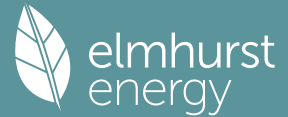


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Property Reference	UNIT 40				Issued on Date	02/07/2025	
Assessment Reference	UNIT 40			Prop Type Ref			
Property	Flat 41, Alexander House, 205 Kings Road, READING, RG1 4FW						
SAP Rating	85 B	DER	3.86	TER	10.10		
Environmental	97 A	% DER < TER				61.78	
CO ₂ Emissions (t/year)	0.24	DFEE	41.30	TFEE	41.87		
Compliance Check	See BREL	% DFEE < TFEE				1.36	
% DPER < TPER	24.96	DPER	40.53	TPER	54.01		
Assessor Details	Mr. Ondrej Gajdos				Assessor ID	W452-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	67.8000 (1b)	2.5000 (2b)	169.5000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.8000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	169.5000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.1300 (17)
Infiltration rate	0.1565 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1213 (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	0.1546	0.1516	0.1486	0.1334	0.1304	0.1152	0.1152	0.1122	0.1213	0.1304	0.1364	0.1425 (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) =												79.2000 (23c)
Effective ac	0.2586	0.2556	0.2526	0.2374	0.2344	0.2192	0.2192	0.2162	0.2253	0.2344	0.2404	0.2465 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
1			6.5000	1.1450	7.4427		(27)
2			6.5000	1.1450	7.4427		(27)
3			6.5000	1.1450	7.4427		(27)
1			2.1000	1.0000	2.1000		(26)
top floor exposed new	33.0000	19.5000	13.5000	0.2000	2.7000	18.0000	243.0000 (29a)
corridor new	52.5000	2.1000	50.4000	0.2300	11.5920	14.0000	705.6000 (29a)
flat roof new	31.3000		31.3000	0.1300	4.0690	9.0000	281.7000 (30)
roof terrace new	36.5000		36.5000	0.1300	4.7450	9.0000	328.5000 (30)
Total net area of external elements A _{um} (A, m ²)			153.3000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.5342		(33)
Main dwelling							
pw			10.7500	0.0000	0.0000	20.0000	215.0000 (32)
pf			67.8000			30.0000	2034.0000 (32d)
iw			88.0000			9.0000	792.0000 (32c)

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Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 4599.8000 (34)
Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$ 67.8437 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	8.8000	0.0470	0.4136
E2 Other lintels (including other steel lintels)	7.8000	0.0150	0.1170
E3 Sill	19.2000	0.0470	0.9024
E4 Jamb	13.3000	0.1970	2.6201
E15 Flat roof with parapet	2.5000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	5.0000	0.2400	1.2000
E18 Party wall between dwellings	13.3000	0.0500	0.6650
E24 Eaves (insulation at ceiling level - inverted)			

Thermal bridges (Sum($L \times \text{Psi}$)) calculated using Appendix K) 5.9181 (36)
Point Thermal Bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 53.4523 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	14.4671	14.2975	14.1279	13.2799	13.1103	12.2622	12.2622	12.0926	12.6015	13.1103	13.4495	13.7887 (38)
Heat transfer coeff	67.9195	67.7499	67.5802	66.7322	66.5626	65.7146	65.7146	65.5450	66.0538	66.5626	66.9018	67.2410 (39)
Average = Sum(39)m / 12 =												66.6898

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0018	0.9993	0.9968	0.9843	0.9817	0.9692	0.9692	0.9667	0.9742	0.9817	0.9868	0.9918 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1916 (42)
Hot water usage for mixer showers	60.9647	60.0486	58.7135	56.1591	54.2740	52.1718	50.9769	52.3019	53.7543	56.0114	58.6207	60.7312 (42a)
Hot water usage for baths	26.3401	25.9489	25.3980	24.3823	23.6217	22.7784	22.3229	22.8699	23.4655	24.3679	25.4045	26.2510 (42b)
Hot water usage for other uses	37.0737	35.7255	34.3774	33.0293	31.6811	30.3330	30.3330	31.6811	33.0293	34.3774	35.7255	37.0737 (42c)
Average daily hot water use (litres/day)												114.3322 (43)
Daily hot water use	124.3785	121.7230	118.4889	113.5707	109.5769	105.2832	103.6328	106.8529	110.2490	114.7567	119.7507	124.0559 (44)
Energy conte	196.9851	173.3319	182.1131	155.4726	147.5116	129.4580	125.3349	132.3062	135.9481	155.7238	170.6069	194.2415 (45)
Energy content (annual)										Total = Sum(45)m =		1899.0337
Distribution loss (46)m = $0.15 \times (45)\text{m}$	29.5478	25.9998	27.3170	23.3209	22.1267	19.4187	18.8002	19.8459	20.3922	23.3586	25.5910	29.1362 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5500 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8370 (55)
Total storage loss	25.9470	23.4360	25.9470	25.1100	25.9470	25.1100	25.9470	25.9470	25.1100	25.9470	25.1100	25.9470 (56)
If cylinder contains dedicated solar storage	25.9470	23.4360	25.9470	25.1100	25.9470	25.1100	25.9470	25.9470	25.1100	25.9470	25.1100	25.9470 (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	246.1945	217.7791	231.3225	203.0946	196.7210	177.0800	174.5443	181.5156	183.5701	204.9332	218.2289	243.4509 (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	246.1945	217.7791	231.3225	203.0946	196.7210	177.0800	174.5443	181.5156	183.5701	204.9332	218.2289	243.4509 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2478.4347 (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	104.8651	93.1906	99.9201	89.7922	88.4151	81.1424	81.0414	83.3593	83.3003	91.1457	94.8244	103.9528 (65)

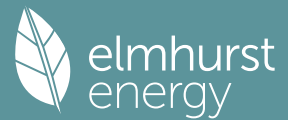
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	109.5776	109.5776	109.5776	109.5776	109.5776	109.5776	109.5776	109.5776	109.5776	109.5776	109.5776	109.5776 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	96.8969	107.2787	96.8969	100.1268	96.8969	100.1268	96.8969	96.8969	100.1268	96.8969	100.1268	96.8969 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.1089	194.1024	189.0789	178.3844	164.8845	152.1965	143.7201	141.7267	146.7502	157.4447	170.9446	183.6326 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578 (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)	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621 (71)
Water heating gains (Table 5)	140.9477	138.6765	134.3012	124.7114	118.8375	112.6978	108.9266	112.0421	115.6949	122.5076	131.7005	139.7215 (72)
Total internal gains	485.8267	495.9309	476.1502	459.0959	436.4922	420.8943	405.4169	406.5389	418.4452	432.7225	458.6452	476.1242 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	6.5000	10.6334	0.6300	0.8000	0.7700	24.1406 (74)
East	6.5000	19.6403	0.6300	0.8000	0.7700	44.5887 (76)
East	6.5000	19.6403	0.6300	0.8000	0.7700	44.5887 (76)

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Solar gains	113.3180	220.5838	365.6869	544.9203	683.1262	707.2485	669.9858	564.3842	428.3885	261.9159	140.9742	93.4599 (83)
Total gains	599.1447	716.5147	841.8371	1004.0161	1119.6184	1128.1428	1075.4027	970.9231	846.8336	694.6383	599.6194	569.5842 (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	18.8123	18.8594	18.9067	19.1470	19.1958	19.4435	19.4435	19.4938	19.3437	19.1958	19.0985	19.0021
alpha	2.2542	2.2573	2.2604	2.2765	2.2797	2.2962	2.2962	2.2996	2.2896	2.2797	2.2732	2.2668
util living area	0.8720	0.8218	0.7440	0.6163	0.4782	0.3476	0.2591	0.2957	0.4690	0.6939	0.8281	0.8825 (86)
Living	18.5635	18.9986	19.5887	20.2425	20.6637	20.8849	20.9576	20.9416	20.7637	20.1549	19.2621	18.4913
Non living	17.2391	17.7774	18.5006	19.2864	19.7684	20.0130	20.0815	20.0715	19.8954	19.2089	18.1222	17.1539
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	19.7536	18.9986	19.5887	20.2425	20.6637	20.8849	20.9576	20.9416	20.7637	20.1549	19.2621	18.8422 (87)
Th 2	20.0819	20.0839	20.0860	20.0965	20.0986	20.1090	20.1090	20.1111	20.1049	20.0986	20.0944	20.0902 (88)
util rest of house	0.8601	0.8062	0.7228	0.5875	0.4421	0.3045	0.2095	0.2427	0.4206	0.6618	0.8104	0.8713 (89)
MIT 2	18.9479	17.7774	18.5006	19.2864	19.7684	20.0130	20.0815	20.0715	19.8954	19.2089	18.1222	17.6828 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	19.3270	18.3520	19.0126	19.7363	20.1897	20.4232	20.4937	20.4809	20.3039	19.6540	18.6585	18.2283 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.3270	18.3520	19.0126	19.7363	20.1897	20.4232	20.4937	20.4809	20.3039	19.6540	18.6585	18.2283 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8490	0.7713	0.6948	0.5753	0.4459	0.3199	0.2312	0.2650	0.4317	0.6444	0.7771	0.8437 (94)
Useful gains	508.6934	552.6625	584.9413	577.6473	499.2125	360.9337	248.5936	257.3411	365.5978	447.6461	465.9469	480.5322 (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	1020.6235	911.3699	845.6015	723.1279	565.0945	382.6709	255.8721	267.4809	409.7926	602.6569	773.2861	943.2796 (97)
Space heating kWh	380.8760	241.0514	193.9313	104.7460	49.0162	0.0000	0.0000	0.0000	0.0000	115.3280	221.2842	344.2841 (98a)
Space heating requirement - total per year (kWh/year)	1650.5171											
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	380.8760	241.0514	193.9313	104.7460	49.0162	0.0000	0.0000	0.0000	0.0000	115.3280	221.2842	344.2841 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1650.5171											
Space heating per m2	(98c) / (4) = 24.3439 (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 %)	230.9614 (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	380.8760	241.0514	193.9313	104.7460	49.0162	0.0000	0.0000	0.0000	0.0000	115.3280	221.2842	344.2841 (98)
Space heating efficiency (main heating system 1)	230.9614	230.9614	230.9614	230.9614	230.9614	0.0000	0.0000	0.0000	0.0000	230.9614	230.9614	230.9614 (210)
Space heating fuel (main heating system)	164.9089	104.3687	83.9670	45.3522	21.2227	0.0000	0.0000	0.0000	0.0000	49.9339	95.8101	149.0656 (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	246.1945	217.7791	231.3225	203.0946	196.7210	177.0800	174.5443	181.5156	183.5701	204.9332	218.2289	243.4509 (64)
Efficiency of water heater (217)m	322.0211	322.0211	322.0211	322.0211	322.0211	322.0211	322.0211	322.0211	322.0211	322.0211	322.0211	322.0211 (216)
Fuel for water heating, kWh/month	76.4529	67.6288	71.8346	63.0687	61.0895	54.9902	54.2028	56.3676	57.0056	63.6397	67.7685	75.6009 (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	11.8550	10.7078	11.8550	11.4726	11.8550	11.4726	11.8550	11.8550	11.4726	11.8550	11.4726	11.8550 (231)
Lighting	19.3560	15.5281	13.9813	10.2433	7.9122	6.4644	7.2178	9.3820	12.1862	15.9890	18.0595	19.8939 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	714.6291 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	322.0211											

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Water heating fuel used	769.6498 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6750) mechanical ventilation fans (SFP = 0.6750)	139.5833 (230a)
Total electricity for the above, kWh/year	139.5833 (231)
Electricity for lighting (calculated in Appendix L)	156.2136 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1780.0758 (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	714.6291	0.1557	111.2689	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	769.6498	0.1409	108.4499	(264)
Space and water heating			219.7188	(265)
Pumps, fans and electric keep-hot	139.5833	0.1387	19.3619	(267)
Energy for lighting	156.2136	0.1443	22.5465	(268)
Total CO2, kg/year			261.6272	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8600	(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	714.6291	1.5764	1126.5246	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	769.6498	1.5210	1170.6587	(278)
Space and water heating			2297.1833	(279)
Pumps, fans and electric keep-hot	139.5833	1.5128	211.1616	(281)
Energy for lighting	156.2136	1.5338	239.6057	(282)
Total Primary energy kWh/year			2747.9506	(286)
Dwelling Primary energy Rate (DPER)			40.5300	(287)

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

1. Overall dwelling characteristics

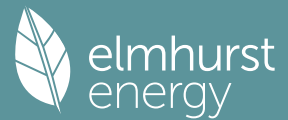
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	67.8000	(1b) x 2.5000	169.5000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.8000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	169.5000	(5)

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) = 0.1180 (8)
Pressure Test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3680	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2852 (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
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
Adj infilt rate	0.3636	0.3565	0.3494	0.3137	0.3066	0.2709	0.2709	0.2638	0.2852	0.3066	0.3208	0.3351
Effective ac	0.5661	0.5635	0.5610	0.5492	0.5470	0.5367	0.5367	0.5348	0.5407	0.5470	0.5515	0.5561

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
TER Opaque door			2.1000	1.0000	2.1000			(26)					
TER Opening Type			14.8500	1.1450	17.0038			(27)					
top floor exposed new	33.0000	14.8500	18.1500	0.1800	3.2670			(29a)					
corridor new	52.5000	2.1000	50.4000	0.1800	9.0720			(29a)					
flat roof new	31.3000		31.3000	0.1100	3.4430			(30)					
roof terrace new	36.5000		36.5000	0.1100	4.0150			(30)					
Total net area of external elements Aum(A, m2)			153.3000					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.9008			(33)					
Main dwelling pw			10.7500	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							67.8437	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				8.8000	0.0500		0.4400						
E3 Sill				7.8000	0.0500		0.3900						
E4 Jamb				19.2000	0.0500		0.9600						
E15 Flat roof with parapet				13.3000	0.5600		7.4480						
E17 Corner (inverted - internal area greater than external area)				2.5000	-0.0900		-0.2250						
E18 Party wall between dwellings				5.0000	0.0600		0.3000						
E24 Eaves (insulation at ceiling level - inverted)				13.3000	0.2400		3.1920						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.5050	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	51.4058	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 31.6654	Feb 31.5218	Mar 31.3811	Apr 30.7200	May 30.5963	Jun 30.0205	Jul 30.0205	Aug 29.9139	Sep 30.2423	Oct 30.5963	Nov 30.8465	Dec 31.1081	(38)
Heat transfer coeff	83.0713	82.9277	82.7869	82.1258	82.0021	81.4263	81.4263	81.3197	81.6481	82.0021	82.2523	82.5139	(39)
Average = Sum(39)m / 12 =												82.1252	
HLP	Jan 1.2252	Feb 1.2231	Mar 1.2210	Apr 1.2113	May 1.2095	Jun 1.2010	Jul 1.2010	Aug 1.1994	Sep 1.2042	Oct 1.2095	Nov 1.2132	Dec 1.2170	(40)
HLP (average)												1.2113	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

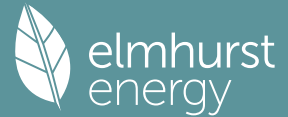
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1916	(42)
Hot water usage for mixer showers	60.9647	60.0486	58.7135	56.1591	54.2740	52.1718	50.9769	52.3019	53.7543	56.0114	58.6207	60.7312	(42a)	
Hot water usage for baths	26.3401	25.9489	25.3980	24.3823	23.6217	22.7784	22.3229	22.8699	23.4655	24.3679	25.4045	26.2510	(42b)	
Hot water usage for other uses	37.0737	35.7255	34.3774	33.0293	31.6811	30.3330	30.3330	31.6811	33.0293	34.3774	35.7255	37.0737	(42c)	
Average daily hot water use (litres/day)													114.3322	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	124.3785	121.7230	118.4889	113.5707	109.5769	105.2832	103.6328	106.8529	110.2490	114.7567	119.7507	124.0559	(44)	
Distribution loss (46)m = 0.15 x (45)m	196.9851	173.3319	182.1131	155.4726	147.5116	129.4580	125.3349	132.3062	135.9481	155.7238	170.6069	194.2415	(45)	
Water storage loss:														
Store volume	29.5478	25.9998	27.3170	23.3209	22.1267	19.4187	18.8002	19.8459	20.3922	23.3586	25.5910	29.1362	(46)	
a) If manufacturer declared loss factor is known (kWh/day):														
Temperature factor from Table 2b													1.3938	(48)
Enter (49) or (54) in (55)													0.5400	(49)
Total storage loss													0.7527	(55)
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	(56)	
Primary 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	(57)	
Combi 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)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
WWHRS	243.5800	215.4176	228.7080	200.5644	194.1065	174.5499	171.9298	178.9011	181.0399	202.3187	215.6987	240.8364	(62)	
PV diverter	-27.8705	-24.6489	-25.8109	-21.3725	-19.9184	-17.0443	-15.9763	-16.9892	-17.6347	-20.7894	-23.5518	-27.3544	(63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h	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)	
12Total per year (kWh/year)	215.7095	190.7687	202.8970	179.1920	174.1881	157.5056	155.9535	161.9119	163.4053	181.5293	192.1469	213.4820	(64)	
Electric shower(s)													2188.6897	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2189	(64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month													0.0000	(64a)
	102.7735	91.3014	97.8285	87.7681	86.3235	79.1183	78.9498	81.2677	81.2762	89.0541	92.8003	101.8612	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 109.5776	Feb 109.5776	Mar 109.5776	Apr 109.5776	May 109.5776	Jun 109.5776	Jul 109.5776	Aug 109.5776	Sep 109.5776	Oct 109.5776	Nov 109.5776	Dec 109.5776	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
96.9448	107.3317	96.9448	100.1763	96.9448	100.1763	96.9448	96.9448	100.1763	96.9448	100.1763	96.9448	96.9448	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
192.1089	194.1024	189.0789	178.3844	164.8845	152.1965	143.7201	141.7267	146.7502	157.4447	170.9446	183.6326	183.6326	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	33.9578	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	-87.6621	(71)
Water heating gains (Table 5)													
138.1364	135.8652	131.4899	121.9002	116.0262	109.8865	106.1153	109.2308	112.8836	119.6963	128.8893	136.9102	136.9102	(72)

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Total internal gains
486.0633 496.1726 476.3869 459.3341 436.7288 418.1325 402.6535 403.7755 415.6834 432.9591 458.8834 476.3608 (73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
North	4.9500				10.6334	0.6300		0.7000	0.7700	16.0860 (74)
East	9.9000				19.6403	0.6300		0.7000	0.7700	59.4230 (76)
Solar gains	75.5090	146.9852	243.6740	363.1055	455.1985	471.2723	446.4424	376.0752	285.4550	174.5266 93.9376 62.2767 (83)
Total gains	561.5723	643.1578	720.0609	822.4396	891.9273	889.4048	849.0959	779.8508	701.1384	607.4857 552.8210 538.6375 (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	15.3810	15.4077	15.4339	15.5581	15.5816	15.6918	15.6918	15.7123	15.6491	15.5816	15.5342	15.4849
alpha	2.0254	2.0272	2.0289	2.0372	2.0388	2.0461	2.0461	2.0475	2.0433	2.0388	2.0356	2.0323
util living area	0.8981	0.8676	0.8198	0.7318	0.6172	0.4848	0.3770	0.4176	0.5958	0.7761	0.8678	0.9051 (86)
MIT	17.8112	18.1908	18.7927	19.5763	20.2287	20.6719	20.8606	20.8232	20.4693	19.6134	18.5911	17.7429 (87)
Th 2	19.8999	19.9015	19.9032	19.9110	19.9124	19.9192	19.9192	19.9205	19.9166	19.9124	19.9095	19.9064 (88)
util rest of house	0.8868	0.8533	0.8000	0.7020	0.5734	0.4225	0.2968	0.3358	0.5354	0.7440	0.8511	0.8945 (89)
MIT 2	16.2361	16.7059	17.4484	18.3998	19.1630	19.6527	19.8344	19.8069	19.4549	18.4705	17.2166	16.1533 (90)
Living area fraction									fLA = Living area / (4) =			0.4705 (91)
MIT	16.9772	17.4046	18.0809	18.9533	19.6644	20.1322	20.3172	20.2851	19.9322	19.0083	17.8633	16.9012 (92)
Temperature adjustment												0.0000
adjusted MIT	16.9772	17.4046	18.0809	18.9533	19.6644	20.1322	20.3172	20.2851	19.9322	19.0083	17.8633	16.9012 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8465	0.8114	0.7598	0.6721	0.5626	0.4354	0.3274	0.3647	0.5363	0.7124	0.8107	0.8551 (94)
Useful gains	475.3530	521.8376	547.1165	552.7214	501.7592	387.2383	278.0134	284.3738	376.0322	432.7463	448.1503	460.5838 (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	1053.1097	1036.9740	958.7481	825.6383	653.0985	450.4668	302.6808	315.9342	476.1892	689.4948	885.3091	1048.0254 (97)
Space heating kWh	429.8510	346.1717	306.2539	196.5001	112.5964	0.0000	0.0000	0.0000	0.0000	191.0209	314.7543	437.0566 (98a)
Space heating requirement - total per year (kWh/year)												2334.2049
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	429.8510	346.1717	306.2539	196.5001	112.5964	0.0000	0.0000	0.0000	0.0000	191.0209	314.7543	437.0566 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2334.2049
Space heating per m2										(98c) / (4) =		34.4278 (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	429.8510	346.1717	306.2539	196.5001	112.5964	0.0000	0.0000	0.0000	0.0000	191.0209	314.7543	437.0566 (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)	465.7107	375.0506	331.8027	212.8929	121.9896	0.0000	0.0000	0.0000	0.0000	206.9566	341.0123	473.5174 (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	215.7095	190.7687	202.8970	179.1920	174.1881	157.5056	155.9535	161.9119	163.4053	181.5293	192.1469	213.4820 (64)
Efficiency of water heater	85.5751	85.3789	84.9807	84.2670	83.1070	79.8000	79.8000	79.8000	79.8000	84.1743	85.1593	79.8000 (216)
Fuel for water heating, kWh/month	252.0704	223.4379	238.7567	212.6478	209.5950	197.3754	195.4304	202.8972	204.7685	215.6590	225.6323	249.3053 (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	20.1432	16.1596	14.5500	10.6599	8.2340	6.7273	7.5114	9.7635	12.6819	16.6393	18.7941	20.7031 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-52.8255	-69.6668	-93.7892	-98.6108	-100.9788	-92.4641	-91.3284	-88.7372	-83.5330	-76.2574	-56.3448	-46.2602 (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)	-46.4470	-95.1580	-184.6240	-271.0368	-352.5588	-352.1230	-347.9402	-297.1655	-221.3354	-133.8328	-61.2446	-36.9223 (233b)

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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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													2528.9327	(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													2627.5758	(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)													162.5672	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-3351.1850	(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													2053.8907	(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	2528.9327	0.2100	531.0759 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2627.5758	0.2100	551.7909 (264)
Space and water heating			1082.8668 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	162.5672	0.1443	23.4635 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-950.7964	0.1360	-129.3198
PV Unit electricity exported	-2400.3886	0.1266	-303.8534
Total			-433.1731 (269)
Total CO2, kg/year			685.0864 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.1000 (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	2528.9327	1.1300	2857.6940 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2627.5758	1.1300	2969.1606 (278)
Space and water heating			5826.8546 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	162.5672	1.5338	249.3511 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-950.7964	1.5028	-1428.8139
PV Unit electricity exported	-2400.3886	0.4647	-1115.4247
Total			-2544.2386 (283)
Total Primary energy kWh/year			3662.0679 (286)
Target Primary Energy Rate (TPER)			54.0100 (287)