)
EI value			99.1069
EI rating			99 (274)
EI band			A

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1. Overall dwelling characteristics

	Area	x	Storey height	=	Volume
	(m ²)		(m)		(m ³)
Ground floor	49.8400 (1b)		2.4000 (2b)		119.6160 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	49.8400				(4)
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 119.6160 (5)

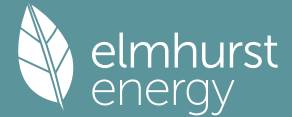
2. Ventilation rate

	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
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =													0.0000 / (5) = 0.0000 (8)
Pressure test													Yes
Pressure Test Method													Blower Door
Measured/design AP50													1.0000 (17)
Infiltration rate													0.0500 (18)
Number of sides sheltered													1 (19)
Shelter factor													(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor													(21) = (18) x (20) = 0.0463 (21)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.2000	4.1000	4.3000	3.9000	3.7000	3.4000	3.5000	3.2000	3.6000	3.9000	3.5000	3.9000	(22)
Wind factor	1.0500	1.0250	1.0750	0.9750	0.9250	0.8500	0.8750	0.8000	0.9000	0.9750	0.8750	0.9750	(22a)
Adj infilt rate	0.0486	0.0474	0.0497	0.0451	0.0428	0.0393	0.0405	0.0370	0.0416	0.0451	0.0405	0.0451	(22b)
Balanced mechanical ventilation with heat recovery													
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)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													81.9000 (23c)
Effective ac	0.1391	0.1379	0.1402	0.1356	0.1333	0.1298	0.1310	0.1275	0.1321	0.1356	0.1310	0.1356	(25)

3. Heat losses and heat loss parameter

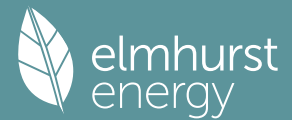
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K						
Windows/Doors (U _w = 1.00)			11.7400	0.9615	11.2885			(27)					
Non-Vision Panel			6.6000	1.0000	6.6000			(26)					
Cavity Wall	64.4400	18.3400	46.1000	0.1300	5.9930	60.0000	2766.0000	(29a)					
Total net area of external elements A _{um} (A, m ²)			64.4400					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.8815			(33)					
Party Walls			10.6800	0.0000	0.0000	180.0000	1922.4000	(32)					
Party Floor 1			49.8400			30.0000	1495.2000	(32d)					
Party Ceiling			49.8400			30.0000	1495.2000	(32b)					
Internal Walls			75.8400			9.0000	682.5600	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8361.3600	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							167.7640	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				9.8000	0.0580	0.5684							
E3 Sill				5.4000	0.0450	0.2430							
E4 Jamb				27.8000	0.0500	1.3900							
E7 Party floor between dwellings (in blocks of flats)				53.7000	0.0000	0.0000							
E16 Corner (normal)				4.8000	0.0440	0.2112							
E18 Party wall between dwellings				4.8000	0.0620	0.2976							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.7102	(36)					
Point Thermal bridges							0.0000	(36a)					
Total fabric heat loss							(33) + (36) + (36a) =	26.5917 (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	5.4893	5.4436	5.5349	5.3523	5.2610	5.1241	5.1698	5.0328	5.2154	5.3523	5.1698	5.3523	(38)
Average = Sum(39)m / 12 =	32.0809	32.0353	32.1266	31.9440	31.8527	31.7158	31.7614	31.6245	31.8071	31.9440	31.7614	31.9440	(39)
HLP	0.6437	0.6428	0.6446	0.6409	0.6391	0.6364	0.6373	0.6345	0.6382	0.6409	0.6373	0.6409	(40)
HLP (average)													0.6397

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Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6854 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	63.6313	62.6863	61.3555	58.9018	57.0645	55.0272	53.9268	55.2482	56.6871	58.8670	61.3713	63.4162 (42b)
Hot water usage for other uses	33.5685	32.3478	31.1272	29.9065	28.6858	27.4652	27.4652	28.6858	29.9065	31.1272	32.3478	33.5685 (42c)
Average daily hot water use (litres/day)												89.5131 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	97.1998	95.0341	92.4827	88.8083	85.7503	82.4924	81.3919	83.9341	86.5936	89.9942	93.7191	96.9847 (44)
Distribution loss (46)m = 0.15 x (45)m	153.9408	135.3274	142.1425	121.5741	115.4364	101.4340	98.4365	103.9279	106.7785	122.1213	133.5201	151.8546 (45)
Water storage loss:												1486.4939
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8600 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												1.4508 (55)
Total storage loss	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (56)
If cylinder contains dedicated solar storage	44.9748	40.6224	44.9748	43.5240	44.9748	43.5240	44.9748	44.9748	43.5240	44.9748	43.5240	44.9748 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	95.0714	84.6354	91.1484	82.8938	82.2687	51.7364	51.3400	53.1659	53.5135	84.4914	86.8658	94.3777 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235	101.1235 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.8719	14.9855	12.1870	9.2264	6.8968	5.8226	6.2915	8.1779	10.9764	13.9371	16.2666	17.3409 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.1319	221.4058	215.6757	203.4768	188.0780	173.6052	163.9366	161.6627	167.3928	179.5917	194.9905	209.4633 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977	46.7977 (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)	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156	-67.4156 (71)
Water heating gains (Table 5)	127.7841	125.9455	122.5114	115.1303	110.5762	71.8561	69.0054	71.4596	74.3242	113.5637	120.6470	126.8518 (72)
Total internal gains	444.2936	442.8424	430.8796	408.3390	386.0566	331.7895	319.7391	321.8058	333.1991	387.5980	412.4097	434.1615 (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	2.1000	11.9957	0.5700	0.7000	0.7700	6.9655 (74)						
South	5.2300	51.1372	0.5700	0.7000	0.7700	73.9511 (78)						
West	4.4100	22.3485	0.5700	0.7000	0.7700	27.2517 (80)						
Solar gains	108.1683	171.7409	237.2577	312.1630	348.3019	373.3013	352.9928	322.9980	279.4544	201.1824	129.9448	91.2670 (83)
Total gains	552.4618	614.5833	668.1373	720.5020	734.3585	705.0908	672.7318	644.8037	612.6535	588.7804	542.3545	525.4285 (84)
7. Mean internal temperature (heating season)												

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, n _{li,m} (see Table 9a)													
tau	72.3982	72.5013	72.2953	72.7085	72.9169	73.2317	73.1264	73.4430	73.0215	72.7085	73.1264	72.7085	
alpha	5.8265	5.8334	5.8197	5.8472	5.8611	5.8821	5.8751	5.8962	5.8681	5.8472	5.8751	5.8472	
util living area	0.8319	0.7631	0.6496	0.5049	0.3680	0.2473	0.1652	0.1766	0.3268	0.5305	0.7386	0.8527	(86)
Living	20.7810	20.8463	20.9075	20.9381	20.9458	20.9471	20.9472	20.9474	20.9466	20.9372	20.8769	20.7579	
Non living	20.1409	20.2160	20.2819	20.3170	20.3260	20.3296	20.3288	20.3315	20.3276	20.3165	20.2566	20.1166	
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	20.8880	20.8463	20.9075	20.9381	20.9458	20.9471	20.9472	20.9474	20.9466	20.9372	20.8769	20.7917	(87)
Th 2	20.3908	20.3917	20.3900	20.3933	20.3949	20.3974	20.3966	20.3990	20.3958	20.3933	20.3966	20.3933	(88)
util rest of house	0.8141	0.7424	0.6252	0.4794	0.3420	0.2203	0.1368	0.1471	0.2955	0.4996	0.7137	0.8360	(89)
MIT 2	20.2912	20.2160	20.2819	20.3170	20.3260	20.3296	20.3288	20.3315	20.3276	20.3165	20.2566	20.1665	(90)
Living area fraction									fLA = Living area / (4) =				0.4687 (91)
MIT	20.5709	20.5114	20.5751	20.6081	20.6165	20.6191	20.6186	20.6201	20.6177	20.6074	20.5473	20.4595	(92)
Temperature adjustment													0.0000
adjusted MIT	20.5709	20.5114	20.5751	20.6081	20.6165	20.6191	20.6186	20.6201	20.6177	20.6074	20.5473	20.4595	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8195	0.7466	0.6327	0.4885	0.3516	0.2302	0.1472	0.1579	0.3070	0.5106	0.7201	0.8379	(94)
Useful gains	452.7456	458.8351	422.7408	351.9513	258.1638	162.3329	99.0507	101.8337	188.0973	300.6069	390.5286	440.2779	(95)
Ext temp.	4.6000	5.1000	7.0000	9.5000	12.5000	15.5000	17.5000	17.4000	14.7000	11.1000	7.5000	4.6000	(96)
Heat loss rate W	512.3613	493.7087	436.1209	354.8369	258.5328	162.3551	99.0518	101.8353	188.2254	303.7048	414.4018	506.6170	(97)
Space heating kWh	44.3541	23.4350	9.9548	2.0777	0.2745	0.0000	0.0000	0.0000	0.0000	2.3048	17.1887	49.3563	(98a)
Space heating requirement - total per year (kWh/year)												148.9459	
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	44.3541	23.4350	9.9548	2.0777	0.2745	0.0000	0.0000	0.0000	0.0000	2.3048	17.1887	49.3563	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												148.9459	
Space heating per m ²										(98c) / (4) =		2.9885	(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 %)													265.5248 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	44.3541	23.4350	9.9548	2.0777	0.2745	0.0000	0.0000	0.0000	0.0000	2.3048	17.1887	49.3563	(98)
Space heating efficiency (main heating system 1)	265.5248	265.5248	265.5248	265.5248	265.5248	0.0000	0.0000	0.0000	0.0000	265.5248	265.5248	265.5248	(210)
Space heating fuel (main heating system)	16.7043	8.8259	3.7491	0.7825	0.1034	0.0000	0.0000	0.0000	0.0000	0.8680	6.4735	18.5882	(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	253.7732	225.4986	241.9749	218.1861	215.2688	167.4700	166.6737	172.1651	172.8145	221.9537	230.1321	251.6870	(64)
Efficiency of water heater (217)m	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	171.5152	(216)
Fuel for water heating, kWh/month	147.9596	131.4744	141.0807	127.2110	125.5101	97.6415	97.1772	100.3789	100.7576	129.4076	134.1759	146.7433	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.2878	6.5825	7.2878	7.0527	7.2878	7.0527	7.2878	7.2878	7.0527	7.2878	7.0527	7.2878	(231)
Lighting	14.7679	11.8474	10.6672	7.8153	6.0367	4.9321	5.5069	7.1581	9.2977	12.1990	13.7788	15.1784	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-32.6829	-53.7822	-96.5576	-134.1636	-158.6808	-156.5705	-152.4696	-137.8689	-108.6983	-72.9796	-39.3307	-26.3684	(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	-1.6006	-5.0527	-16.5781	-40.5718	-65.3049	-84.5201	-79.5156	-58.6900	-31.7535	-10.4436	-2.6942	-1.0584	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													

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(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												56.0949	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.5152	
Water heating fuel used												1479.5177	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.5880)													
mechanical ventilation fans (SFP = 0.5880)												85.8077	(230a)
Total electricity for the above, kWh/year												85.8077	(231)
Electricity for lighting (calculated in Appendix L)												119.1855	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1567.9365	(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												172.6693	(238)

10a. Fuel costs - using BEDF prices (528)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	56.0949	21.5100	12.0660	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1479.5177	21.5100	318.2443	(247)
Energy for instantaneous electric shower(s)	0.0000	21.5100	0.0000	(247a)
Pumps, fans and electric keep-hot	85.8077	21.5100	18.4572	(249)
Energy for lighting	119.1855	21.5100	25.6368	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1170.1531	21.5100	-251.6999	
PV Unit electricity exported	-397.7834	5.5900	-22.2361	
Total			-273.9360	(252)
Total energy cost			100.4683	(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	56.0949	0.1597	8.9595	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1479.5177	0.1415	209.3148	(264)
Space and water heating			218.2743	(265)
Pumps, fans and electric keep-hot	85.8077	0.1387	11.9026	(267)
Energy for lighting	119.1855	0.1443	17.2022	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1170.1531	0.1311	-153.4143	
PV Unit electricity exported	-397.7834	0.1160	-46.1374	
Total			-199.5517	(269)
Total CO2, kg/year			47.8274	(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	56.0949	1.5912	89.2562	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1479.5177	1.5232	2253.5564	(278)
Space and water heating			2342.8126	(279)
Pumps, fans and electric keep-hot	85.8077	1.5128	129.8099	(281)
Energy for lighting	119.1855	1.5338	182.8108	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1170.1531	1.4843	-1736.9103	
PV Unit electricity exported	-397.7834	0.4250	-169.0734	
Total			-1905.9837	(283)
Total Primary energy kWh/year			749.4496	(286)