

Full SAP Calculation Printout



Plot Reference	10350	Issued on Date	23/04/2026
Assessment Reference	Baseline	Plot Type Ref	
Plot Address	2, Crossway Parade, London, N22 5QS	SAP Version	10.2
SAP Rating	41 E	DER	17.39
Environmental	88 B	% DER < TER	9.92
CO ₂ Emissions (t/year)	0.77	DFEE	74.04
Compliance Check	See BREL	% DFEE < TFEE	35.63
% DPER < TPER	-240.73	TPER	-107.83
Assessor Details	Mr. Harry Davey	Assessor ID	R434-0001
Client			

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.1400	3.3000	168.7620
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1400		
Dwelling volume			168.7620

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1185 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8685	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.6731 (21)

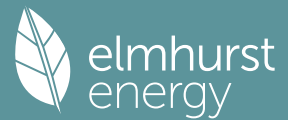
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8582	0.8414	0.8245	0.7404	0.7236	0.6394	0.6394	0.6226	0.6731	0.7236	0.7572	0.7909 (22b)
Effective ac	0.8683	0.8540	0.8399	0.7741	0.7618	0.7044	0.7044	0.6938	0.7265	0.7618	0.7867	0.8128 (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							
HGD			4.0000	1.6000	6.4000		(26a)
Window			3.1300	1.5038	4.7068		(27)
Heatloss Floor 1			51.1400	0.2500	12.7850		(28a)
upgrade	17.4900	3.0000	14.4900	0.3000	4.3470		(29a)
new	17.4900	4.1300	13.3600	0.1800	2.4048		(29a)
Total net area of external elements Aum(A, m ²)			86.1200				(31)
Fabric heat loss, W/K = Sum (A x U)					30.6436		(33)
Main dwelling							
Party Wall 1			63.6900	0.0000	0.0000		(32)
Party Ceiling 1			51.1400				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							200.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							17.2240 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	47.8676 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	48.3541	47.5578	46.7772	43.1107	42.4248	39.2314	39.2314	38.6400	40.4614	42.4248	43.8125	45.2633 (38)
Heat transfer coeff												

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Average = Sum(39)m / 12 =	96.2217	95.4253	94.6447	90.9783	90.2923	87.0990	87.0990	86.5076	88.3290	90.2923	91.6801	93.1309 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.8815	1.8660	1.8507	1.7790	1.7656	1.7031	1.7031	1.6916	1.7272	1.7656	1.7927	1.8211 (40)
HLP (average)												1.7789
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7237 (42)
Hot water usage for mixer showers												
93.7425	92.3337	90.2808	86.3531	83.4545	80.2220	78.3847	80.4220	82.6553	86.1260	90.1381	93.3833 (42a)	
Hot water usage for baths												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)	
Hot water usage for other uses												
32.2824	31.1085	29.9346	28.7607	27.5868	26.4129	26.4129	27.5868	28.7607	29.9346	31.1085	32.2824 (42c)	
Average daily hot water use (litres/day)												115.7751 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
126.0249	123.4422	120.2154	115.1138	111.0413	106.6349	104.7976	108.0088	111.4160	116.0606	121.2466	125.6657 (44)	
Energy content	199.5926	175.7801	184.7667	157.5850	149.4829	131.1201	126.7436	133.7374	137.3870	157.4931	172.7380	196.7621 (45)
Energy content (annual)										Total = Sum(45)m =		1923.1886
Distribution loss (46)m = 0.15 x (45)m												
29.9389	26.3670	27.7150	23.6378	22.4224	19.6680	19.0115	20.0606	20.6081	23.6240	25.9107	29.5143 (46)	
Water storage loss (or HIU loss):												
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8900 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												1.1340 (55)
Total storage loss												
35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)	
If cylinder contains dedicated solar storage												
35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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	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												
234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161 (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												
234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161 (64)	
									Total per year (kWh/year) = Sum(64)m =			2337.0986 (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												
94.4877	83.8485	89.5581	79.6130	77.8263	70.8134	70.2654	72.5909	72.8972	80.4897	84.6514	93.5466 (65)	

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

Metabolic gains (Table 5), Watts												
(66)m	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	24.1784	21.4750	17.4647	13.2219	9.8835	8.3441	9.0161	11.7194	15.7298	19.9726	23.3110	24.8504 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1705	226.4967	220.6348	208.1555	192.4025	177.5970	167.7060	165.3798	171.2418	183.7211	199.4740	214.2795 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659 (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)	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480 (71)
Water heating gains (Table 5)	126.9996	124.7745	120.3738	110.5736	104.6052	98.3520	94.4428	97.5684	101.2461	108.1850	117.5714	125.7347 (72)
Total internal gains	459.8885	457.2862	443.0132	416.4909	391.4312	365.8330	352.7048	356.2076	369.7575	396.4186	424.8962	449.4045 (73)

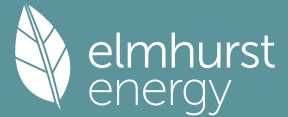
6. Solar gains

[Jan]												Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
North												2.1300	10.6334	0.6300	0.7000	0.7700			6.9219	(74)			
South												1.0000	46.7521	0.6300	0.7000	0.7700			14.2880	(78)			
Solar gains	21.2099	36.6282	52.2853	69.7940	83.7427	85.8518	81.6210	70.6239	58.1630	40.9855	25.4752			18.1166	(83)								
Total gains	481.0984	493.9143	495.2985	486.2849	475.1739	451.6848	434.3258	426.8315	427.9206	437.4041	450.3715	467.5211			(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	29.5267	29.7731	30.0187	31.2284	31.4657	32.6193	32.6193	32.8423	32.1651	31.4657	30.9894	30.5067
alpha	2.9684	2.9849	3.0012	3.0819	3.0977	3.1746	3.1746	3.1895	3.1443	3.0977	3.0660	3.0338
util living area	0.9803	0.9768	0.9695	0.9533	0.9176	0.8335	0.7109	0.7340	0.8726	0.9476	0.9730	0.9819 (86)
MIT	18.5596	18.7280	19.0711	19.6034	20.1130	20.5977	20.8344	20.8113	20.4775	19.8475	19.1723	18.5964 (87)
Th 2	19.4135	19.4242	19.4347	19.4847	19.4942	19.5386	19.5386	19.5469	19.5214	19.4942	19.4751	19.4553 (88)
util rest of house	0.9746	0.9699	0.9595	0.9358	0.8797	0.7416	0.5386	0.5729	0.7995	0.9244	0.9637	0.9767 (89)

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MIT 2	17.2953	17.4690	17.8155	18.3716	18.8664	19.3269	19.4896	19.4851	19.2188	18.6181	17.9438	17.3592 (90)
Living area fraction									FLA = Living area / (4) =			0.1975 (91)
MIT	17.5450	17.7176	18.0634	18.6149	19.1126	19.5779	19.7552	19.7471	19.4674	18.8609	18.1864	17.6035 (92)
Temperature adjustment												0.0000
adjusted MIT	17.5450	17.7176	18.0634	18.6149	19.1126	19.5779	19.7552	19.7471	19.4674	18.8609	18.1864	17.6035 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9647	0.9591	0.9471	0.9218	0.8669	0.7447	0.5690	0.5996	0.7961	0.9108	0.9523	0.9676	(94)
Useful gains	464.1299	473.7121	469.0918	448.2776	411.9435	336.3551	247.1104	255.9195	340.6482	398.3989	428.9077	452.3711	(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	1274.4586	1223.1269	1094.4185	883.8416	669.2996	433.5673	274.8126	289.5459	474.0934	745.8938	1016.4038	1248.2812	(97)
Space heating kWh	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571	(98a)
Space heating requirement - total per year (kWh/year)												3350.5039	
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	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3350.5039	
Space heating per m2										(98c) / (4) =		65.5163	(99)

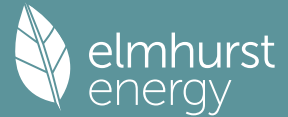
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571	(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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(64)
Efficiency of water heater													100.0000 (216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	21.1632	16.9779	15.2867	11.1997	8.6510	7.0679	7.8917	10.2579	13.3241	17.4819	19.7458	21.7514	(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													3350.5039 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													100.0000
Water heating fuel used													2337.0986 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
Total electricity for the above, kWh/year													41.0000 (231)
Electricity for lighting (calculated in Appendix L)													170.7992 (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													5899.4018 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3350.5039	16.4900	552.4981	(240)

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Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2337.0986	16.4900	385.3876 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	170.7992	16.4900	28.1648 (250)
Additional standing charges			0.0000 (251)
Total energy cost			972.8113 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	3.6427 (257)
SAP value		41.1480
SAP rating (Section 12)		41 (258)
SAP band		E

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	3350.5039	0.1539	515.7047 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2337.0986	0.1411	329.7260 (264)
Space and water heating			845.4307 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	170.7992	0.1443	24.6516 (268)
Total CO2, kg/year			875.7695 (272)
CO2 emissions per m2			17.1200 (273)
EI value			87.7935
EI rating			88 (274)
EI band			B

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.1400 (1b)	x 3.3000 (2b)	= 168.7620 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1400		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 168.7620 (5)
Dwelling volume			

2. Ventilation rate

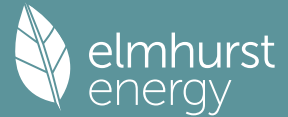
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1185 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8685 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6731 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.2000	4.2000	3.9000	3.9000	3.4000	3.5000	3.7000	3.6000	3.8000	3.8000	4.2000 (22)
Wind factor	1.1000	1.0500	1.0500	0.9750	0.9750	0.8500	0.8750	0.9250	0.9000	0.9500	0.9500	1.0500 (22a)
Adj infilt rate	0.7404	0.7068	0.7068	0.6563	0.6563	0.5721	0.5890	0.6226	0.6058	0.6394	0.6394	0.7068 (22b)
Effective ac	0.7741	0.7497	0.7497	0.7153	0.7153	0.6637	0.6734	0.6938	0.6835	0.7044	0.7044	0.7497 (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							
HGD			4.0000	1.6000	6.4000		(26a)
Window			3.1300	1.5038	4.7068		(27)
Heatloss Floor 1			51.1400	0.2500	12.7850		(28a)
upgrade	17.4900	3.0000	14.4900	0.3000	4.3470		(29a)
new	17.4900	4.1300	13.3600	0.1800	2.4048		(29a)

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Total net area of external elements Aum(A, m2)	86.1200			(31)
Fabric heat loss, W/K = Sum (A x U)	(26) ... (30) + (32) =	30.6436		(33)
Main dwelling				
Party Wall 1	63.6900	0.0000	0.0000	(32)
Party Ceiling 1	51.1400			(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				200.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)				17.2240 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	47.8676 (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	43.1107	41.7546	41.7546	39.8385	39.8385	36.9606	37.5046	38.6400	38.0645	39.2314	39.2314	41.7546	(38)
Average = Sum(39)m / 12 =	90.9783	89.6221	89.6221	87.7061	87.7061	84.8281	85.3722	86.5076	85.9320	87.0990	87.0990	89.6221	(39)
												87.6746	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.7790	1.7525	1.7525	1.7150	1.7150	1.6587	1.6694	1.6916	1.6803	1.7031	1.7031	1.7525	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7237 (42)
Hot water usage for mixer showers	93.7425	92.3337	90.2808	86.3531	83.4545	80.2220	78.3847	80.4220	82.6553	86.1260	90.1381	93.3833	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	32.2824	31.1085	29.9346	28.7607	27.5868	26.4129	26.4129	27.5868	28.7607	29.9346	31.1085	32.2824	(42c)
Average daily hot water use (litres/day)												115.7751	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	126.0249	123.4422	120.2154	115.1138	111.0413	106.6349	104.7976	108.0088	111.4160	116.0606	121.2466	125.6657	(44)
Energy content (annual)	199.5926	175.7801	184.7667	157.5850	149.4829	131.1201	126.7436	133.7374	137.3870	157.4931	172.7380	196.7621	(45)
Distribution loss (46)m = 0.15 x (45)m	29.9389	26.3670	27.7150	23.6378	22.4224	19.6680	19.0115	20.0606	20.6081	23.6240	25.9107	29.5143	(46)
Water storage loss (or HIU loss):													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8900	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												1.1340	(55)
Total storage loss	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540	(56)
If cylinder contains dedicated solar storage	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540	(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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(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	94.4877	83.8485	89.5581	79.6130	77.8263	70.8134	70.2654	72.5909	72.8972	80.4897	84.6514	93.5466	(65)

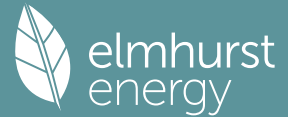
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	24.1784	21.4750	17.4647	13.2219	9.8835	8.3441	9.0161	11.7194	15.7298	19.9726	23.3110	24.8504	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	224.1705	226.4967	220.6348	208.1555	192.4025	177.5970	167.7060	165.3798	171.2418	183.7211	199.4740	214.2795	(68)
Pumps, fans	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	(71)
Total internal gains	126.9996	124.7745	120.3738	110.5736	104.6052	98.3520	94.4428	97.5684	101.2461	108.1850	117.5714	125.7347	(72)
	459.8885	457.2862	443.0132	416.4909	391.4312	365.8330	352.7048	356.2076	369.7575	396.4186	424.8962	449.4045	(73)

6. Solar gains

[Jan]												
			Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	
North			2.1300	11.5821		0.6300		0.7000		0.7700	7.5394 (74)	
South			1.0000	49.2853		0.6300		0.7000		0.7700	15.0622 (78)	
Solar gains	22.6016	35.1317	50.6613	70.8602	83.0697	91.4390	87.1396	76.8030	62.5823	43.0222	28.0498	19.7688 (83)
Total gains	482.4901	492.4179	493.6745	487.3511	474.5009	457.2720	439.8444	433.0105	432.3398	439.4408	452.9461	469.1733 (84)

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7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	31.2284	31.7010	31.7010	32.3935	32.3935	33.4926	33.2791	32.8423	33.0623	32.6193	32.6193	31.7010	21.0000 (85)
alpha	3.0819	3.1134	3.1134	3.1596	3.1596	3.2328	3.2186	3.1895	3.2042	3.1746	3.1746	3.1134	
util living area	0.9760	0.9722	0.9606	0.9337	0.8699	0.7001	0.4597	0.5019	0.7816	0.9212	0.9637	0.9776	(86)
MIT	18.9216	19.0736	19.4387	19.9469	20.4369	20.8428	20.9748	20.9638	20.7375	20.1764	19.5303	18.9307	(87)
Th 2	19.4847	19.5034	19.5034	19.5301	19.5301	19.5705	19.5629	19.5469	19.5550	19.5386	19.5386	19.5034	(88)
util rest of house	0.9687	0.9637	0.9469	0.9067	0.8047	0.5395	0.2053	0.2469	0.6529	0.8831	0.9504	0.9708	(89)
MIT 2	17.7008	17.8633	18.2228	18.7338	19.1844	19.5206	19.5619	19.5447	19.4456	18.9608	18.3385	17.7225	(90)
Living area fraction									fLA = Living area /	(4) =		0.1975	(91)
MIT	17.9419	18.1023	18.4629	18.9734	19.4318	19.7817	19.8409	19.8250	19.7007	19.2009	18.5739	17.9611	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.9419	18.1023	18.4629	18.9734	19.4318	19.7817	19.8409	19.8250	19.7007	19.2009	18.5739	17.9611	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9581	0.9524	0.9338	0.8930	0.7992	0.5672	0.2577	0.2998	0.6688	0.8713	0.9382	0.9607	(94)
Useful gains	462.2663	468.9628	460.9885	435.1969	379.2043	259.3655	113.3601	129.8374	289.1589	382.8726	424.9453	450.7329	(95)
Ext temp.	5.4000	5.9000	7.8000	10.4000	13.4000	16.4000	18.5000	18.3000	15.7000	12.1000	8.4000	5.4000	(96)
Heat loss rate W	1141.0374	1093.5959	955.6341	751.9398	529.0248	286.8648	114.4763	131.9227	343.7891	618.4773	886.1367	1125.7542	(97)
Space heating kWh	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159	(98a)
Space heating requirement - total per year (kWh/year)												2641.8604	
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	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2641.8604	
Space heating per m2										(98c) / (4) =		51.6594	(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 %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159	(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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	21.1632	16.9779	15.2867	11.1997	8.6510	7.0679	7.8917	10.2579	13.3241	17.4819	19.7458	21.7514	(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												2641.8604	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												2337.0986	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												170.7992	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)

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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	5190.7582 (238)

10a. Fuel costs - using BEDF prices (593)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2641.8604	27.6700	731.0028 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2337.0986	27.6700	646.6752 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	27.6700	11.3447 (249)
Energy for lighting	170.7992	27.6700	47.2601 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1436.2828 (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	2641.8604	0.1548	408.9497 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2337.0986	0.1411	329.7260 (264)
Space and water heating			738.6758 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	170.7992	0.1443	24.6516 (268)
Total CO2, kg/year			769.0146 (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	2641.8604	1.5731	4155.9470 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2337.0986	1.5217	3556.3275 (278)
Space and water heating			7712.2744 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	170.7992	1.5338	261.9775 (282)
Total Primary energy kWh/year			8036.2768 (286)

SAP 10 EPC IMPROVEMENTS

Baseline

Current energy efficiency rating:	E 41
Current environmental impact rating:	B 88

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

Recommended measures: (none)	SAP change	Cost change	CO2 change
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Recommended measures (none)	Total Savings	£0	0.00 kg/m²	Energy efficiency	Environmental impact
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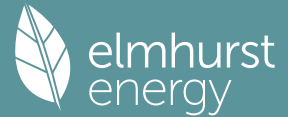
Potential energy efficiency rating:	E 41
Potential environmental impact rating:	B 88

Fuel prices for cost data on this page from database revision number 593 TEST (31 Mar 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £1436	Potential £1436	Saving £0
Electricity			
Space heating	£742	£742	£0
Water heating	£647	£647	£0
Lighting	£47	£47	£0
Total cost of fuels	£1436	£1436	£0
Total cost of uses	£1436	£1436	£0
Delivered energy	102 kWh/m²	102 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.8 tonnes	0.8 tonnes	0.0 tonnes
CO2 emissions per m²	15 kg/m²	15 kg/m²	0 kg/m²
Primary energy	157 kWh/m²	157 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.1400 (1b)	x 3.3000 (2b)	= 168.7620 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.7620 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1185 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8685 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6731 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8582	0.8414	0.8245	0.7404	0.7236	0.6394	0.6394	0.6226	0.6731	0.7236	0.7572	0.7909 (22b)
Effective ac	0.8683	0.8540	0.8399	0.7741	0.7618	0.7044	0.7044	0.6938	0.7265	0.7618	0.7867	0.8128 (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							
HGD			4.0000	1.6000	6.4000		(26a)
Window			3.1300	1.5038	4.7068		(27)
Heatloss Floor 1			51.1400	0.2500	12.7850		(28a)
upgrade	17.4900	3.0000	14.4900	0.3000	4.3470		(29a)
new	17.4900	4.1300	13.3600	0.1800	2.4048		(29a)
Total net area of external elements Aum(A, m ²)			86.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.6436		(33)
Main dwelling							
Party Wall 1			63.6900	0.0000	0.0000		(32)
Party Ceiling 1			51.1400				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							200.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							17.2240 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	47.8676 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	48.3541	47.5578	46.7772	43.1107	42.4248	39.2314	39.2314	38.6400	40.4614	42.4248	43.8125	45.2633 (38)
Heat transfer coeff	96.2217	95.4253	94.6447	90.9783	90.2923	87.0990	87.0990	86.5076	88.3290	90.2923	91.6801	93.1309 (39)
Average = Sum(39)m / 12 =												90.9750
HLP	1.8815	1.8660	1.8507	1.7790	1.7656	1.7031	1.7031	1.6916	1.7272	1.7656	1.7927	1.8211 (40)
HLP (average)												1.7789
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7237 (42)
Hot water usage for mixer showers												
93.7425	92.3337	90.2808	86.3531	83.4545	80.2220	78.3847	80.4220	82.6553	86.1260	90.1381	93.3833 (42a)	
Hot water usage for baths												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)	
Hot water usage for other uses												
32.2824	31.1085	29.9346	28.7607	27.5868	26.4129	26.4129	27.5868	28.7607	29.9346	31.1085	32.2824 (42c)	
Average daily hot water use (litres/day)												115.7751 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
126.0249	123.4422	120.2154	115.1138	111.0413	106.6349	104.7976	108.0088	111.4160	116.0606	121.2466	125.6657 (44)	
Energy content (annual)	199.5926	175.7801	184.7667	157.5850	149.4829	131.1201	126.7436	133.7374	137.3870	157.4931	172.7380	196.7621 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m = 1923.1886											
29.9389	26.3670	27.7150	23.6378	22.4224	19.6680	19.0115	20.0606	20.6081	23.6240	25.9107	29.5143 (46)	
Water storage loss (or HIU loss):												
Store volume	250.0000 (47)											

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a) If manufacturer declared loss factor is known (kWh/day):	1.8900 (48)
Temperature factor from Table 2b	0.6000 (49)
Enter (49) or (54) in (55)	1.1340 (55)
Total storage loss	
35.1540 31.7520 35.1540 34.0200 35.1540 34.0200 35.1540 35.1540 34.0200 35.1540 34.0200 35.1540 (56)	
If cylinder contains dedicated solar storage	
35.1540 31.7520 35.1540 34.0200 35.1540 34.0200 35.1540 35.1540 34.0200 35.1540 34.0200 35.1540 (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 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	
234.7466 207.5321 219.9207 191.6050 184.6369 165.1401 161.8976 168.8914 171.4070 192.6471 206.7580 231.9161 (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	
234.7466 207.5321 219.9207 191.6050 184.6369 165.1401 161.8976 168.8914 171.4070 192.6471 206.7580 231.9161 (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	
94.4877 83.8485 89.5581 79.6130 77.8263 70.8134 70.2654 72.5909 72.8972 80.4897 84.6514 93.5466 (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	
103.4220 103.4220 103.4220 103.4220 103.4220 103.4220 103.4220 103.4220 103.4220 103.4220 103.4220 103.4220 (66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
24.1784 21.4750 17.4647 13.2219 9.8835 8.3441 9.0161 11.7194 15.7298 19.9726 23.3110 24.8504 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
224.1705 226.4967 220.6348 208.1555 192.4025 177.5970 167.7060 165.3798 171.2418 183.7211 199.4740 214.2795 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
47.0659 47.0659 47.0659 47.0659 47.0659 47.0659 47.0659 47.0659 47.0659 47.0659 47.0659 47.0659 (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)	
-68.9480 -68.9480 -68.9480 -68.9480 -68.9480 -68.9480 -68.9480 -68.9480 -68.9480 -68.9480 -68.9480 -68.9480 (71)	
Water heating gains (Table 5)	
126.9996 124.7745 120.3738 110.5736 104.6052 98.3520 94.4428 97.5684 101.2461 108.1850 117.5714 125.7347 (72)	
Total internal gains	
459.8885 457.2862 443.0132 416.4909 391.4312 365.8330 352.7048 356.2076 369.7575 396.4186 424.8962 449.4045 (73)	

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
North						2.1300	10.6334	0.6300	0.7000			0.7700			6.9219 (74)
South						1.0000	46.7521	0.6300	0.7000			0.7700			14.2880 (78)
Solar gains	21.2099	36.6282	52.2853	69.7940	83.7427	85.8518	81.6210	70.6239	58.1630	40.9855	25.4752			18.1166 (83)	
Total gains	481.0984	493.9143	495.2985	486.2849	475.1739	451.6848	434.3258	426.8315	427.9206	437.4041	450.3715			467.5211 (84)	

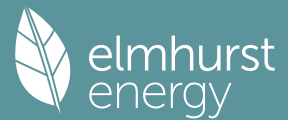
7. Mean internal temperature (heating season)

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 29.5267 29.7731 30.0187 31.2284 31.4657 32.6193 32.6193 32.8423 32.1651 31.4657 30.9894 30.5067	
alpha 2.9684 2.9849 3.0012 3.0819 3.0977 3.1746 3.1746 3.1895 3.1443 3.0977 3.0660 3.0338	
util living area	
0.9803 0.9768 0.9695 0.9533 0.9176 0.8335 0.7109 0.7340 0.8726 0.9476 0.9730 0.9819 (86)	
MIT 18.5596 18.7280 19.0711 19.6034 20.1130 20.5977 20.8344 20.8113 20.4775 19.8475 19.1723 18.5964 (87)	
Th 2 19.4135 19.4242 19.4347 19.4847 19.4942 19.5386 19.5386 19.5469 19.5214 19.4942 19.4751 19.4553 (88)	
util rest of house	
0.9746 0.9699 0.9595 0.9358 0.8797 0.7416 0.5386 0.5729 0.7995 0.9244 0.9637 0.9767 (89)	
MIT 2 17.2953 17.4690 17.8155 18.3716 18.8664 19.3269 19.4896 19.4851 19.2188 18.6181 17.9438 17.3592 (90)	
Living area fraction	
FLA = Living area / (4) =	
MIT 17.5450 17.7176 18.0634 18.6149 19.1126 19.5779 19.7552 19.7471 19.4674 18.8609 18.1864 17.6035 (92)	
Temperature adjustment	
adjusted MIT 17.5450 17.7176 18.0634 18.6149 19.1126 19.5779 19.7552 19.7471 19.4674 18.8609 18.1864 17.6035 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9647	0.9591	0.9471	0.9218	0.8669	0.7447	0.5690	0.5996	0.7961	0.9108	0.9523	0.9676 (94)
Ext temp.	464.1299	473.7121	469.0918	448.2776	411.9435	336.3551	247.1104	255.9195	340.6482	398.3989	428.9077	452.3711 (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	1274.4586	1223.1269	1094.4185	883.8416	669.2996	433.5673	274.8126	289.5459	474.0934	745.8938	1016.4038	1248.2812 (97)
Space heating requirement - total per year (kWh/year)	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571 (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)	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98d)
Space heating per m2	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571 (98c)
(98c) / (4) =	65.5163											65.5163 (99)

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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 %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	602.8845	503.6068	465.2431	313.6061	191.4729	0.0000	0.0000	0.0000	0.0000	258.5362	422.9972	592.1571	(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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161	(217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.3699	3.4822	3.3699	3.4822	3.3699	(231)
Lighting	21.1632	16.9779	15.2867	11.1997	8.6510	7.0679	7.8917	10.2579	13.3241	17.4819	19.7458	21.7514	(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												3350.5039	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												2337.0986	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												170.7992	(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												5899.4018	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3350.5039	16.4900	552.4981	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2337.0986	16.4900	385.3876	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609	(249)
Energy for lighting	170.7992	16.4900	28.1648	(250)
Additional standing charges			0.0000	(251)
Total energy cost			972.8113	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	3.6427	(257)
SAP value		41.1480	
SAP rating (Section 12)		41	(258)
SAP band		E	

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	3350.5039	0.1539	515.7047	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2337.0986	0.1411	329.7260	(264)
Space and water heating			845.4307	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)

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Energy for lighting	170.7992	0.1443	24.6516 (268)
Total CO ₂ , kg/year			875.7695 (272)
CO ₂ emissions per m ²			17.1200 (273)
EI value			87.7935
EI rating			88 (274)
EI band			B

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.1400 (1b)	x 3.3000 (2b)	= 168.7620 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.7620 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1185 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8685 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6731 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.2000	4.2000	3.9000	3.9000	3.4000	3.5000	3.7000	3.6000	3.8000	3.8000	4.2000 (22)
Wind factor	1.1000	1.0500	1.0500	0.9750	0.9750	0.8500	0.8750	0.9250	0.9000	0.9500	0.9500	1.0500 (22a)
Adj infilt rate	0.7404	0.7068	0.7068	0.6563	0.6563	0.5721	0.5890	0.6226	0.6058	0.6394	0.6394	0.7068 (22b)
Effective ac	0.7741	0.7497	0.7497	0.7153	0.7153	0.6637	0.6734	0.6938	0.6835	0.7044	0.7044	0.7497 (25)

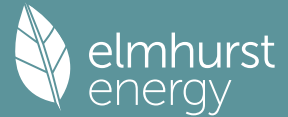
3. Heat losses and heat loss parameter

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												
HGD			4.0000	1.6000	6.4000		(26a)					
Window			3.1300	1.5038	4.7068		(27)					
Heatloss Floor 1			51.1400	0.2500	12.7850		(28a)					
upgrade	17.4900	3.0000	14.4900	0.3000	4.3470		(29a)					
new	17.4900	4.1300	13.3600	0.1800	2.4048		(29a)					
Total net area of external elements Aum(A, m2)			86.1200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.6436		(33)					
Main dwelling												
Party Wall 1			63.6900	0.0000	0.0000		(32)					
Party Ceiling 1			51.1400				(32b)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							200.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							17.2240 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	47.8676 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.1107	Feb 41.7546	Mar 41.7546	Apr 39.8385	May 39.8385	Jun 36.9606	Jul 37.5046	Aug 38.6400	Sep 38.0645	Oct 39.2314	Nov 39.2314	Dec 41.7546 (38)
Heat transfer coeff	90.9783	89.6221	89.6221	87.7061	87.7061	84.8281	85.3722	86.5076	85.9320	87.0990	87.0990	89.6221 (39)
Average = Sum(39)m / 12 =												87.6746
HLP	Jan 1.7790	Feb 1.7525	Mar 1.7525	Apr 1.7150	May 1.7150	Jun 1.6587	Jul 1.6694	Aug 1.6916	Sep 1.6803	Oct 1.7031	Nov 1.7031	Dec 1.7525 (40)
HLP (average)												1.7144
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

												1.7237 (42)
Assumed occupancy												
Hot water usage for mixer showers												
93.7425	92.3337	90.2808	86.3531	83.4545	80.2220	78.3847	80.4220	82.6553	86.1260	90.1381	93.3833 (42a)	

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Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	32.2824	31.1085	29.9346	28.7607	27.5868	26.4129	26.4129	27.5868	28.7607	29.9346	31.1085	32.2824 (42c)
Average daily hot water use (litres/day)												115.7751 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	126.0249	123.4422	120.2154	115.1138	111.0413	106.6349	104.7976	108.0088	111.4160	116.0606	121.2466	125.6657 (44)
Distribution loss (46)m = 0.15 x (45)m	199.5926	175.7801	184.7667	157.5850	149.4829	131.1201	126.7436	133.7374	137.3870	157.4931	172.7380	196.7621 (45)
Water storage loss (or HIU loss):	29.9389	26.3670	27.7150	23.6378	22.4224	19.6680	19.0115	20.0606	20.6081	23.6240	25.9107	29.5143 (46)
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8900 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												1.1340 (55)
Total storage loss	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)
If cylinder contains dedicated solar storage	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161 (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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161 (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	94.4877	83.8485	89.5581	79.6130	77.8263	70.8134	70.2654	72.5909	72.8972	80.4897	84.6514	93.5466 (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	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220	103.4220 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	24.1784	21.4750	17.4647	13.2219	9.8835	8.3441	9.0161	11.7194	15.7298	19.9726	23.3110	24.8504 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1705	226.4967	220.6348	208.1555	192.4025	177.5970	167.7060	165.3798	171.2418	183.7211	199.4740	214.2795 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659	47.0659 (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)	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480	-68.9480 (71)
Water heating gains (Table 5)	126.9996	124.7745	120.3738	110.5736	104.6052	98.3520	94.4428	97.5684	101.2461	108.1850	117.5714	125.7347 (72)
Total internal gains	459.8885	457.2862	443.0132	416.4909	391.4312	365.8330	352.7048	356.2076	369.7575	396.4186	424.8962	449.4045 (73)

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d			Gains W
North						2.1300	11.5821	0.6300	0.7000	0.7700			7.5394 (74)
South						1.0000	49.2853	0.6300	0.7000	0.7700			15.0622 (78)
Solar gains	22.6016	35.1317	50.6613	70.8602	83.0697	91.4390	87.1396	76.8030	62.5823	43.0222	28.0498	19.7688	(83)
Total gains	482.4901	492.4179	493.6745	487.3511	474.5009	457.2720	439.8444	433.0105	432.3398	439.4408	452.9461	469.1733	(84)

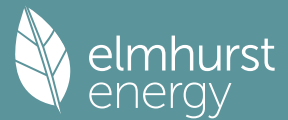
7. Mean internal temperature (heating season)

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	31.2284	31.7010	31.7010	32.3935	32.3935	33.4926	33.2791	32.8423	33.0623	32.6193	32.6193	31.7010
alpha	3.0819	3.1134	3.1134	3.1596	3.1596	3.2328	3.2186	3.1895	3.2042	3.1746	3.1746	3.1134
util living area	0.9760	0.9722	0.9606	0.9337	0.8699	0.7001	0.4597	0.5019	0.7816	0.9212	0.9637	0.9776 (86)
MIT	18.9216	19.0736	19.4387	19.9469	20.4369	20.8428	20.9748	20.9638	20.7375	20.1764	19.5303	18.9307 (87)
Th 2	19.4847	19.5034	19.5034	19.5301	19.5301	19.5705	19.5629	19.5469	19.5550	19.5386	19.5386	19.5034 (88)
util rest of house	0.9687	0.9637	0.9469	0.9067	0.8047	0.5395	0.2053	0.2469	0.6529	0.8831	0.9504	0.9708 (89)
MIT 2	17.7008	17.8633	18.2228	18.7338	19.1844	19.5206	19.5619	19.5447	19.4456	18.9608	18.3385	17.7225 (90)
Living area fraction	17.9419	18.1023	18.4629	18.9734	19.4318	19.7817	19.8409	19.8250	19.7007	19.2009	18.5739	17.9611 (92)
Temperature adjustment	17.9419	18.1023	18.4629	18.9734	19.4318	19.7817	19.8409	19.8250	19.7007	19.2009	18.5739	17.9611 (93)
adjusted MIT												0.0000

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9581	0.9524	0.9338	0.8930	0.7992	0.5672	0.2577	0.2998	0.6688	0.8713	0.9382	0.9607 (94)
Ext temp.	462.2663	468.9628	460.9885	435.1969	379.2043	259.3655	113.3601	129.8374	289.1589	382.8726	424.9453	450.7329 (95)
Heat loss rate W	5.4000	5.9000	7.8000	10.4000	13.4000	16.4000	18.5000	18.3000	15.7000	12.1000	8.4000	5.4000 (96)

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Space heating kWh	1141.0374	1093.5959	955.6341	751.9398	529.0248	286.8648	114.4763	131.9227	343.7891	618.4773	886.1367	1125.7542 (97)
Space heating requirement - total per year (kWh/year)	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159 (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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2641.8604
Space heating per m2											(98c) / (4) =	51.6594 (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 %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	505.0057	419.7534	368.0163	228.0549	111.4665	0.0000	0.0000	0.0000	0.0000	175.2899	332.0578	502.2159 (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	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	234.7466	207.5321	219.9207	191.6050	184.6369	165.1401	161.8976	168.8914	171.4070	192.6471	206.7580	231.9161 (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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	21.1632	16.9779	15.2867	11.1997	8.6510	7.0679	7.8917	10.2579	13.3241	17.4819	19.7458	21.7514 (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												2641.8604 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												2337.0986 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans: central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												41.0000 (231)
Electricity for lighting (calculated in Appendix L)												170.7992 (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												5190.7582 (238)

10a. Fuel costs - using BEDF prices (593)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2641.8604	27.6700	731.0028 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2337.0986	27.6700	646.6752 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	27.6700	11.3447 (249)
Energy for lighting	170.7992	27.6700	47.2601 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1436.2828 (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	2641.8604	0.1548	408.9497 (261)

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Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2337.0986	0.1411	329.7260 (264)
Space and water heating			738.6758 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	170.7992	0.1443	24.6516 (268)
Total CO2, kg/year			769.0146 (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	2641.8604	1.5731	4155.9470 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2337.0986	1.5217	3556.3275 (278)
Space and water heating			7712.2744 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	170.7992	1.5338	261.9775 (282)
Total Primary energy kWh/year			8036.2768 (286)