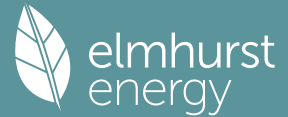


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Plot Reference	01774				Issued on Date	08/01/2026	
Assessment Reference	00001			Plot Type Ref			
Plot Address	Unit 2 , 9 , Circuit Lane , Reading , RG30 5HB				SAP Version	10.2	
SAP Rating	76 C	DER	25.14	TER			
Environmental	74 C	% DER < TER				N/A	
CO ₂ Emissions (t/year)	3.34	DFEE	88.86	TFEE			
Compliance Check	N/A	% DFEE < TFEE					
% DPER < TPER		DPER	137.15	TPER			
Assessor Details	Mr. Matthew Carter				Assessor ID	7869-0001	
Client	Simon Knight, Simon Knight						

SAP 10 WORKSHEET FOR Conversion (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)
Main dwelling			
Ground floor	61.1000 (1b)	x 2.4000 (2b)	= 146.6400 (1b) - (3b)
First floor	60.7000 (1c)	x 2.6500 (2c)	= 160.8550 (1c) - (3c)
Second floor	33.0000 (1d)	x 2.4600 (2d)	= 81.1800 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 388.6750 (5)

2. Ventilation rate

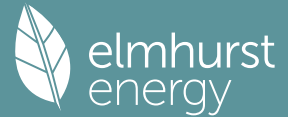
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	6 * 10 = 60.0000 (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)	60.0000 / (5) = 0.1544 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9044 (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) = 0.8365 (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	1.0666	1.0457	1.0248	0.9202	0.8993	0.7947	0.7947	0.7738	0.8365	0.8993	0.9411	0.9829 (22b)
Effective ac	1.0666	1.0457	1.0248	0.9234	0.9044	0.8158	0.8158	0.7994	0.8499	0.9044	0.9428	0.9831 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			3.8200	1.4000	5.3480		(26)
Windows			26.7100	1.3258	35.4110		(27)
Roof windows			1.0900	1.3258	1.4451		(27a)
Existing			36.8800	0.5700	21.0216	110.0000	4056.8000 (28a)
New Floor			24.7200	0.1800	4.4496	75.0000	1854.0000 (28a)
Existing	152.7400	29.7000	123.0400	0.3700	45.5248	190.0000	23377.6000 (29a)
Dwarf wall	12.9000		12.9000	0.1800	2.3220	9.0000	116.1000 (29a)
Dormer Wall	4.2000	0.8300	3.3700	0.1800	0.6066	9.0000	30.3300 (29a)
Loft	28.6000		28.6000	0.1100	3.1460	9.0000	257.4000 (30)
Slope	42.8900	1.0900	41.8000	0.1500	6.2700	9.0000	376.2000 (30)
Total net area of external elements A _{um} (A, m ²)			302.9300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		125.5447		(33)
Main dwelling							
Party Wall 1			52.5300	0.0000	0.0000	180.0000	9455.4000 (32)
Internal Wall 1			58.2700			75.0000	4370.2500 (32c)
Internal Wall 2			102.1300			9.0000	919.1700 (32c)
Internal Wall 3			37.3900			75.0000	2804.2500 (32c)
Internal Floor 1			33.0000			18.0000	594.0000 (32d)

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Internal Floor 2	60.7000	18.0000	1092.6000 (32d)
Internal Ceiling 1	61.6000	9.0000	554.4000 (32e)
Internal Ceiling 2	60.7000	9.0000	546.3000 (32e)

Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 50404.8000 (34)
 Thermal mass parameter ($\text{TMP} = C_m / \text{TFA}$) in $\text{kJ/m}^2\text{K}$ 325.6124 (35)
 Thermal bridges (Default value 0.200 * total exposed area) 60.5860 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 186.1307 (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	136.8040	134.1216	131.4392	118.4354	115.9951	104.6350	104.6350	102.5313	109.0108	115.9951	120.9318	126.0930 (38)
Average = $\text{Sum}(39)m / 12 =$	322.9347	320.2523	317.5698	304.5661	302.1258	290.7657	290.7657	288.6620	295.1414	302.1258	307.0625	312.2236 (39)
												304.5163
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.0861	2.0688	2.0515	1.9675	1.9517	1.8783	1.8783	1.8647	1.9066	1.9517	1.9836	2.0169 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

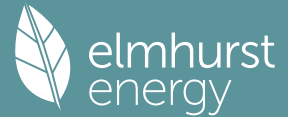
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.9414 (42)
Hot water usage for mixer showers												
	73.5382	72.4331	70.8227	67.7415	65.4676	62.9318	61.4905	63.0887	64.8407	67.5633	70.7107	73.2565 (42a)
Hot water usage for baths	31.7471	31.2756	30.6116	29.3874	28.4707	27.4543	26.9053	27.5646	28.2824	29.3701	30.6195	31.6397 (42b)
Hot water usage for other uses	44.7534	43.1260	41.4986	39.8712	38.2438	36.6164	36.6164	38.2438	39.8712	41.4986	43.1260	44.7534 (42c)
Average daily hot water use (litres/day)												137.9192 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	150.0386	146.8346	142.9329	137.0001	132.1821	127.0025	125.0121	128.8970	132.9943	138.4319	144.4562	149.6496 (44)
Energy content (annual)	237.6245	209.0906	219.6825	187.5462	177.9426	156.1644	151.1913	159.6015	163.9952	187.8508	205.8043	234.3151 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = $\text{Sum}(45)m =$ 2290.8090
Water storage loss (or HIU loss):	35.6437	31.3636	32.9524	28.1319	26.6914	23.4247	22.6787	23.9402	24.5993	28.1776	30.8706	35.1473 (46)
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	14.3269	12.9271	14.2838	13.7629	14.1836	13.6876	14.1194	14.1396	13.7064	14.2074	13.8067	14.3189 (61)
Total heat required for water heating calculated for each month	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = $\text{Sum}(64)m =$ 2458.2793 (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	82.5919	72.7544	76.6154	65.7999	62.7118	55.3466	53.8010	56.6024	57.9550	66.0123	71.8816	81.4895 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	167.6333	185.5940	167.6333	173.2211	167.6333	173.2211	167.6333	167.6333	173.2211	167.6333	173.2211	167.6333 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.6965	329.0762	320.5595	302.4283	279.5409	258.0301	243.6595	240.2797	248.7965	266.9277	289.8150	311.3259 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072 (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)	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579 (71)
Water heating gains (Table 5)	111.0106	108.2655	102.9777	91.3887	84.2901	76.8702	72.3131	76.0785	80.4931	88.7261	99.8356	109.5289 (72)
Total internal gains	674.4621	693.0574	661.2922	637.1598	601.5860	575.2431	550.7276	551.1133	569.6324	593.4089	632.9934	658.6098 (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				3.2600	10.6334		0.6300		0.7000		0.7700	10.5940 (74)
East				14.5700	19.6403		0.6300		0.7000		0.7700	87.4538 (76)
West				8.8800	19.6403		0.6300		0.7000		0.7700	53.3006 (80)
East				1.0900	25.9973		0.6300		0.7000		1.0000	11.2470 (82)
Solar gains	162.5954	318.1078	526.2536	774.7120	958.0722	985.1021	936.0373	797.8709	614.0902	377.8809	202.6886	133.7722 (83)
Total gains	837.0576	1011.1652	1187.5458	1411.8718	1559.6582	1560.3451	1486.7649	1348.9841	1183.7226	971.2897	835.6820	792.3820 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.3565	43.7197	44.0890	45.9714	46.3427	48.1533	48.1533	48.5043	47.4394	46.3427	45.5977	44.8439
alpha	3.8904	3.9146	3.9393	4.0648	4.0895	4.2102	4.2102	4.2336	4.1626	4.0895	4.0398	3.9896
util living area	0.9994	0.9986	0.9964	0.9874	0.9578	0.8719	0.7430	0.8025	0.9534	0.9943	0.9989	0.9995 (86)
MIT	18.7616	18.9585	19.3116	19.8569	20.3421	20.7474	20.9118	20.8759	20.5434	19.9119	19.2906	18.7925 (87)
Th 2	19.2765	19.2879	19.2992	19.3551	19.3657	19.4157	19.4157	19.4250	19.3963	19.3657	19.3443	19.3221 (88)
util rest of house	0.9991	0.9979	0.9944	0.9793	0.9252	0.7620	0.5297	0.6070	0.8999	0.9895	0.9982	0.9993 (89)
MIT 2	17.3114	17.5160	17.8762	18.4562	18.9292	19.3090	19.3999	19.3975	19.1459	18.5222	17.8878	17.3742 (90)
Living area fraction	fLA = Living area / (4) = 0.1721 (91)											
MIT	17.5610	17.7642	18.1232	18.6973	19.1724	19.5566	19.6601	19.6519	19.3864	18.7613	18.1292	17.6183 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.5610	17.7642	18.1232	18.6973	19.1724	19.5566	19.6601	19.6519	19.3864	18.7613	18.1292	17.6183 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9986	0.9969	0.9922	0.9743	0.9196	0.7747	0.5687	0.6422	0.8994	0.9865	0.9974	0.9989 (94)
Useful gains	835.8816	1008.0405	1178.2665	1375.5317	1434.3202	1208.7812	845.5864	866.3581	1064.6132	958.1353	833.4729	791.5452 (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	4282.4280	4119.8034	3691.1837	2983.9154	2257.5983	1441.1970	889.7732	938.7085	1560.2321	2465.7486	3386.6501	4189.4965 (97)
Space heating kWh	2564.2305	2091.1046	1869.6104	1158.0363	612.5189	0.0000	0.0000	0.0000	0.0000	1121.6643	1838.2876	2528.0757 (98a)
Space heating requirement - total per year (kWh/year)												13783.5284
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	2564.2305	2091.1046	1869.6104	1158.0363	612.5189	0.0000	0.0000	0.0000	0.0000	1121.6643	1838.2876	2528.0757 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												13783.5284
Space heating per m2										(98c) / (4) =		89.0409 (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 %)												89.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	2564.2305	2091.1046	1869.6104	1158.0363	612.5189	0.0000	0.0000	0.0000	0.0000	1121.6643	1838.2876	2528.0757 (98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000 (210)
Space heating fuel (main heating system)	2881.1579	2349.5558	2100.6858	1301.1643	688.2235	0.0000	0.0000	0.0000	0.0000	1260.2970	2065.4917	2840.5345 (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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (64)
Efficiency of water heater (217)m	88.8452	88.8340	88.8077	88.7441	88.5881	87.3000	87.3000	87.3000	87.3000	88.7362	88.8154	87.3000 (216)
Fuel for water heating, kWh/month	283.5847	249.9243	263.4529	226.8423	216.8758	194.5613	189.3594	199.0161	203.5528	227.7066	247.2667	279.8511 (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	36.8493	29.5619	26.6172	19.5009	15.0631	12.3067	13.7410	17.8611	23.1998	30.4394	34.3813	37.8735 (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												15487.1105 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												87.3000
Water heating fuel used												2781.9940 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												297.3952 (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)

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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	18652.4997 (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	15487.1105	0.2100	3252.2932 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2781.9940	0.2100	584.2187 (264)
Space and water heating			3836.5119 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	297.3952	0.1443	42.9233 (268)
Total CO2, kg/year			3891.3645 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			25.1400 (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	15487.1105	1.1300	17500.4349 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2781.9940	1.1300	3143.6532 (278)
Space and water heating			20644.0881 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	297.3952	1.5338	456.1547 (282)
Total Primary energy kWh/year			21230.3436 (286)
Dwelling Primary energy Rate (DPER)			137.1500 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	61.1000 (1b)	x 2.4000 (2b)	= 146.6400 (1b) - (3b)
First floor	60.7000 (1c)	x 2.6500 (2c)	= 160.8550 (1c) - (3c)
Second floor	33.0000 (1d)	x 2.4600 (2d)	= 81.1800 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	388.6750 (5)

2. Ventilation rate

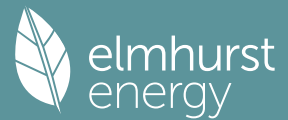
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1029 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8529 (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) = 0.7889 (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	1.0059	0.9862	0.9665	0.8678	0.8481	0.7495	0.7495	0.7298	0.7889	0.8481	0.8876	0.9270 (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	1.0059	0.9863	0.9670	0.8766	0.8597	0.7809	0.7809	0.7663	0.8112	0.8597	0.8939	0.9297 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Door			3.8200	1.4000	5.3480		(26)
Windows			26.7100	1.3258	35.4110		(27)

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Roof windows			1.0900	1.3258	1.4451			(27a)
Existing			36.8800	0.5700	21.0216	110.0000	4056.8000	(28a)
New Floor			24.7200	0.1800	4.4496	75.0000	1854.0000	(28a)
Existing	152.7400	29.7000	123.0400	0.3700	45.5248	190.0000	23377.6000	(29a)
Dwarf wall	12.9000		12.9000	0.1800	2.3220	9.0000	116.1000	(29a)
Dormer Wall	4.2000	0.8300	3.3700	0.1800	0.6066	9.0000	30.3300	(29a)
Loft	28.6000		28.6000	0.1100	3.1460	9.0000	257.4000	(30)
Slope	42.8900	1.0900	41.8000	0.1500	6.2700	9.0000	376.2000	(30)
Total net area of external elements Aum(A, m2)			302.9300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		125.5447			(33)
Main dwelling								
Party Wall 1			52.5300	0.0000	0.0000	180.0000	9455.4000	(32)
Internal Wall 1			58.2700			75.0000	4370.2500	(32c)
Internal Wall 2			102.1300			9.0000	919.1700	(32c)
Internal Wall 3			37.3900			75.0000	2804.2500	(32c)
Internal Floor 1			33.0000			18.0000	594.0000	(32d)
Internal Floor 2			60.7000			18.0000	1092.6000	(32d)
Internal Ceiling 1			61.6000			9.0000	554.4000	(32e)
Internal Ceiling 2			60.7000			9.0000	546.3000	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 50404.8000 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 325.6124 (35)
 Thermal bridges (Default value 0.200 * total exposed area) 60.5860 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 186.1307 (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 129.0202 126.5026 124.0327 112.4317 110.2611 100.1570 100.1570 98.2859 104.0490 110.2611 114.6521 119.2426 (38)
 coeff 315.1508 312.6333 310.1634 298.5623 296.3918 286.2877 286.2877 284.4165 290.1796 296.3918 300.7827 305.3732 (39)
 Average = Sum(39)m / 12 = 298.5517

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.0359	2.0196	2.0036	1.9287	1.9147	1.8494	1.8494	1.8373	1.8745	1.9147	1.9430	1.9727 (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													2.9414 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
31.7471	31.2756	30.6116	29.3874	28.4707	27.4543	26.9053	27.5646	28.2824	29.3701	30.6195	31.6397	31.6397	(42b)
Hot water usage for other uses													
44.7534	43.1260	41.4986	39.8712	38.2438	36.6164	36.6164	38.2438	39.8712	41.4986	43.1260	44.7534	44.7534	(42c)
Average daily hot water use (litres/day)													70.1194 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
76.5004	74.4015	72.1102	69.2586	66.7145	64.0707	63.5216	65.8083	68.1536	70.8686	73.7454	76.3931	76.3931	(44)
Energy conte	121.1580	105.9468	110.8307	94.8115	89.8106	78.7824	76.8239	81.4845	84.0402	96.1681	105.0639	119.6131	119.6131 (45)
Energy content (annual)										Total = Sum(45)m =			1164.5335
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
102.9843	90.0548	94.2061	80.5898	76.3390	66.9650	65.3003	69.2618	71.4342	81.7428	89.3043	101.6712	101.6712	(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	102.9843	90.0548	94.2061	80.5898	76.3390	66.9650	65.3003	69.2618	71.4342	81.7428	89.3043	101.6712	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			989.8535 (64)
Electric shower(s)	58.8919	52.4731	57.2987	54.6794	55.7054	53.1376	54.9088	55.7054	54.6794	57.2987	56.2212	58.8919	(64a)
													669.8915 (64a)
Heat gains from water heating, kWh/month	40.4690	35.6320	37.8762	33.8173	33.0111	30.0256	30.0523	31.2418	31.5284	34.7604	36.3814	40.1408	(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	
147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	147.0723	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
167.6333	185.5940	167.6333	173.2211	167.6333	173.2211	167.6333	167.6333	173.2211	167.6333	173.2211	167.6333	167.6333	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
325.6965	329.0762	320.5595	302.4283	279.5409	258.0301	243.6595	240.2797	248.7965	266.9277	289.8150	311.3259	311.3259	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	37.7072	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	(71)
Water heating gains (Table 5)													
54.3939	53.0238	50.9088	46.9685	44.3698	41.7023	40.3929	41.9917	43.7894	46.7209	50.5297	53.9526	53.9526	(72)
Total internal gains	614.8454	634.8157	606.2233	589.7396	558.6657	540.0751	518.8073	517.0265	532.9287	548.4036	580.6875	600.0336	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W
North	3.2600	10.6334	0.6300	0.7000	0.7700	10.5940 (74)
East	14.5700	19.6403	0.6300	0.7000	0.7700	87.4538 (76)
West	8.8800	19.6403	0.6300	0.7000	0.7700	53.3006 (80)
East	1.0900	25.9973	0.6300	0.7000	1.0000	11.2470 (82)

Solar gains	162.5954	318.1078	526.2536	774.7120	958.0722	985.1021	936.0373	797.8709	614.0902	377.8809	202.6886	133.7722 (83)
Total gains	777.4408	952.9235	1132.4769	1364.4516	1516.7379	1525.1772	1454.8446	1314.8973	1147.0190	926.2845	783.3761	733.8057 (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	44.4274	44.7852	45.1418	46.8958	47.2393	48.9065	48.9065	49.2283	48.2506	47.2393	46.5497	45.8499
alpha	3.9618	3.9857	4.0095	4.1264	4.1493	4.2604	4.2604	4.2819	4.2167	4.1493	4.1033	4.0567
util living area	0.9996	0.9989	0.9970	0.9887	0.9605	0.8761	0.7475	0.8086	0.9569	0.9952	0.9992	0.9997 (86)
MIT	18.7818	18.9775	19.3275	19.8649	20.3471	20.7486	20.9127	20.8756	20.5431	19.9145	19.2992	18.8079 (87)
Th 2	19.3095	19.3203	19.3309	19.3813	19.3908	19.4356	19.4356	19.4440	19.4183	19.3908	19.3716	19.3516 (88)
util rest of house	0.9993	0.9984	0.9954	0.9814	0.9296	0.7688	0.5365	0.6162	0.9067	0.9911	0.9986	0.9995 (89)
MIT 2	17.3547	17.5578	17.9145	18.4835	18.9540	19.3282	19.4197	19.4158	19.1641	18.5431	17.9157	17.4104 (90)
Living area fraction	17.6003	17.8021	18.1577	18.7213	19.1937	19.5727	19.6767	19.6670	FLA = Living area / (4) =			0.1721 (91)
MIT	17.6003	17.8021	18.1577	18.7213	19.1937	19.5727	19.6767	19.6670	19.4014	18.7791	18.1538	17.6509 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6003	17.8021	18.1577	18.7213	19.1937	19.5727	19.6767	19.6670	19.4014	18.7791	18.1538	17.6509 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9990	0.9976	0.9934	0.9768	0.9242	0.7810	0.5751	0.6509	0.9059	0.9885	0.9980	0.9992 (94)
Useful gains	776.6415	950.6074	1125.0519	1332.7729	1401.8094	1191.1660	836.6896	855.8421	1039.0475	915.6416	781.7857	733.2488 (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	4191.6019	4033.6296	3615.7800	2932.2584	2221.0834	1423.6163	880.8140	929.2005	1538.3589	2424.2110	3324.7838	4107.5573 (97)
Space heating kWh	2540.7306	2071.7909	1853.1017	1151.6296	609.5399	0.0000	0.0000	0.0000	0.0000	1122.3756	1830.9586	2510.4855 (98a)
Space heating requirement - total per year (kWh/year)												13690.6124
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	2540.7306	2071.7909	1853.1017	1151.6296	609.5399	0.0000	0.0000	0.0000	0.0000	1122.3756	1830.9586	2510.4855 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												13690.6124
Space heating per m2										(98c) / (4) =		88.4406 (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	2691.1040	2118.5286	2161.5655	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5941	0.6877	0.6280	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1598.6697	1456.9119	1357.5553	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1694.5407	1616.2881	1458.0272	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	69.0271	118.5759	74.7511	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	17.2568	29.6440	18.6878	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												65.5885 (107)
Energy for space heating												88.4406 (99)
Energy for space cooling												0.4237 (108)
Total												88.8643 (109)
Fabric Energy Efficiency (DFEE)												88.9 (109)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	61.1000 (1b)	x 2.4000 (2b)	= 146.6400 (1b) - (3b)
First floor	60.7000 (1c)	x 2.6500 (2c)	= 160.8550 (1c) - (3c)
Second floor	33.0000 (1d)	x 2.4600 (2d)	= 81.1800 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	388.6750 (5)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	60.0000	Air changes per hour	0.1544	(8)
Pressure test			No		
Pressure Test Method			Blower Door		
Measured/design AP50				15.0000	(17)
Infiltration rate				0.9044	(18)
Number of sides sheltered				1	(19)

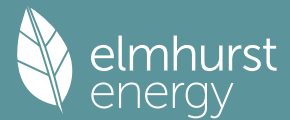
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
	1.0666	1.0457	1.0248	0.9202	0.8993	0.7947	0.7947	0.7738	0.8365	0.8993	0.9411	0.9829 (22b)
Effective ac	1.0666	1.0457	1.0248	0.9234	0.9044	0.8158	0.8158	0.7994	0.8499	0.9044	0.9428	0.9831 (25)

Heat capacity $C_m = \text{Sum}(A \times k)$	(28)...(30) + (32) + (32a)...(32e) =	50404.8000	(34)
Thermal mass parameter (TMF = C_m / TFA) in kJ/m ² K		325.6124	(35)
Thermal bridges (Default value 0.200 * total exposed area)		60.5860	(36)
Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	186.1307	(37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.0861	2.0688	2.0515	1.9675	1.9517	1.8783	1.8783	1.8647	1.9066	1.9517	1.9836	2.0169 (40)
HLP (average)												1.9672
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

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WWHRS	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (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	82.5919	72.7544	76.6154	65.7999	62.7118	55.3466	53.8010	56.6024	57.9550	66.0123	71.8816	81.4895 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.0994	37.3923	30.4095	23.0219	17.2091	14.5287	15.6988	20.4058	27.3887	34.7762	40.5890	43.2694	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	486.1142	491.1586	478.4470	451.3855	417.2253	385.1195	363.6708	358.6265	371.3381	398.3995	432.5598	464.6656	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	(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)	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	(71)
Water heating gains (Table 5)	111.0106	108.2655	102.9777	91.3887	84.2901	76.8702	72.3131	76.0785	80.4931	88.7261	99.8356	109.5289	(72)
Total internal gains	756.6432	754.2354	729.2531	683.2152	636.1435	590.9374	566.1018	569.5299	593.6389	639.3210	690.4034	734.8829	(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					3.2600	10.6334	0.6300		0.7000	0.7700	10.5940 (74)	
East					14.5700	19.6403	0.6300		0.7000	0.7700	87.4538 (76)	
West					8.8800	19.6403	0.6300		0.7000	0.7700	53.3006 (80)	
East					1.0900	25.9973	0.6300		0.7000	1.0000	11.2470 (82)	
Solar gains	162.5954	318.1078	526.2536	774.7120	958.0722	985.1021	936.0373	797.8709	614.0902	377.8809	202.6886	133.7722 (83)
Total gains	919.2386	1072.3431	1255.5068	1457.9272	1594.2157	1576.0395	1502.1391	1367.4008	1207.7291	1017.2018	893.0919	868.6551 (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	43.3565	43.7197	44.0890	45.9714	46.3427	48.1533	48.1533	48.5043	47.4394	46.3427	45.5977	44.8439	
alpha	3.8904	3.9146	3.9393	4.0648	4.0895	4.2102	4.2102	4.2336	4.1626	4.0895	4.0398	3.9896	
util living area	0.9991	0.9983	0.9956	0.9859	0.9549	0.8687	0.7383	0.7969	0.9504	0.9933	0.9986	0.9994	(86)
MIT	18.8018	18.9884	19.3445	19.8785	20.3563	20.7517	20.9140	20.8795	20.5531	19.9342	19.3191	18.8302	(87)
Th 2	19.2765	19.2879	19.2992	19.3551	19.3567	19.4157	19.4157	19.4250	19.3963	19.3657	19.3443	19.3221	(88)
util rest of house	0.9987	0.9974	0.9932	0.9769	0.9204	0.7575	0.5249	0.6004	0.8944	0.9876	0.9977	0.9990	(89)
MIT 2	17.3516	17.5458	17.9088	18.4770	18.9414	19.3115	19.4004	19.3986	19.1534	18.5439	17.9161	17.4118	(90)
Living area fraction	17.6012	17.7941	18.1559	18.7182	19.1849	19.5594	19.6609	19.6535	19.3943	18.7832	18.1575	17.6559	(91)
MIT	17.6012	17.7941	18.1559	18.7182	19.1849	19.5594	19.6609	19.6535	19.3943	18.7832	18.1575	17.6559	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6012	17.7941	18.1559	18.7182	19.1849	19.5594	19.6609	19.6535	19.3943	18.7832	18.1575	17.6559	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9980	0.9962	0.9906	0.9716	0.9150	0.7706	0.5640	0.6358	0.8943	0.9843	0.9967	0.9985	(94)
Ext temp.	917.4433	1068.2870	1243.7241	1416.5422	1458.7659	1214.4346	847.1665	869.4439	1080.1093	1001.1834	890.1010	867.3745	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	4295.4038	4129.3532	3701.5551	2990.2916	2261.3921	1442.0117	890.0068	939.1499	1562.5718	2472.3518	3395.3474	4201.2582	(97)
Space heating requirement - total per year (kWh/year)	2513.2026	2057.0365	1828.6263	1133.0996	597.1539	0.0000	0.0000	0.0000	0.0000	1094.5493	1803.7774	2480.4094	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	2513.2026	2057.0365	1828.6263	1133.0996	597.1539	0.0000	0.0000	0.0000	0.0000	1094.5493	1803.7774	2480.4094	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												13507.8550	(99)
Space heating per m2												87.2600	(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 %)	89.0000	(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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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	2513.2026	2057.0365	1828.6263	1133.0996	597.1539	0.0000	0.0000	0.0000	0.0000	1094.5493	1803.7774	2480.4094	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	2823.8232	2311.2769	2054.6363	1273.1456	670.9594	0.0000	0.0000	0.0000	0.0000	1229.8307	2026.7161	2786.9769	(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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340	(64)
Efficiency of water heater (217)m	88.8424	88.8315	88.8038	88.7393	88.5801	87.3000	87.3000	87.3000	87.3000	88.7307	88.8123	87.3000	(216)
Fuel for water heating, kWh/month	283.5938	249.9313	263.4642	226.8545	216.8954	194.5613	189.3594	199.0161	203.5528	227.7207	247.2755	279.8596	(217)
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	36.8493	29.5619	26.6172	19.5009	15.0631	12.3067	13.7410	17.8611	23.1998	30.4394	34.3813	37.8735	(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												15177.3651	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2782.0845	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												297.3952	(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												18342.8448	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	15177.3651	3.6400	552.4561	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2782.0845	3.6400	101.2679	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	16.4900	14.1814	(249)
Energy for lighting	297.3952	16.4900	49.0405	(250)
Additional standing charges			92.0000	(251)
Total energy cost			808.9458	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.4576	(257)
SAP value		76.3730	
SAP rating (Section 12)		76	(258)
SAP band		C	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	15177.3651	0.2100	3187.2467	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2782.0845	0.2100	584.2377	(264)
Space and water heating			3771.4844	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	297.3952	0.1443	42.9233	(268)
Total CO2, kg/year			3826.3370	(272)
CO2 emissions per m2			24.7200	(273)
EI value			74.3379	
EI rating			74	(274)
EI band			C	

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

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.1000 (1b)	x 2.4000 (2b)	= 146.6400 (1b) - (3b)
First floor	60.7000 (1c)	x 2.6500 (2c)	= 160.8550 (1c) - (3c)
Second floor	33.0000 (1d)	x 2.4600 (2d)	= 81.1800 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.8000		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	388.6750 (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	6 * 10 =	60.0000 (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) =	60.0000 / (5) =	0.1544 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.9044	(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) =	0.8365 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000
Adj infilt rate												
Effective ac	0.9202	0.8575	0.8575	0.8156	0.8156	0.7111	0.7111	0.6901	0.7111	0.7947	0.7738	0.8365
	0.9234	0.8676	0.8676	0.8326	0.8326	0.7528	0.7528	0.7382	0.7528	0.8158	0.7994	0.8499

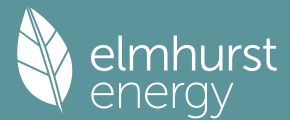
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			3.8200	1.4000	5.3480		(26)
Windows			26.7100	1.3258	35.4110		(27)
Roof windows			1.0900	1.3258	1.4451		(27a)
Existing			36.8800	0.5700	21.0216	110.0000	4056.8000 (28a)
New Floor			24.7200	0.1800	4.4496	75.0000	1854.0000 (28a)
Existing	152.7400	29.7000	123.0400	0.3700	45.5248	190.0000	23377.6000 (29a)
Dwarf wall	12.9000		12.9000	0.1800	2.3220	9.0000	116.1000 (29a)
Dormer Wall	4.2000	0.8300	3.3700	0.1800	0.6066	9.0000	30.3300 (29a)
Loft	28.6000		28.6000	0.1100	3.1460	9.0000	257.4000 (30)
Slope	42.8900	1.0900	41.8000	0.1500	6.2700	9.0000	376.2000 (30)
Total net area of external elements Aum(A, m ²)			302.9300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		125.5447		(33)
Main dwelling							
Party Wall 1			52.5300	0.0000	0.0000	180.0000	9455.4000 (32)
Internal Wall 1			58.2700			75.0000	4370.2500 (32c)
Internal Wall 2			102.1300			9.0000	919.1700 (32c)
Internal Wall 3			37.3900			75.0000	2804.2500 (32c)
Internal Floor 1			33.0000			18.0000	594.0000 (32d)
Internal Floor 2			60.7000			18.0000	1092.6000 (32d)
Internal Ceiling 1			61.6000			9.0000	554.4000 (32e)
Internal Ceiling 2			60.7000			9.0000	546.3000 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	50404.8000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		325.6124 (35)
Thermal bridges (Default value 0.200 * total exposed area)		60.5860 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	186.1307 (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	118.4354	111.2828	111.2828	106.7948	106.7948	96.5567	96.5567	94.6774	96.5567	104.6350	102.5313	109.0108
Average = Sum(39)m / 12 =	304.5661	297.4134	297.4134	292.9255	292.9255	282.6874	282.6874	280.8081	282.6874	290.7657	288.6620	295.1414
HLP	1.9675	1.9213	1.9213	1.8923	1.8923	1.8261	1.8261	1.8140	1.8261	1.8783	1.8647	1.9066
HLP (average)												1.8781
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												2.9414 (42)
Hot water usage for mixer showers												
73.5382	72.4331	70.8227	67.7415	65.4676	62.9318	61.4905	63.0887	64.8407	67.5633	70.7107	73.2565	(42a)
Hot water usage for baths												
31.7471	31.2756	30.6116	29.3874	28.4707	27.4543	26.9053	27.5646	28.2824	29.3701	30.6195	31.6397	(42b)
Hot water usage for other uses												
44.7534	43.1260	41.4986	39.8712	38.2438	36.6164	36.6164	38.2438	39.8712	41.4986	43.1260	44.7534	(42c)
Average daily hot water use (litres/day)												137.9192 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	150.0386	146.8346	142.9329	137.0001	132.1821	127.0025	125.0121	128.8970	132.9943	138.4319	144.4562	149.6496 (44)
Energy content	237.6245	209.0906	219.6825	187.5462	177.9426	156.1644	151.1913	159.6015	163.9952	187.8508	205.8043	234.3151 (45)
Energy content (annual)												Total = Sum(45)m = 2290.8090
Distribution loss (46)m = 0.15 x (45)m												
35.6437	31.3636	32.9524	28.1319	26.6914	23.4247	22.6787	23.9402	24.5993	28.1776	30.8706	35.1473	(46)
Water storage loss (or HIU loss):												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	14.3269	12.9271	14.2838	13.7629	14.1836	13.6876	14.1194	14.1396	13.7064	14.2074	13.8067	14.3189 (61)
Total heat required for water heating calculated for each month												
251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (64)
Total per year (kWh/year) = Sum(64)m =												2458.2793 (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	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
82.5919	72.7544	76.6154	65.7999	62.7118	55.3466	53.8010	56.6024	57.9550	66.0123	71.8816	81.4895	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
42.0994	37.3923	30.4095	23.0219	17.2091	14.5287	15.6988	20.4058	27.3887	34.7762	40.5890	43.2694	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
486.1142	491.1586	478.4470	451.3855	417.2253	385.1195	363.6708	358.6265	371.3381	398.3995	432.5598	464.6656	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	(71)
Water heating gains (Table 5)												
111.0106	108.2655	102.9777	91.3887	84.2901	76.8702	72.3131	76.0785	80.4931	88.7261	99.8356	109.5289	(72)
Total internal gains	756.6432	754.2354	729.2531	683.2152	636.1435	590.9374	566.1018	569.5299	593.6389	639.3210	690.4034	734.8829 (73)

6. Solar gains

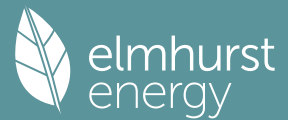
[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				3.2600	12.7500	0.6300	0.7000	0.7700	12.7028 (74)			
East				14.5700	23.7835	0.6300	0.7000	0.7700	105.9027 (76)			
West				8.8800	23.7835	0.6300	0.7000	0.7700	64.5447 (80)			
East				1.0900	31.6691	0.6300	0.7000	1.0000	13.7007 (82)			
Solar gains	196.8508	336.6443	552.4384	824.1253	991.4106	1077.5771	1014.0941	882.3402	686.7312	429.1528	241.7785	162.8537 (83)
Total gains	953.4940	1090.8796	1281.6915	1507.3404	1627.5542	1668.5145	1580.1959	1451.8700	1280.3700	1068.4738	932.1818	897.7366 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.9714	47.0770	47.0770	47.7983	49.5294	49.5294	49.8609	49.5294	48.1533	48.5043	47.4394	
alpha	4.0648	4.1385	4.1385	4.1866	4.1866	4.3020	4.3241	4.3020	4.2102	4.2336	4.1626	
util living area	0.9990	0.9980	0.9943	0.9794	0.9296	0.7736	0.5780	0.6445	0.9139	0.9891	0.9981	0.9992 (86)
MIT	19.0288	19.2325	19.5944	20.0760	20.5373	20.8802	20.9757	20.9618	20.7039	20.1244	19.5435	19.0613 (87)
Th 2	19.3551	19.3863	19.3863	19.4061	19.4061	19.4518	19.4518	19.4602	19.4518	19.4157	19.4250	19.3963 (88)
util rest of house	0.9984	0.9970	0.9909	0.9658	0.8748	0.6122	0.3294	0.3939	0.8221	0.9793	0.9968	0.9988 (89)
MIT 2	17.6336	17.8592	18.2195	18.7070	19.1337	19.4175	19.4502	19.4569	19.3183	18.7673	18.1979	17.6955 (90)
Living area fraction												
MIT	17.8737	18.0955	18.4561	18.9426	19.3752	19.6693	19.7127	19.7159	19.5568	19.0009	18.4295	17.9306 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8737	18.0955	18.4561	18.9426	19.3752	19.6693	19.7127	19.7159	19.5568	19.0009	18.4295	17.9306 (93)

8. Space heating requirement

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9977	0.9957	0.9879	0.9599	0.8733	0.6392	0.3744	0.4401	0.8307	0.9752	0.9955	0.9982	(94)
Useful gains	951.2553	1086.1843	1266.2220	1446.8903	1421.4020	1066.5194	591.5619	639.0136	1063.6293	1041.9948	927.9880	896.1230	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	3951.3473	3746.0841	3317.9795	2707.3916	1955.3491	1150.3261	597.2458	650.3101	1344.6811	2210.0766	3068.3179	3845.8597	(97)
Space heating kWh	2232.0685	1787.4527	1526.5075	907.5609	397.2567	0.0000	0.0000	0.0000	0.0000	869.0529	1541.0375	2194.6041	(98a)
Space heating requirement - total per year (kWh/year)												11455.5408	
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	2232.0685	1787.4527	1526.5075	907.5609	397.2567	0.0000	0.0000	0.0000	0.0000	869.0529	1541.0375	2194.6041	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												11455.5408	
Space heating per m2												74.0022	(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 %)													89.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	2232.0685	1787.4527	1526.5075	907.5609	397.2567	0.0000	0.0000	0.0000	0.0000	869.0529	1541.0375	2194.6041	(98)	
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)	
Space heating fuel (main heating system)	2507.9422	2008.3738	1715.1770	1019.7314	446.3558	0.0000	0.0000	0.0000	0.0000	976.4639	1731.5028	2465.8473	(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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340	(64)	
Efficiency of water heater (217)m	88.8246	88.8089	88.7703	88.6865	88.4386	87.3000	87.3000	87.3000	87.3000	88.6743	88.7843	88.8240	(216)	
Fuel for water heating, kWh/month	283.6506	249.9947	263.5638	226.9897	217.2424	194.5613	189.3594	199.0161	203.5528	227.8657	247.3533	279.9176	(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	36.8493	29.5619	26.6172	19.5009	15.0631	12.3067	13.7410	17.8611	23.1998	30.4394	34.3813	37.8735	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1												12871.3942	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												87.3000		
Water heating fuel used												2783.0675	(219)	
Space cooling fuel												0.0000	(221)	
Electricity for pumps and fans:														
central heating pump												41.0000	(230c)	
main heating flue fan												45.0000	(230e)	
Total electricity for the above, kWh/year												86.0000	(231)	
Electricity for lighting (calculated in Appendix L)												297.3952	(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												16037.8569	(238)	

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	12871.3942	6.5500	843.0763	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2783.0675	6.5500	182.2909	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	28.4300	24.4498	(249)
Energy for lighting	297.3952	28.4300	84.5495	(250)
Additional standing charges			104.0000	(251)
Total energy cost			1238.3665	(255)

Full SAP Calculation Printout



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	12871.3942	0.2100	2702.9928 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2783.0675	0.2100	584.4442 (264)
Space and water heating			3287.4370 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	297.3952	0.1443	42.9233 (268)
Total CO2, kg/year			3342.2895 (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	12871.3942	1.1300	14544.6754 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2783.0675	1.1300	3144.8663 (278)
Space and water heating			17689.5417 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	297.3952	1.5338	456.1547 (282)
Total Primary energy kWh/year			18275.7972 (286)

SAP 10 EPC IMPROVEMENTS

00001

Current energy efficiency rating: C 76
Current environmental impact rating: C 74

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

Recommended measures:	SAP change	Cost change	CO2 change
U Solar photovoltaic panels	+ 4.1	-£ 254	-120 kg (3.6%)

Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ 0.4	-£ 28	-153 kg (4.6%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar photovoltaic panels	£254 0.77 kg/m²	C 80	C 75
Total Savings	£254 0.77 kg/m²		

Potential energy efficiency rating: C 80
Potential environmental impact rating: C 75

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

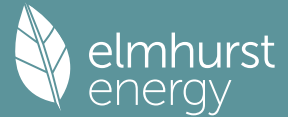
	Current	Potential	Saving
Electricity	£109	£109	£0
Mains gas	£1129	£1129	£0
Space heating	£972	£972	£0
Water heating	£182	£182	£0
Lighting	£85	£85	£0
Generated (PV)	-£0	-£254	£254
Total cost of fuels	£1238	£984	£254
Total cost of uses	£1239	£985	£254
Delivered energy	104 kWh/m²	98 kWh/m²	6 kWh/m²
Carbon dioxide emissions	3.3 tonnes	3.2 tonnes	0.1 tonnes
CO2 emissions per m²	22 kg/m²	21 kg/m²	1 kg/m²
Primary energy	118 kWh/m²	109 kWh/m²	9 kWh/m²

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

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling			
Ground floor	61.1000 (1b)	x 2.4000 (2b)	= 146.6400 (1b) - (3b)
First floor	60.7000 (1c)	x 2.6500 (2c)	= 160.8550 (1c) - (3c)
Second floor	33.0000 (1d)	x 2.4600 (2d)	= 81.1800 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 388.6750 (5)

Full SAP Calculation Printout



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												6 * 10 = 60.0000 (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) =											60.0000 / (5) = 0.1544 (8)
Pressure test												No
Pressure Test Method												Blower Door
Measured/design AP50												15.0000 (17)
Infiltration rate												0.9044 (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) = 0.8365 (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	1.0666	1.0457	1.0248	0.9202	0.8993	0.7947	0.7947	0.7738	0.8365	0.8993	0.9411	0.9829	(22b)
Effective ac	1.0666	1.0457	1.0248	0.9234	0.9044	0.8158	0.8158	0.7994	0.8499	0.9044	0.9428	0.9831	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Door			3.8200	1.4000	5.3480			(26)
Windows			26.7100	1.3258	35.4110			(27)
Roof windows			1.0900	1.3258	1.4451			(27a)
Existing			36.8800	0.5700	21.0216	110.0000	4056.8000	(28a)
New Floor			24.7200	0.1800	4.4496	75.0000	1854.0000	(28a)
Existing	152.7400	29.7000	123.0400	0.3700	45.5248	190.0000	23377.6000	(29a)
Dwarf wall	12.9000		12.9000	0.1800	2.3220	9.0000	116.1000	(29a)
Dormer Wall	4.2000	0.8300	3.3700	0.1800	0.6066	9.0000	30.3300	(29a)
Loft	28.6000		28.6000	0.1100	3.1460	9.0000	257.4000	(30)
Slope	42.8900	1.0900	41.8000	0.1500	6.2700	9.0000	376.2000	(30)
Total net area of external elements Aum(A, m2)			302.9300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	125.5447			(33)
Main dwelling								
Party Wall 1			52.5300	0.0000	0.0000	180.0000	9455.4000	(32)
Internal Wall 1			58.2700			75.0000	4370.2500	(32c)
Internal Wall 2			102.1300			9.0000	919.1700	(32c)
Internal Wall 3			37.3900			75.0000	2804.2500	(32c)
Internal Floor 1			33.0000			18.0000	594.0000	(32d)
Internal Floor 2			60.7000			18.0000	1092.6000	(32d)
Internal Ceiling 1			61.6000			9.0000	554.4000	(32e)
Internal Ceiling 2			60.7000			9.0000	546.3000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		50404.8000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							325.6124	(35)
Thermal bridges (Default value 0.200 * total exposed area)							60.5860	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	186.1307	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9414 (42)
Hot water usage for mixer showers													
	73.5382	72.4331	70.8227	67.7415	65.4676	62.9318	61.4905	63.0887	64.8407	67.5633	70.7107	73.2565	(42a)
Hot water usage for baths													
	31.7471	31.2756	30.6116	29.3874	28.4707	27.4543	26.9053	27.5646	28.2824	29.3701	30.6195	31.6397	(42b)
Hot water usage for other uses													
	44.7534	43.1260	41.4986	39.8712	38.2438	36.6164	36.6164	38.2438	39.8712	41.4986	43.1260	44.7534	(42c)
Average daily hot water use (litres/day)													137.9192 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	150.0386	146.8346	142.9329	137.0001	132.1821	127.0025	125.0121	128.8970	132.9943	138.4319	144.4562	149.6496	(44)
Energy conte	237.6245	209.0906	219.6825	187.5462	177.9426	156.1644	151.1913	159.6015	163.9952	187.8508	205.8043	234.3151	(45)
Energy content (annual)													Total = Sum(45)m = 2290.8090
Distribution loss (46)m = 0.15 x (45)m													
	35.6437	31.3636	32.9524	28.1319	26.6914	23.4247	22.6787	23.9402	24.5993	28.1776	30.8706	35.1473	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	14.3269	12.9271	14.2838	13.7629	14.1836	13.6876	14.1194	14.1396	13.7064	14.2074	13.8067	14.3189	(61)
Total heat required for water heating calculated for each month													
	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340	(62)

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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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340	(64)
Total per year (kWh/year) = Sum(64)m =													2458.2793 (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	82.5919	72.7544	76.6154	65.7999	62.7118	55.3466	53.8010	56.6024	57.9550	66.0123	71.8816	81.4895	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.0994	37.3923	30.4095	23.0219	17.2091	14.5287	15.6988	20.4058	27.3887	34.7762	40.5890	43.2694	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	486.1142	491.1586	478.4470	451.3855	417.2253	385.1195	363.6708	358.6265	371.3381	398.3995	432.5598	464.6656	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	(71)
Water heating gains (Table 5)	111.0106	108.2655	102.9777	91.3887	84.2901	76.8702	72.3131	76.0785	80.4931	88.7261	99.8356	109.5289	(72)
Total internal gains	756.6432	754.2354	729.2531	683.2152	636.1435	590.9374	566.1018	569.5299	593.6389	639.3210	690.4034	734.8829	(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					3.2600	10.6334	0.6300	0.7000				0.7700	10.5940 (74)	
East					14.5700	19.6403	0.6300	0.7000				0.7700	87.4538 (76)	
West					8.8800	19.6403	0.6300	0.7000				0.7700	53.3006 (80)	
East					1.0900	25.9973	0.6300	0.7000				1.0000	11.2470 (82)	

Solar gains	162.5954	318.1078	526.2536	774.7120	958.0722	985.1021	936.0373	797.8709	614.0902	377.8809	202.6886	133.7722 (83)		
Total gains	919.2386	1072.3431	1255.5068	1457.9272	1594.2157	1576.0395	1502.1391	1367.4008	1207.7291	1017.2018	893.0919	868.6551 (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	43.3565	43.7197	44.0890	45.9714	46.3427	48.1533	48.1533	48.5043	47.4394	46.3427	45.5977	44.8439	
alpha	3.8904	3.9146	3.9393	4.0648	4.0895	4.2102	4.2102	4.2336	4.1626	4.0895	4.0398	3.9896	
util living area	0.9991	0.9983	0.9956	0.9859	0.9549	0.8687	0.7383	0.7969	0.9504	0.9933	0.9986	0.9994	(86)
MIT	18.8018	18.9884	19.3445	19.8785	20.3563	20.7517	20.9140	20.8795	20.5531	19.9342	19.3191	18.8302	(87)
Th 2	19.2765	19.2879	19.2992	19.3551	19.3657	19.4157	19.4157	19.4250	19.3963	19.3657	19.3443	19.3221	(88)
util rest of house	0.9987	0.9974	0.9932	0.9769	0.9204	0.7575	0.5249	0.6004	0.8944	0.9876	0.9977	0.9990	(89)
MIT 2	17.3516	17.5458	17.9088	18.4770	18.9414	19.3115	19.4004	19.3986	19.1534	18.5439	17.9161	17.4118	(90)
Living area fraction													(91)
MIT	17.6012	17.7941	18.1559	18.7182	19.1849	19.5594	19.6609	19.6535	19.3943	18.7832	18.1575	17.6559	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6012	17.7941	18.1559	18.7182	19.1849	19.5594	19.6609	19.6535	19.3943	18.7832	18.1575	17.6559	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9980	0.9962	0.9906	0.9716	0.9150	0.7706	0.5640	0.6358	0.8943	0.9843	0.9967	0.9985	(94)
Useful gains	917.4433	1068.2870	1243.7241	1416.5422	1458.7659	1214.4346	847.1665	869.4439	1080.1093	1001.1834	890.1010	867.3745	(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	4295.4038	4129.3532	3701.5551	2990.2916	2261.3921	1442.0117	890.0068	939.1499	1562.5718	2472.3518	3395.3474	4201.2582	(97)
Space heating kWh	2513.2026	2057.0365	1828.6263	1133.0996	597.1539	0.0000	0.0000	0.0000	0.0000	1094.5493	1803.7774	2480.4094	(98a)
Space heating requirement - total per year (kWh/year)												13507.8550	
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	2513.2026	2057.0365	1828.6263	1133.0996	597.1539	0.0000	0.0000	0.0000	0.0000	1094.5493	1803.7774	2480.4094	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												13507.8550	
Space heating per m ²										(98c) / (4) =		87.2600	(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 %)													89.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

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Space heating requirement	2513.2026	2057.0365	1828.6263	1133.0996	597.1539	0.0000	0.0000	0.0000	0.0000	1094.5493	1803.7774	2480.4094	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	2823.8232	2311.2769	2054.6363	1273.1456	670.9594	0.0000	0.0000	0.0000	0.0000	1229.8307	2026.7161	2786.9769	(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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340	(64)
Efficiency of water heater	88.8424	88.8315	88.8038	88.7393	88.5801	87.3000	87.3000	87.3000	87.3000	88.7307	88.8123	88.8424	(216)
Fuel for water heating, kWh/month	283.5938	249.9313	263.4642	226.8545	216.8954	194.5613	189.3594	199.0161	203.5528	227.7207	247.2755	279.8596	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	36.8493	29.5619	26.6172	19.5009	15.0631	12.3067	13.7410	17.8611	23.1998	30.4394	34.3813	37.8735	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-35.4858	-52.1438	-78.1771	-91.7013	-102.0100	-96.2707	-94.9598	-88.0160	-76.3480	-61.1630	-39.7105	-30.4221	(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												15177.3651	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2782.0845	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												297.3952	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-846.4079	(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												17496.4369	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	15177.3651	3.6400	552.4561 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2782.0845	3.6400	101.2679 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	86.0000	16.4900	14.1814 (249)
Energy for lighting	297.3952	16.4900	49.0405 (250)
Additional standing charges			92.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-846.4079	16.4900	-139.5727
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-139.5727 (252)
Total energy cost			669.3732 (255)

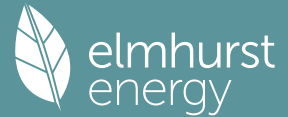
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		1.2061 (257)
SAP value		80.4495
SAP rating (Section 12)		80 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	15177.3651	0.2100	3187.2467 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2782.0845	0.2100	584.2377 (264)
Space and water heating			3771.4844 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	297.3952	0.1443	42.9233 (268)
Energy saving/generation technologies			

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PV Unit electricity used in dwelling	-846.4079	0.1337	-113.2054
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-113.2054 (269)
Total CO2, kg/year			3713.1316 (272)
CO2 emissions per m2			23.9900 (273)
EI value			75.0971 (4)
EI rating			75 (274)
EI band			C

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	61.1000 (1b)	x 2.4000 (2b)	= 146.6400 (1b) - (3b)
First floor	60.7000 (1c)	x 2.6500 (2c)	= 160.8550 (1c) - (3c)
Second floor	33.0000 (1d)	x 2.4600 (2d)	= 81.1800 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	154.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	388.6750 (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	6 * 10 = 60.0000 (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) =	60.0000 / (5) = 0.1544 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9044 (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) = 0.8365 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.9202	0.8575	0.8575	0.8156	0.8156	0.7111	0.7111	0.6901	0.7111	0.7947	0.7738	0.8365 (22b)
Effective ac	0.9234	0.8676	0.8676	0.8326	0.8326	0.7528	0.7528	0.7382	0.7528	0.8158	0.7994	0.8499 (25)

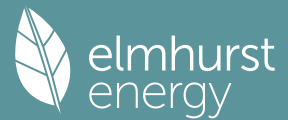
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Door			3.8200	1.4000	5.3480		(26)
Windows			26.7100	1.3258	35.4110		(27)
Roof windows			1.0900	1.3258	1.4451		(27a)
Existing			36.8800	0.5700	21.0216	110.0000	4056.8000 (28a)
New Floor			24.7200	0.1800	4.4496	75.0000	1854.0000 (28a)
Existing	152.7400	29.7000	123.0400	0.3700	45.5248	190.0000	23377.6000 (29a)
Dwarf wall	12.9000		12.9000	0.1800	2.3220	9.0000	116.1000 (29a)
Dormer Wall	4.2000	0.8300	3.3700	0.1800	0.6066	9.0000	30.3300 (29a)
Loft	28.6000		28.6000	0.1100	3.1460	9.0000	257.4000 (30)
Slope	42.8900	1.0900	41.8000	0.1500	6.2700	9.0000	376.2000 (30)
Total net area of external elements Aum(A, m2)			302.9300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		125.5447		(33)
Main dwelling							
Party Wall 1			52.5300	0.0000	0.0000	180.0000	9455.4000 (32)
Internal Wall 1			58.2700			75.0000	4370.2500 (32c)
Internal Wall 2			102.1300			9.0000	919.1700 (32c)
Internal Wall 3			37.3900			75.0000	2804.2500 (32c)
Internal Floor 1			33.0000			18.0000	594.0000 (32d)
Internal Floor 2			60.7000			18.0000	1092.6000 (32d)
Internal Ceiling 1			61.6000			9.0000	554.4000 (32e)
Internal Ceiling 2			60.7000			9.0000	546.3000 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	50404.8000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		325.6124 (35)
Thermal bridges (Default value 0.200 * total exposed area)		60.5860 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	186.1307 (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	118.4354	111.2828	111.2828	106.7948	106.7948	96.5567	96.5567	94.6774	96.5567	104.6350	102.5313	109.0108 (38)
	304.5661	297.4134	297.4134	292.9255	292.9255	282.6874	282.6874	280.8081	282.6874	290.7657	288.6620	295.1414 (39)

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Average = Sum(39)m / 12 =

290.7236

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.9675	1.9213	1.9213	1.8923	1.8923	1.8261	1.8261	1.8140	1.8261	1.8783	1.8647	1.9066 (40)
HLP (average)												1.8781
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9414 (42)
Hot water usage for mixer showers												73.2565 (42a)
73.5382	72.4331	70.8227	67.7415	65.4676	62.9318	61.4905	63.0887	64.8407	67.5633	70.7107		
Hot water usage for baths												31.6397 (42b)
31.7471	31.2756	30.6116	29.3874	28.4707	27.4543	26.9053	27.5646	28.2824	29.3701	30.6195		
Hot water usage for other uses												44.7534 (42c)
44.7534	43.1260	41.4986	39.8712	38.2438	36.6164	36.6164	38.2438	39.8712	41.4986	43.1260		
Average daily hot water use (litres/day)												137.9192 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	150.0386	146.8346	142.9329	137.0001	132.1821	127.0025	125.0121	128.8970	132.9943	138.4319	144.4562	149.6496 (44)
Energy conte	237.6245	209.0906	219.6825	187.5462	177.9426	156.1644	151.1913	159.6015	163.9952	187.8508	205.8043	234.3151 (45)
Energy content (annual)												2290.8090
Distribution loss (46)m = 0.15 x (45)m												
35.6437	31.3636	32.9524	28.1319	26.6914	23.4247	22.6787	23.9402	24.5993	28.1776	30.8706		35.1473 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	14.3269	12.9271	14.2838	13.7629	14.1836	13.6876	14.1194	14.1396	13.7064	14.2074	13.8067	14.3189 (61)
Total heat required for water heating calculated for each month	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340 (64)
												2458.2793 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	82.5919	72.7544	76.6154	65.7999	62.7118	55.3466	53.8010	56.6024	57.9550	66.0123	71.8816	81.4895 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868	176.4868 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.0994	37.3923	30.4095	23.0219	17.2091	14.5287	15.6988	20.4058	27.3887	34.7762	40.5890	43.2694 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	486.1142	491.1586	478.4470	451.3855	417.2253	385.1195	363.6708	358.6265	371.3381	398.3995	432.5598	464.6656 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901	55.5901 (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)	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579	-117.6579 (71)
Water heating gains (Table 5)	111.0106	108.2655	102.9777	91.3887	84.2901	76.8702	72.3131	76.0785	80.4931	88.7261	99.8356	109.5289 (72)
Total internal gains	756.6432	754.2354	729.2531	683.2152	636.1435	590.9374	566.1018	569.5299	593.6389	639.3210	690.4034	734.8829 (73)

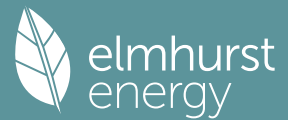
6. Solar gains

[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				3.2600	12.7500		0.6300		0.7000		0.7700		12.7028 (74)
East				14.5700	23.7835		0.6300		0.7000		0.7700		105.9027 (76)
West				8.8800	23.7835		0.6300		0.7000		0.7700		64.5447 (80)
East				1.0900	31.6691		0.6300		0.7000		1.0000		13.7007 (82)
Solar gains	196.8508	336.6443	552.4384	824.1253	991.4106	1077.5771	1014.0941	882.3402	686.7312	429.1528	241.7785	162.8537	(83)
Total gains	953.4940	1090.8796	1281.6915	1507.3404	1627.5542	1668.5145	1580.1959	1451.8700	1280.3700	1068.4738	932.1818	897.7366	(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	45.9714	47.0770	47.0770	47.7983	47.7983	49.5294	49.5294	49.8609	49.5294	48.1533	48.5043	47.4394
alpha	4.0648	4.1385	4.1385	4.1866	4.1866	4.3020	4.3020	4.3241	4.3020	4.2102	4.2336	4.1626
util living area	0.9990	0.9980	0.9943	0.9794	0.9296	0.7736	0.5780	0.6445	0.9139	0.9891	0.9981	0.9992 (86)
MIT	19.0288	19.2325	19.5944	20.0760	20.5373	20.8802	20.9757	20.9618	20.7039	20.1244	19.5435	19.0613 (87)
Th 2	19.3551	19.3863	19.3863	19.4061	19.4061	19.4518	19.4518	19.4602	19.4518	19.4157	19.4250	19.3963 (88)
util rest of house	0.9984	0.9970	0.9909	0.9658	0.8748	0.6122	0.3294	0.3939	0.8221	0.9793	0.9968	0.9988 (89)
MIT 2	17.6336	17.8592	18.2195	18.7070	19.1337	19.4175	19.4502	19.4569	19.3183	18.7673	18.1979	17.6955 (90)
Living area fraction												0.1721 (91)
MIT	17.8737	18.0955	18.4561	18.9426	19.3752	19.6693	19.7127	19.7159	19.5568	19.0009	18.4295	17.9306 (92)

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Temperature adjustment												0.0000
adjusted MIT	17.8737	18.0955	18.4561	18.9426	19.3752	19.6693	19.7127	19.7159	19.5568	19.0009	18.4295	17.9306 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9977	0.9957	0.9879	0.9599	0.8733	0.6392	0.3744	0.4401	0.8307	0.9752	0.9955	0.9982	(94)
Useful gains	951.2553	1086.1843	1266.2220	1446.8903	1421.4020	1066.5194	591.5619	639.0136	1063.6293	1041.9948	927.9880	896.1230	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	3951.3473	3746.0841	3317.9795	2707.3916	1955.3491	1150.3261	597.2458	650.3101	1344.6811	2210.0766	3068.3179	3845.8597	(97)
Space heating kWh	2232.0685	1787.4527	1526.5075	907.5609	397.2567	0.0000	0.0000	0.0000	0.0000	869.0529	1541.0375	2194.6041	(98a)
Space heating requirement - total per year (kWh/year)												11455.5408	
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	2232.0685	1787.4527	1526.5075	907.5609	397.2567	0.0000	0.0000	0.0000	0.0000	869.0529	1541.0375	2194.6041	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												11455.5408	
Space heating per m2											(98c) / (4) =	74.0022	(99)

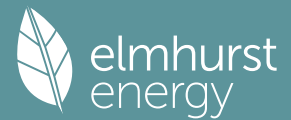
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)													89.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	2232.0685	1787.4527	1526.5075	907.5609	397.2567	0.0000	0.0000	0.0000	0.0000	869.0529	1541.0375	2194.6041	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	2507.9422	2008.3738	1715.1770	1019.7314	446.3558	0.0000	0.0000	0.0000	0.0000	976.4639	1731.5028	2465.8473	(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	251.9514	222.0177	233.9663	201.3091	192.1262	169.8520	165.3108	173.7411	177.7016	202.0582	219.6110	248.6340	(64)
Efficiency of water heater	88.8246	88.8089	88.7703	88.6865	88.4386	87.3000	87.3000	87.3000	87.3000	88.6743	88.7843	88.8240	(216)
Fuel for water heating, kWh/month	283.6506	249.9947	263.5638	226.9897	217.2424	194.5613	189.3594	199.0161	203.5528	227.8657	247.3533	279.9176	(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	36.8493	29.5619	26.6172	19.5009	15.0631	12.3067	13.7410	17.8611	23.1998	30.4394	34.3813	37.8735	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-40.9557	-53.8243	-80.1535	-94.7591	-103.6494	-100.7902	-98.8802	-92.8107	-81.2971	-66.2571	-45.0650	-35.3494	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												12871.3942	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2783.0675	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												297.3952	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-893.7916	(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												15144.0653	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	12871.3942	6.5500	843.0763	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2783.0675	6.5500	182.2909	(247)

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Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	86.0000	28.4300	24.4498 (249)
Energy for lighting	297.3952	28.4300	84.5495 (250)
Additional standing charges			104.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-893.7916	28.4300	-254.1049
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-254.1049 (252)
Total energy cost			984.2616 (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	12871.3942	0.2100	2702.9928 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2783.0675	0.2100	584.4442 (264)
Space and water heating			3287.4370 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	297.3952	0.1443	42.9233 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-893.7916	0.1340	-119.7447
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-119.7447 (269)
Total CO2, kg/year			3222.5448 (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	12871.3942	1.1300	14544.6754 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2783.0675	1.1300	3144.8663 (278)
Space and water heating			17689.5417 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	297.3952	1.5338	456.1547 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-893.7916	1.4951	-1336.3049
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1336.3049 (283)
Total Primary energy kWh/year			16939.4924 (286)

Predicted Energy Assessment



Unit 2 , 9 , Circuit Lane , Reading , RG30 5HB

Dwelling type:

House, Semi-Detached

Date of assessment:

08/01/2026

SAP Version:

10.2

Produced by:

Matthew Carter

Total floor area:

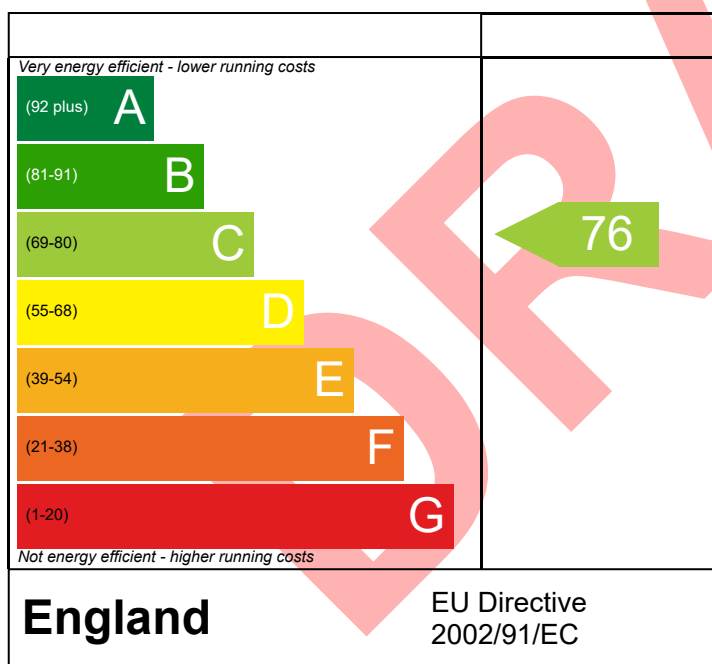
154.8 m²

DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

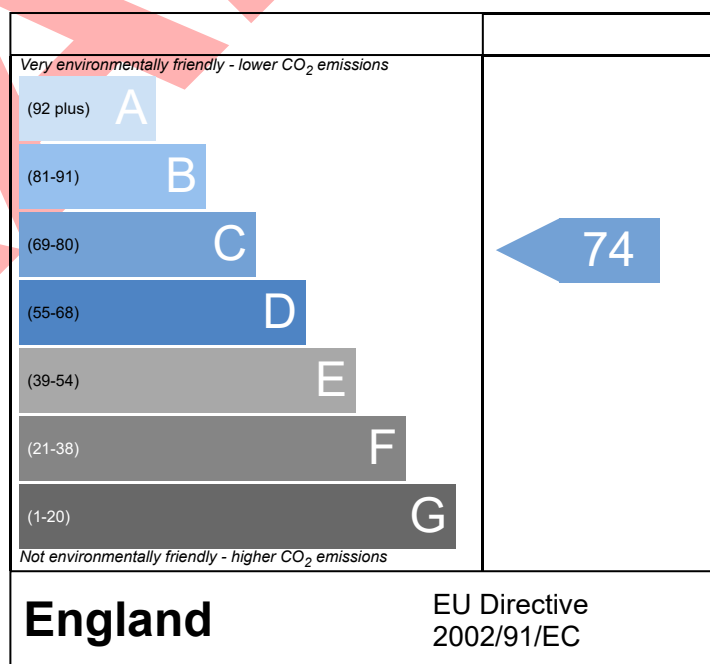
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Summary for Input Data

Plot Reference	01774	Issued on Date	08/01/2026
Assessment Reference	00001	Plot Type Ref	
Plot Address	Unit 2 , 9 , Circuit Lane , Reading , RG30 5HB	SAP Version	10.2

SAP Rating	76 C	DER	25.14	TER	
Environmental	74 C	% DER < TER			N/A
CO ₂ Emissions (t/year)	3.34	DFEE	88.86	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	137.15	TPER	

Assessor Details	Mr. Matthew Carter	Assessor ID	7869-0001
Client	Simon Knight, Simon Knight		

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	West	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
2.0 Number of Storeys	3	
3.0 Date Built	2026	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	325.61	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements	Ground floor:	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	1st Storey:	26.11 m	61.10 m ²	2.40 m
	2nd Storey:	25.56 m	60.70 m ²	2.65 m
		20.88 m	33.00 m ²	2.46 m

8.0 Living Area	26.64	m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	Existing	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure	0.37	190.00	152.74	123.04	0.00	None	29.70	Enter Gross Area
	Dwarf wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	12.90	12.90	0.00	None	0.00	Enter Gross Area
	Dormer Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	4.20	3.37	0.00	None	0.83	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
	Party Wall 1	Filled Cavity with Edge Sealing	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	180.00	52.53		None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall 1	Dense block, plasterboard on dabs	75.00	58.27
	Internal Wall 2	Plasterboard on timber frame	9.00	102.13
	Internal Wall 3	Dense block, plasterboard on dabs	75.00	37.39

10.0 External Roofs	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
	Loft	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	28.60	28.60	None	0.00	Enter Gross Area	0.00
	Slope	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	42.89	41.80	None	0.00	Enter Gross Area	1.09

Summary for Input Data

10.2 Internal Ceilings

Description	Storey	Construction	Kappa	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	9.00	61.60
Internal Ceiling 2	+1	Plasterboard ceiling, carpeted chipboard floor	9.00	60.70

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Existing	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.57	None	0.00	110.00	36.88
New Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.18	None	0.00	75.00	24.72

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	+2	Plasterboard ceiling, carpeted chipboard floor	18.00	33.00
Internal Floor 2	+1	Plasterboard ceiling, carpeted chipboard floor	18.00	60.70

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Solid Door				0.00			1.40
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Roof windows	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Existing	West	1.91	
Opening	Windows	Existing	West	8.88	
Opening	Windows	Existing	East	13.74	
Opening	Windows	Dormer Wall	East	0.83	
Opening	Roof windows	Slope	East	1.09	44
Door	Door	Existing	North	1.91	
Opening	Windows	Existing	North	3.26	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

Y-value

 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys

Number of open flues

Number of chimneys/flues attached to closed fire

Number of flues attached to solid fuel boiler

Number of flues attached to other heater

Number of blocked chimneys

Number of intermittent extract fans

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	84.00	7.00	588.00	24

24.0 Main Heating 1

Percentage of Heat %

Database Ref. No.

Fuel Type

Summary for Input Data

In Winter	89.00
In Summer	87.30
Model Name	LOGIC COMBI
Manufacturer	Ideal Boilers
System Type	Combi boiler
Controls SAP Code	2106
Controls description	Programmer, room thermostat and TRVs
Delayed Start Stat	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	Yes
Combi boiler type	Standard Combi
Combi keep hot type	None

25.0 Main Heating 2

None

26.0 Heat Networks

None

27.0 Secondary Heating

None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	1

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Unknown	8.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	SAP rating	Environmental Impact
Solar water heating			C 77	C 75
Photovoltaic	£8,000 - £10,000	£254	C 80	C 75
Wind turbine			0	0