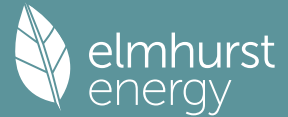


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Property Reference	8517-1				Issued on Date	11/12/2024
Assessment Reference	Baseline		Prop Type Ref			
Property	Flat 1, 78, Great North Road, London, N2 0NL					
SAP Rating	48 E	DER	15.22	TER	13.65	
Environmental	89 B	% DER < TER				-11.50
CO ₂ Emissions (t/year)	0.73	DFEE	62.76	TFEE	39.42	
Compliance Check	See BREL	% DFEE < TFEE				-59.20
% DPER < TPER	-121.79	DPER	159.07	TPER	71.72	
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)
Ground floor	51.7600 (1b)	2.5000 (2b)	129.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600		129.4000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	129.4000 (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) = 0.1546 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.3746 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2622 (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	0.3343	0.3277	0.3212	0.2884	0.2819	0.2491	0.2491	0.2425	0.2622	0.2819	0.2950	0.3081 (22b)
Effective ac	0.5559	0.5537	0.5516	0.5416	0.5397	0.5310	0.5310	0.5294	0.5344	0.5397	0.5435	0.5475 (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
DTC			1.8900	1.4000	2.6460		(26)
Opening Type 2 (Uw = 1.40)			9.0300	1.3258	11.9716		(27)
Heatloss Floor 1			51.7600	0.1400	7.2464	110.0000	5693.6000 (28a)
External Wall 1	61.0000	9.0300	51.9700	0.2600	13.5122	0.0000	0.0000 (29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000 (29a)
Total net area of external elements Aum(A, m ²)			132.2600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.5460		(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000 (32)
Party Ceiling 1			51.7600			0.0000	0.0000 (32b)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		5693.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							110.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							26.4520 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		64.9980 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	23.7370	23.6444	23.5536	23.1270	23.0472	22.6757	22.6757	22.6069	22.8188	23.0472	23.2086	23.3774 (38)
Heat transfer coeff												

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Average = Sum(39)m / 12 =	88.7350	88.6424	88.5516	88.1250	88.0452	87.6736	87.6736	87.6048	87.8168	88.0452	88.2066	88.3754 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.7144	1.7126	1.7108	1.7026	1.7010	1.6938	1.6938	1.6925	1.6966	1.7010	1.7041	1.7074 (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												1.7420 (42)
Hot water usage for mixer showers	94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247 (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	32.4697	31.2890	30.1083	28.9276	27.7469	26.5661	26.5661	27.7469	28.9276	30.1083	31.2890	32.4697 (42c)
Average daily hot water use (litres/day)												116.4464 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.7557	124.1580	120.9126	115.7813	111.6852	107.2533	105.4053	108.6351	112.0621	116.7336	121.9497	126.3944 (44)
Energy content (annual)	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031 (45)
Distribution loss (46)m = 0.15 x (45)m	30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855 (46)
Water storage loss:												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.6000 (49)
Temperature factor from Table 2b												0.9660 (55)
Enter (49) or (54) in (55)												0.9660 (55)
Total storage loss	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460 (56)
If cylinder contains dedicated solar storage	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460 (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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (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	66.7494	58.7858	61.7912	52.7009	49.9913	43.8502	42.3866	44.7256	45.9461	52.6701	57.7684	65.8028 (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	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.6605	16.5741	13.4790	10.2044	7.6279	6.4398	6.9585	9.0449	12.1400	15.4145	17.9910	19.1792 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939 (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)	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796 (71)
Water heating gains (Table 5)	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446 (72)
Total internal gains	416.9833	415.0100	401.5639	375.8193	351.3181	328.8764	315.4662	318.3452	331.0641	353.9308	381.8698	406.2327 (73)

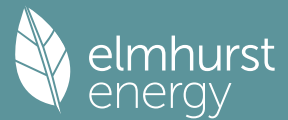
6. Solar gains

[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		
Northeast				1.6900	11.2829	0.6300	0.7000		0.7700	5.8275 (75)		
Southeast				1.1500	36.7938	0.6300	0.7000		0.7700	12.9314 (77)		
Southwest				5.0400	36.7938	0.6300	0.7000		0.7700	56.6732 (79)		
Northwest				1.1500	11.2829	0.6300	0.7000		0.7700	3.9654 (81)		
Solar gains	79.3975	138.4961	198.1364	259.9827	304.4208	308.0338	294.5578	260.5160	219.4144	155.3972	95.6922	67.5644 (83)
Total gains	496.3808	553.5060	599.7003	635.8020	655.7389	636.9101	610.0239	578.8612	550.4785	509.3280	477.5620	473.7971 (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	17.8234	17.8420	17.8603	17.9467	17.9630	18.0391	18.0391	18.0533	18.0097	17.9630	17.9301	17.8959
alpha	2.1882	2.1895	2.1907	2.1964	2.1975	2.2026	2.2026	2.2036	2.2006	2.1975	2.1953	2.1931
util living area	0.9373	0.9191	0.8897	0.8396	0.7596	0.6432	0.5223	0.5575	0.7199	0.8556	0.9190	0.9429 (86)
MIT	17.8104	18.1170	18.6432	19.3239	19.9899	20.5221	20.7881	20.7466	20.3390	19.4888	18.5232	17.7371 (87)
Th 2	19.5306	19.5318	19.5331	19.5390	19.5401	19.5452	19.5452	19.5462	19.5433	19.5401	19.5379	19.5355 (88)

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util rest of house	0.9263	0.9049	0.8693	0.8071	0.7047	0.5492	0.3840	0.4225	0.6378	0.8195	0.9022	0.9328 (89)
MIT 2	15.9479	16.3314	16.9881	17.8279	18.6197	19.2066	19.4485	19.4207	19.0308	18.0488	16.8529	15.8584 (90)
Living area fraction									FLA = Living area / (4) =			0.4934 (91)
MIT	16.8669	17.2125	17.8048	18.5661	19.2958	19.8557	20.1095	20.0749	19.6763	18.7593	17.6771	16.7854 (92)
Temperature adjustment												0.0000
adjusted MIT	16.8669	17.2125	17.8048	18.5661	19.2958	19.8557	20.1095	20.0749	19.6763	18.7593	17.6771	16.7854 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8979	0.8741	0.8379	0.7804	0.6940	0.5715	0.4421	0.4762	0.6465	0.7951	0.8728	0.9055	(94)
Useful gains	445.6787	483.8194	502.4887	496.1674	455.0806	364.0046	269.6691	275.6528	355.8831	404.9666	416.8260	429.0048	(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	1115.1280	1091.4068	1001.0585	851.8226	668.7759	460.7870	307.6881	321.9433	489.6899	718.3886	932.9675	1112.2398	(97)
Space heating kWh	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269	(98a)
Space heating requirement - total per year (kWh/year)												2805.5006	
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	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2805.5006	
Space heating per m2											(98c) / (4) =	54.2021	(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)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
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	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269	(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)	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	16.3334	13.1033	11.7981	8.6438	6.6767	5.4549	6.0907	7.9169	10.2833	13.4923	15.2395	16.7874	(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												2805.5006	(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												2286.9309	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												131.8202	(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												5224.2518	(238)

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10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2805.5006	16.4900	462.6271 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2286.9309	16.4900	377.1149 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	131.8202	16.4900	21.7372 (250)
Additional standing charges			0.0000 (251)
Total energy cost			861.4791 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	3.2052 (257)
SAP value		48.0442
SAP rating (Section 12)		48 (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	2805.5006	0.1538	431.5568 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2286.9309	0.1411	322.7993 (264)
Space and water heating			754.3560 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	131.8202	0.1443	19.0257 (268)
Total CO2, kg/year			773.3818 (272)
CO2 emissions per m2			14.9400 (273)
EI value			89.2897
EI rating			89 (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

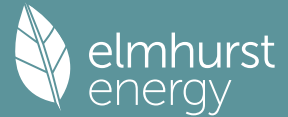
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	51.7600 (1b)	x 2.5000 (2b)	= 129.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	129.4000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1546 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.3746 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2622 (21)
Wind speed	Jan 4.9000 Feb 4.7000 Mar 4.7000 Apr 4.3000 May 4.3000 Jun 3.8000 Jul 3.9000 Aug 3.9000 Sep 4.0000 Oct 4.3000 Nov 4.2000 Dec 4.6000 (22)
Wind factor	1.2250 1.1750 1.1750 1.0750 1.0750 0.9500 0.9750 0.9750 1.0000 1.0750 1.0500 1.1500 (22a)
Adj infilt rate	0.3212 0.3081 0.3081 0.2819 0.2819 0.2491 0.2556 0.2556 0.2622 0.2819 0.2753 0.3015 (22b)
Effective ac	0.5516 0.5475 0.5475 0.5397 0.5397 0.5310 0.5327 0.5327 0.5344 0.5397 0.5379 0.5455 (25)

3. Heat losses and heat loss parameter

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Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
DTC			1.8900	1.4000	2.6460			(26)
Opening Type 2 (Uw = 1.40)			9.0300	1.3258	11.9716			(27)
Heatloss Floor 1			51.7600	0.1400	7.2464	110.0000	5693.6000	(28a)
External Wall 1	61.0000	9.0300	51.9700	0.2600	13.5122	0.0000	0.0000	(28a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000	(29a)
Total net area of external elements Aum(A, m2)			132.2600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.5460			(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000	(32)
Party Ceiling 1			51.7600			0.0000	0.0000	(32b)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5693.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area) 26.4520 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 64.9980 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 23.5536	Feb 23.3774	Mar 23.3774	Apr 23.0472	May 23.0472	Jun 22.6757	Jul 22.7463	Aug 22.7463	Sep 22.8188	Oct 23.0472	Nov 22.9692	Dec 23.2921
Heat transfer coeff	88.5516	88.3754	88.3754	88.0452	88.0452	87.6736	87.7443	87.7443	87.8168	88.0452	87.9672	88.2901
Average = Sum(39)m / 12 =												88.0562
	Jan 1.7108	Feb 1.7074	Mar 1.7074	Apr 1.7010	May 1.7010	Jun 1.6938	Jul 1.6952	Aug 1.6952	Sep 1.6966	Oct 1.7010	Nov 1.6995	Dec 1.7058
HLP (average)												1.7012
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7420
Hot water usage for mixer showers	94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247
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
Hot water usage for other uses	32.4697	31.2890	30.1083	28.9276	27.7469	26.5661	26.5661	27.7469	28.9276	30.1083	31.2890	32.4697
Average daily hot water use (litres/day)												116.4464
Daily hot water use	Jan 126.7557	Feb 124.1580	Mar 120.9126	Apr 115.7813	May 111.6852	Jun 107.2533	Jul 105.4053	Aug 108.6351	Sep 112.0621	Oct 116.7336	Nov 121.9497	Dec 126.3944
Energy conte	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031
Energy content (annual)										Total = Sum(45)m =		1934.3409
Distribution loss (46)m = 0.15 x (45)m	30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855
Water storage loss:												201.0000
Store volume												1.6100
a) If manufacturer declared loss factor is known (kWh/day):												0.6000
Temperature factor from Table 2b												0.9660
Enter (49) or (54) in (55)												0.9660
Total storage loss	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460
If cylinder contains dedicated solar storage	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460
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
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
Total heat required for water heating calculated for each month	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491
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
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
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
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
Output from w/h	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491
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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000
Heat gains from water heating, kWh/month	66.7494	58.7858	61.7912	52.7009	49.9913	43.8502	42.3866	44.7256	45.9461	52.6701	57.7684	65.8028

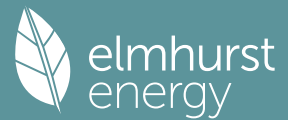
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan 104.5194	Feb 104.5194	Mar 104.5194	Apr 104.5194	May 104.5194	Jun 104.5194	Jul 104.5194	Aug 104.5194	Sep 104.5194	Oct 104.5194	Nov 104.5194	Dec 104.5194
(66)m	18.6605	16.5741	13.4790	10.2044	7.6279	6.4398	6.9585	9.0449	12.1400	15.4145	17.9910	19.1792
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pumps, fans	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796
Losses e.g. evaporation (negative values) (Table 5)	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446
Water heating gains (Table 5)	416.9833	415.0100	401.5639	375.8193	351.3181	328.8764	315.4662	318.3452	331.0641	353.9308	381.8698	406.2327

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
Northeast	1.6900	12.4928	0.6300	0.7000	0.7700	6.4523
Southeast	1.1500	39.1209	0.6300	0.7000	0.7700	13.7492

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Southwest			5.0400		39.1209		0.6300		0.7000		0.7700		60.2575 (79)
Northwest			1.1500		12.4928		0.6300		0.7000		0.7700		4.3906 (81)

Solar gains	84.8498	133.0401	191.7112	262.7523	298.6796	323.1458	309.5740	280.1931	233.5709	163.2079	105.6321	70.8747 (83)
Total gains	501.8331	548.0500	593.2751	638.5716	649.9977	652.0222	625.0401	598.5383	564.6350	517.1387	487.5019	477.1074 (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	17.8603	17.8959	17.8959	17.9630	17.9630	18.0391	18.0246	18.0246	18.0097	17.9630	17.9789	17.9132
alpha	2.1907	2.1931	2.1931	2.1975	2.1975	2.2026	2.2016	2.2016	2.2006	2.1975	2.1986	2.1942
util living area	0.9310	0.9159	0.8797	0.8170	0.7185	0.5446	0.3824	0.4070	0.6515	0.8257	0.9070	0.9368 (86)
MIT	18.0177	18.2441	18.8624	19.5654	20.2249	20.7373	20.9236	20.9104	20.5539	19.7661	18.7626	17.9630 (87)
Th 2	19.5331	19.5355	19.5355	19.5401	19.5401	19.5452	19.5443	19.5443	19.5433	19.5401	19.5412	19.5367 (88)
util rest of house	0.9184	0.9007	0.8563	0.7782	0.6501	0.4229	0.2109	0.2330	0.5462	0.7794	0.8870	0.9252 (89)
MIT 2	16.2108	16.4934	17.2631	18.1209	18.8865	19.4034	19.5293	19.5248	19.2484	18.3816	17.1537	16.1450 (90)
Living area fraction									fLA = Living area / (4) =			0.4934 (91)
MIT	17.1024	17.3573	18.0523	18.8337	19.5469	20.0616	20.2173	20.2085	19.8926	19.0648	17.9476	17.0421 (92)
Temperature adjustment												0.0000
adjusted MIT	17.1024	17.3573	18.0523	18.8337	19.5469	20.0616	20.2173	20.2085	19.8926	19.0648	17.9476	17.0421 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8893	0.8700	0.8258	0.7554	0.6505	0.4697	0.2945	0.3171	0.5746	0.7608	0.8575	0.8970 (94)
Useful gains	446.2663	476.7793	489.9070	482.3628	422.8282	306.2699	184.0458	189.8229	324.4255	393.4508	418.0527	427.9773 (95)
Ext temp.	5.0000	5.4000	7.4000	9.9000	12.9000	16.0000	18.0000	17.9000	15.2000	11.7000	7.9000	5.0000 (96)
Heat loss rate W	1071.6845	1056.7278	941.3972	786.5651	585.2261	356.0955	194.5569	202.5547	412.0870	648.4309	883.8588	1063.1946 (97)
Space heating kWh	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017 (98a)
Space heating requirement - total per year (kWh/year)												2528.4824
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	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2528.4824
Space heating per m2										(98c) / (4) =		48.8501 (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)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
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	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017 (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)	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017 (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)	
Space heating fuel used, main 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)	
Water heating													
Water heating requirement	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	16.3334	13.1033	11.7981	8.6438	6.6767	5.4549	6.0907	7.9169	10.2833	13.4923	15.2395	16.7874 (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													2528.4824 (211)
Space heating fuel - main system 2													0.0000 (213)

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Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	100.0000	
Water heating fuel used	2286.9309	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	131.8202	(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	4947.2336	(238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2528.4824	26.0600	658.9225 (240)
Space heating - main system 2	0.0000	26.0600	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2286.9309	26.0600	595.9742 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	131.8202	26.0600	34.3524 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1289.2491 (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	2528.4824	0.1544	390.3417 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2286.9309	0.1411	322.7993 (264)
Space and water heating			713.1410 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	131.8202	0.1443	19.0257 (268)
Total CO2, kg/year			732.1667 (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	2528.4824	1.5715	3973.6331 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2286.9309	1.5219	3480.5542 (278)
Space and water heating			7454.1873 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	131.8202	1.5338	202.1903 (282)
Total Primary energy kWh/year			7656.3776 (286)

SAP 10 EPC IMPROVEMENTS

Baseline

Current energy efficiency rating:	E 48
Current environmental impact rating:	B 89

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
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	E 48
Potential environmental impact rating:	B 89

Fuel prices for cost data on this page from database revision number 556 TEST (29 Nov 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £1289	Potential £1289	Saving £0
Electricity			
Space heating	£659	£659	£0
Water heating	£596	£596	£0
Lighting	£34	£34	£0
Total cost of fuels	£1289	£1289	£0

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Total cost of uses	£1289	£1289	£0
Delivered energy	96 kWh/m ²	96 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.7 tonnes	0.7 tonnes	0.0 tonnes
CO2 emissions per m ²	14 kg/m ²	14 kg/m ²	0 kg/m ²
Primary energy	148 kWh/m ²	148 kWh/m ²	0 kWh/m ²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.7600 (1b)	x 2.5000 (2b)	= 129.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 129.4000 (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) = 0.1546 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.3746 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2622 (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	0.3343	0.3277	0.3212	0.2884	0.2819	0.2491	0.2491	0.2425	0.2622	0.2819	0.2950	0.3081 (22b)
Effective ac	0.5559	0.5537	0.5516	0.5416	0.5397	0.5310	0.5310	0.5294	0.5344	0.5397	0.5435	0.5475 (25)

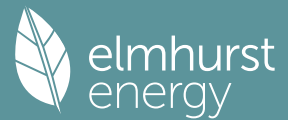
3. Heat losses and heat loss parameter

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					
DTC			1.8900	1.4000	2.6460		(26)					
Opening Type 2 (Uw = 1.40)			9.0300	1.3258	11.9716		(27)					
Heatloss Floor 1			51.7600	0.1400	7.2464	110.0000	5693.6000 (28a)					
External Wall 1	61.0000	9.0300	51.9700	0.2600	13.5122	0.0000	0.0000 (29a)					
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000 (29a)					
Total net area of external elements Aum(A, m2)			132.2600				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.5460		(33)					
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000 (32)					
Party Ceiling 1			51.7600			0.0000	0.0000 (32b)					
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			5693.6000 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							110.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							26.4520 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss				(33) + (36) + (36a) =			64.9980 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 23.7370	Feb 23.6444	Mar 23.5536	Apr 23.1270	May 23.0472	Jun 22.6757	Jul 22.6757	Aug 22.6069	Sep 22.8188	Oct 23.0472	Nov 23.2086	Dec 23.3774 (38)
Heat transfer coeff	88.7350	88.6424	88.5516	88.1250	88.0452	87.6736	87.6736	87.6048	87.8168	88.0452	88.2066	88.3754 (39)
Average = Sum(39)m / 12 =												88.1246
HLP	Jan 1.7144	Feb 1.7126	Mar 1.7108	Apr 1.7026	May 1.7010	Jun 1.6938	Jul 1.6938	Aug 1.6925	Sep 1.6966	Oct 1.7010	Nov 1.7041	Dec 1.7074 (40)
HLP (average)												1.7026
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7420 (42)
Hot water usage for mixer showers	94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247 (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	32.4697	31.2890	30.1083	28.9276	27.7469	26.5661	26.5661	27.7469	28.9276	30.1083	31.2890	32.4697 (42c)
Average daily hot water use (litres/day)												116.4464 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	126.7557	124.1580	120.9126	115.7813	111.6852	107.2533	105.4053	108.6351	112.0621	116.7336	121.9497	126.3944 (44)
Distribution loss (46)m = 0.15 x (45)m	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031 (45)
Total = Sum(45)m =	30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												0.9660 (55)
Total storage loss	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460 (56)
If cylinder contains dedicated solar storage	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460 (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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (64)
Total per year (kWh/year) = Sum(64)m =												2286.9309 (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	66.7494	58.7858	61.7912	52.7009	49.9913	43.8502	42.3866	44.7256	45.9461	52.6701	57.7684	65.8028 (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	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.6605	16.5741	13.4790	10.2044	7.6279	6.4398	6.9585	9.0449	12.1400	15.4145	17.9910	19.1792 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939 (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)	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796 (71)
Water heating gains (Table 5)	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446 (72)
Total internal gains	416.9833	415.0100	401.5639	375.8193	351.3181	328.8764	315.4662	318.3452	331.0641	353.9308	381.8698	406.2327 (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
Northeast	1.6900	11.2829	0.6300	0.7000	0.7700	5.8275 (75)
Southeast	1.1500	36.7938	0.6300	0.7000	0.7700	12.9314 (77)
Southwest	5.0400	36.7938	0.6300	0.7000	0.7700	56.6732 (79)
Northwest	1.1500	11.2829	0.6300	0.7000	0.7700	3.9654 (81)

Solar gains	79.3975	138.4961	198.1364	259.9827	304.4208	308.0338	294.5578	260.5160	219.4144	155.3972	95.6922	67.5644 (83)
Total gains	496.3808	553.5060	599.7003	635.8020	655.7389	636.9101	610.0239	578.8612	550.4785	509.3280	477.5620	473.7971 (84)

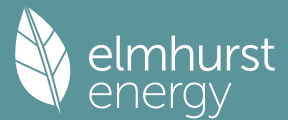
7. Mean internal temperature (heating season)

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	17.8234	17.8420	17.8603	17.9467	17.9630	18.0391	18.0391	18.0533	18.0097	17.9630	17.9301	17.8959
alpha	2.1882	2.1895	2.1907	2.1964	2.1975	2.2026	2.2026	2.2036	2.2006	2.1975	2.1953	2.1931
util living area	0.9373	0.9191	0.8897	0.8396	0.7596	0.6432	0.5223	0.5575	0.7199	0.8556	0.9190	0.9429 (86)
MIT	17.8104	18.1170	18.6432	19.3239	19.9899	20.5221	20.7881	20.7466	20.3390	19.4888	18.5232	17.7371 (87)
Th 2	19.5306	19.5318	19.5331	19.5390	19.5401	19.5452	19.5452	19.5462	19.5433	19.5401	19.5379	19.5355 (88)
util rest of house	0.9263	0.9049	0.8693	0.8071	0.7047	0.5492	0.3840	0.4225	0.6378	0.8195	0.9022	0.9328 (89)
MIT 2	15.9479	16.3314	16.9881	17.8279	18.6197	19.2066	19.4485	19.4207	19.0308	18.0488	16.8529	15.8584 (90)
Living area fraction	16.8669	17.2125	17.8048	18.5661	19.2958	19.8557	20.1095	20.0749	19.6763	18.7593	17.6771	16.7854 (91)
MIT	16.8669	17.2125	17.8048	18.5661	19.2958	19.8557	20.1095	20.0749	19.6763	18.7593	17.6771	16.7854 (92)
Temperature adjustment												0.0000
adjusted MIT	16.8669	17.2125	17.8048	18.5661	19.2958	19.8557	20.1095	20.0749	19.6763	18.7593	17.6771	16.7854 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8979	0.8741	0.8379	0.7804	0.6940	0.5715	0.4421	0.4762	0.6465	0.7951	0.8728	0.9055 (94)
	445.6787	483.8194	502.4887	496.1674	455.0806	364.0046	269.6691	275.6528	355.8831	404.9666	416.8260	429.0048 (95)

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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	1115.1280	1091.4068	1001.0585	851.8226	668.7759	460.7870	307.6881	321.9433	489.6899	718.3886	932.9675	1112.2398 (97)
Space heating kWh	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269 (98a)
Space heating requirement - total per year (kWh/year)												2805.5006
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	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2805.5006
Space heating per m2										(98c) / (4) =		54.2021 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
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	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269 (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)	498.0703	408.2987	370.9359	256.0717	158.9893	0.0000	0.0000	0.0000	0.0000	233.1860	371.6218	508.3269 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	16.3334	13.1033	11.7981	8.6438	6.6767	5.4549	6.0907	7.9169	10.2833	13.4923	15.2395	16.7874 (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												2805.5006 (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												2286.9309 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												131.8202 (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												5224.2518 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2805.5006	16.4900	462.6271 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2286.9309	16.4900	377.1149 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	131.8202	16.4900	21.7372 (250)
Additional standing charges			0.0000 (251)
Total energy cost			861.4791 (255)

elmhurst
energy

$$\frac{[(255) \times (256)]}{[(4) + 45.0]} = \begin{array}{r} 0.3600 \text{ (256)} \\ 3.2052 \text{ (257)} \\ 48.0442 \\ 48 \text{ (258)} \\ \hline \text{F} \end{array}$$

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2805.5006	0.1538	431.5568 (261)
Space heating - main system 2			0.0000 (262)
Total CO2 associated with community systems	0.0000	0.0000	0.0000 (373)
Water heating (other fuel)	2286.9309	0.1411	322.7993 (264)
Space and water heating			754.3560 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	131.8202	0.1443	19.0257 (268)
Total CO2, kg/year			773.3818 (272)
CO2 emissions per m2			14.9400 (273)
EI value			89.2897
EI rating			89 (274)
EI band			B

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.7600 (1b)	x 2.5000 (2b)	= 129.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 129.4000 (5)

		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) =	0.1546 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			4.4000 (17)
Infiltration rate			0.3746 (18)
Number of sides sheltered			4 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.2622 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.7000	4.7000	4.3000	4.3000	3.8000	3.9000	3.9000	4.0000	4.3000	4.2000	4.6000 (22)
Wind factor	1.2250	1.1750	1.1750	1.0750	1.0750	0.9500	0.9750	0.9750	1.0000	1.0750	1.0500	1.1500 (22a)
Adj infilt rate												
	0.3212	0.3081	0.3081	0.2819	0.2819	0.2491	0.2556	0.2556	0.2622	0.2819	0.2753	0.3015 (22b)
Effective ac	0.5516	0.5475	0.5475	0.5397	0.5397	0.5310	0.5327	0.5327	0.5344	0.5397	0.5379	0.5455 (25)

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
DTC			1.8900	1.4000	2.6460		(26)
Opening Type 2 (Uw = 1.40)			9.0300	1.3258	11.9716		(27)
Heatloss Floor 1			51.7600	0.1400	7.2464	110.0000	5693.6000 (28a)
External Wall 1	61.0000	9.0300	51.9700	0.2600	13.5122	0.0000	0.0000 (29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000 (29a)
Total net area of external elements Aum (A, m2)			132.2600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.5460		(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000 (32)
Party Ceiling 1			51.7600			0.0000	0.0000 (32b)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			5693.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							110.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							26.4520 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		64.9980 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.5536	23.3774	23.3774	23.0472	23.0472	22.6757	22.7463	22.7463	22.8188	23.0472	22.9692	23.2921	(38)
Heat transfer coeff	88.5516	88.3754	88.3754	88.0452	88.0452	87.6736	87.7443	87.7443	87.8168	88.0452	87.9672	88.2901	(39)
Average = Sum(39)m / 12 =												88.0562	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7108	1.7074	1.7074	1.7010	1.7010	1.6938	1.6952	1.6952	1.6966	1.7010	1.6995	1.7058	(40)
HLP (average)												1.7012	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7420 (42)
Hot water usage for mixer showers													
94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247	(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													
32.4697	31.2890	30.1083	28.9276	27.7469	26.5661	26.5661	27.7469	28.9276	30.1083	31.2890	32.4697	(42c)	
Average daily hot water use (litres/day)													116.4464 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.7557	124.1580	120.9126	115.7813	111.6852	107.2533	105.4053	108.6351	112.0621	116.7336	121.9497	126.3944	(44)
Energy conte	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1934.3409	
30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855	(46)	
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												0.9660	(55)
Total storage loss													
29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(56)	
If cylinder contains dedicated solar storage													
29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(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													
230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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													
230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)	

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	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.6605	16.5741	13.4790	10.2044	7.6279	6.4398	6.9585	9.0449	12.1400	15.4145	17.9910	19.1792 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939 (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)	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796 (71)
Water heating gains (Table 5)	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446 (72)
Total internal gains	416.9833	415.0100	401.5639	375.8193	351.3181	328.8764	315.4662	318.3452	331.0641	353.9308	381.8698	406.2327 (73)

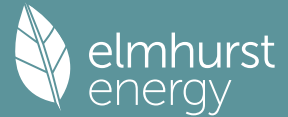
6. Solar gains

[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
Northeast				1.6900	12.4928		0.6300		0.7000		0.7700		6.4523 (75)
Southeast				1.1500	39.1209		0.6300		0.7000		0.7700		13.7492 (77)
Southwest				5.0400	39.1209		0.6300		0.7000		0.7700		60.2575 (79)
Northwest				1.1500	12.4928		0.6300		0.7000		0.7700		4.3906 (81)
Solar gains	84.8498	133.0401	191.7112	262.7523	298.6796	323.1458	309.5740	280.1931	233.5709	163.2079	105.6321	70.8747	(83)
Total gains	501.8331	548.0500	593.2751	638.5716	649.9977	652.0222	625.0401	598.5383	564.6350	517.1387	487.5019	477.1074	(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)													
tau	17.8603	17.8959	17.8959	17.9630	17.9630	18.0391	18.0246	18.0246	18.0097	17.9630	17.9789	17.9132	
alpha	2.1907	2.1931	2.1931	2.1975	2.1975	2.2026	2.2016	2.2016	2.2006	2.1975	2.1986	2.1942	

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util living area	0.9310	0.9159	0.8797	0.8170	0.7185	0.5446	0.3824	0.4070	0.6515	0.8257	0.9070	0.9368 (86)
MIT	18.0177	18.2441	18.8624	19.5654	20.2249	20.7373	20.9236	20.9104	20.5539	19.7661	18.7626	17.9630 (87)
Th 2	19.5331	19.5355	19.5355	19.5401	19.5401	19.5452	19.5443	19.5443	19.5433	19.5401	19.5412	19.5367 (88)
util rest of house												
MIT 2	0.9184	0.9007	0.8563	0.7782	0.6501	0.4229	0.2109	0.2330	0.5462	0.7794	0.8870	0.9252 (89)
Living area fraction	16.2108	16.4934	17.2631	18.1209	18.8865	19.4034	19.5293	19.5248	19.2484	18.3816	17.1537	16.1450 (90)
MIT	17.1024	17.3573	18.0523	18.8337	19.5469	20.0616	20.2173	20.2085	19.8926	19.0648	17.9476	17.0421 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	17.1024	17.3573	18.0523	18.8337	19.5469	20.0616	20.2173	20.2085	19.8926	19.0648	17.9476	17.0421 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8893	0.8700	0.8258	0.7554	0.6505	0.4697	0.2945	0.3171	0.5746	0.7608	0.8575	0.8970	(94)
Useful gains	446.2663	476.7793	489.9070	482.3628	422.8282	306.2699	184.0458	189.8229	324.4255	393.4508	418.0527	427.9773	(95)
Ext temp.	5.0000	5.4000	7.4000	9.9000	12.9000	16.0000	18.0000	17.9000	15.2000	11.7000	7.9000	5.0000	(96)
Heat loss rate W	1071.6845	1056.7278	941.3972	786.5651	585.2261	356.0955	194.5569	202.5547	412.0870	648.4309	883.8588	1063.1946	(97)
Space heating kWh	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017	(98a)
Space heating requirement - total per year (kWh/year)												2528.4824	
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	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2528.4824	
Space heating per m2										(98c) / (4) =		48.8501	(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)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
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	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017	(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)	465.3111	389.7254	335.9087	219.0257	120.8241	0.0000	0.0000	0.0000	0.0000	189.7052	335.3804	472.6017	(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)
Space heating fuel used, main system 2												0.0000	(213)

Water heating requirement	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	16.3334	13.1033	11.7981	8.6438	6.6767	5.4549	6.0907	7.9169	10.2833	13.4923	15.2395	16.7874	(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												2528.4824	(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												2286.9309	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												131.8202	(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)

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Total delivered energy for all uses

4947.2336 (238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2528.4824	26.0600	658.9225 (240)
Space heating - main system 2	0.0000	26.0600	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2286.9309	26.0600	595.9742 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	131.8202	26.0600	34.3524 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1289.2491 (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	2528.4824	0.1544	390.3417 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2286.9309	0.1411	322.7993 (264)
Space and water heating			713.1410 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	131.8202	0.1443	19.0257 (268)
Total CO2, kg/year			732.1667 (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	2528.4824	1.5715	3973.6331 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2286.9309	1.5219	3480.5542 (278)
Space and water heating			7454.1873 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	131.8202	1.5338	202.1903 (282)
Total Primary energy kWh/year			7656.3776 (286)