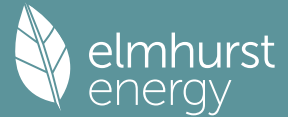


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Property Reference	8517-4				Issued on Date	11/12/2024
Assessment Reference	Green	Prop Type Ref				
Property	Flat 4, 78, Great North Road, London, N2 0NL					
SAP Rating	61 D	DER	11.10	TER	14.58	
Environmental	92 A	% DER < TER				23.87
CO ₂ Emissions (t/year)	0.58	DFEE	69.37	TFEE	47.79	
Compliance Check	See BREL	% DFEE < TFEE				-45.15
% DPER < TPER	-49.36	DPER	114.48	TPER	76.65	
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	56.2600 (1b)	x 3.2500 (2b)	= 182.8450 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 182.8450 (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	3 * 10 = 30.0000 (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)	30.0000 / (5) = 0.1641 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.3841 (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) = 0.2689 (21)

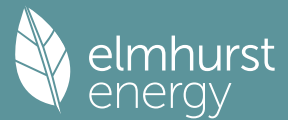
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3428	0.3361	0.3293	0.2957	0.2890	0.2554	0.2554	0.2487	0.2689	0.2890	0.3025	0.3159 (22b)
Effective ac	0.5588	0.5565	0.5542	0.5437	0.5418	0.5326	0.5326	0.5309	0.5361	0.5418	0.5457	0.5499 (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 (U _w = 1.40)			9.7900	1.3258	12.9792		(27)
Opening			2.9700	1.2357	3.6702		(27a)
External Wall 1	88.3500	9.7900	78.5600	0.2600	20.4256	0.0000	0.0000 (29a)
External Wall 2	15.9800	1.8900	14.0900	0.1800	2.5362	0.0000	0.0000 (29a)
External Roof 1	56.2600	2.9700	53.2900	0.1700	9.0593	9.0000	479.6100 (30)
Total net area of external elements A _{um} (A, m ²)			160.5900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.3164		(33)
Party Wall 1			6.3900	0.0000	0.0000	0.0000	0.0000 (32)
Party Floor 1			56.2600			0.0000	0.0000 (32d)
Heat capacity C _m = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			479.6100 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							8.5249 (35)
Thermal bridges (Default value 0.200 * total exposed area)							32.1180 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =			83.4344 (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
	33.7144	33.5767	33.4418	32.8080	32.6895	32.1375	32.1375	32.0353	32.3501	32.6895	32.9293	33.1801 (38)

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Heat transfer coeff
117.1488 117.0112 116.8762 116.2425 116.1239 115.5719 115.5719 115.4697 115.7845 116.1239 116.3638 116.6145 (39)
Average = Sum(39)m / 12 = 116.2419

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.0823	2.0798	2.0774	2.0662	2.0641	2.0542	2.0542	2.0524	2.0580	2.0641	2.0683	2.0728 (40)
HLP (average)												2.0662
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8742 (42)
Hot water usage for mixer showers 71.4281 70.3547 68.7905 65.7977 63.5891 61.1261 59.7261 61.2784 62.9801 65.6247 68.6817 71.1545 (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 33.8234 32.5934 31.3635 30.1336 28.9036 27.6737 27.6737 28.9036 30.1336 31.3635 32.5934 33.8234 (42c)
Average daily hot water use (litres/day) 96.6029 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	105.2515	102.9481	100.1540	95.9313	92.4927	88.7998	87.3998	90.1821	93.1137	96.9882	101.2752	104.9778 (44)
Energy conte	166.6927	146.5968	153.9330	131.3251	124.5130	109.1897	105.7024	111.6642	114.8185	131.6120	144.2851	164.3699 (45)
Energy content (annual)										Total = Sum(45)m =		1604.7023
Distribution loss (46)m = 0.15 x (45)m	25.0039	21.9895	23.0899	19.6988	18.6769	16.3784	15.8554	16.7496	17.2228	19.7418	21.6428	24.6555 (46)
Water storage loss:												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8694 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213 (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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213 (64)
								Total per year (kWh/year) = Sum(64)m =				1922.0333 (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	55.4253	48.7434	51.1827	43.6656	41.4006	36.3056	35.1461	37.1284	38.1771	43.7610	47.9748	54.6530 (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	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5675	17.3796	14.1341	10.7004	7.9987	6.7528	7.2967	9.4845	12.7300	16.1637	18.8654	20.1113 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9198	246.4509	240.0726	226.4938	209.3531	193.2432	182.4808	179.9497	186.3280	199.9068	217.0475	233.1574 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192 (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)	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668 (71)
Water heating gains (Table 5)	74.4964	72.5349	68.7940	60.6467	55.6459	50.4244	47.2393	49.9037	53.0238	58.8185	66.6316	73.4583 (72)
Total internal gains	423.5862	421.9680	408.6032	383.4435	358.6003	336.0230	322.6194	324.9405	337.6845	360.4916	388.1472	412.3296 (73)

6. Solar gains

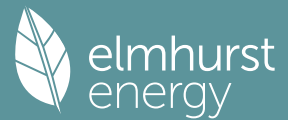
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Southwest	8.6400	36.7938	0.6300	0.7000	0.7700	97.1540 (79)						
Northwest	1.1500	11.2829	0.6300	0.7000	0.7700	3.9654 (81)						
Northeast	2.9700	26.0000	0.6300	0.7000	1.0000	30.6486 (82)						
Solar gains	131.7680	237.2158	354.1364	481.2595	572.6796	581.9598	555.5869	486.2383	398.4571	270.5655	160.2578	111.1366 (83)
Total gains	555.3543	659.1838	762.7396	864.7030	931.2799	917.9828	878.2063	811.1787	736.1416	631.0571	548.4050	523.4662 (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	1.1372	1.1386	1.1399	1.1461	1.1473	1.1527	1.1527	1.1538	1.1506	1.1473	1.1449	1.1424
alpha	1.0758	1.0759	1.0760	1.0764	1.0765	1.0768	1.0768	1.0769	1.0767	1.0765	1.0763	1.0762
util living area	0.8006	0.7632	0.7122	0.6411	0.5567	0.4626	0.3796	0.4099	0.5396	0.6793	0.7692	0.8107 (86)
MIT	15.2383	15.7313	16.6014	17.7276	18.8414	19.7835	20.3235	20.2321	19.4516	18.0054	16.4133	15.1246 (87)
Th 2	19.2790	19.2806	19.2822	19.2896	19.2910	19.2974	19.2974	19.2986	19.2949	19.2910	19.2882	19.2853 (88)

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util rest of house	0.7817	0.7411	0.6844	0.6038	0.5042	0.3847	0.2700	0.3015	0.4662	0.6371	0.7438	0.7927 (89)
MIT 2	13.3062	13.8735	14.8765	16.1651	17.4117	18.4279	18.9555	18.8853	18.1131	16.5211	14.6886	13.1786 (90)
Living area fraction									FLA = Living area / (4) =			0.4575 (91)
MIT	14.1902	14.7235	15.6657	16.8800	18.0658	19.0481	19.5814	19.5015	18.7255	17.2002	15.4777	14.0689 (92)
Temperature adjustment												0.0000
adjusted MIT	14.1902	14.7235	15.6657	16.8800	18.0658	19.0481	19.5814	19.5015	18.7255	17.2002	15.4777	14.0689 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6984	0.6575	0.6051	0.5366	0.4587	0.3715	0.2907	0.3164	0.4364	0.5685	0.6622	0.7100	(94)
Useful gains	387.8779	433.4367	461.4990	463.9802	427.1409	341.0217	255.3330	256.6256	321.2629	358.7573	363.1347	371.6452	(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	1158.6221	1149.4618	1071.2497	927.6127	739.2241	514.0740	344.5660	358.1271	535.5625	766.4395	974.8574	1150.8589	(97)
Space heating kWh	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350	(98a)
Space heating requirement - total per year (kWh/year)												3397.7533	
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	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3397.7533	
Space heating per m2											(98c) / (4) =	60.3938	(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	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350	(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)	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350	(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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	55.4203	48.9225	51.7685	45.0494	43.3486	38.7143	37.9651	39.6713	40.3253	45.3803	48.7585	54.7555	(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	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033	(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												3397.7533	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												550.0796	(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)												138.2270	(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												4086.0599	(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	3397.7533	16.4900	560.2895 (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)	550.0796	16.4900	90.7081 (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	138.2270	16.4900	22.7936 (250)
Additional standing charges			0.0000 (251)
Total energy cost			673.7913 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.3955 (257)
SAP value		61.1695
SAP rating (Section 12)		61 (258)
SAP band		D

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	3397.7533	0.1532	520.5047 (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)	550.0796	0.1411	77.6279 (264)
Space and water heating			598.1326 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	138.2270	0.1443	19.9504 (268)
Total CO2, kg/year			618.0830 (272)
CO2 emissions per m2			10.9900 (273)
EI value			91.8207
EI rating			92 (274)
EI band			A

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

1. Overall dwelling characteristics

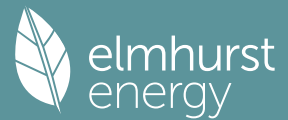
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	56.2600 (1b)	x 3.2500 (2b)	= 182.8450 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	182.8450 (5)

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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1641 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.3841 (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) = 0.2689 (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	0.3293 0.3159 0.3159 0.2890 0.2890 0.2554 0.2621 0.2621 0.2689 0.2890 0.2823 0.3092 (22b)
Effective ac	0.5542 0.5499 0.5499 0.5418 0.5418 0.5326 0.5344 0.5344 0.5361 0.5418 0.5398 0.5478 (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)			9.7900	1.3258	12.9792			(27)
Opening			2.9700	1.2357	3.6702			(27a)
External Wall 1	88.3500	9.7900	78.5600	0.2600	20.4256	0.0000	0.0000	(29a)
External Wall 2	15.9800	1.8900	14.0900	0.1800	2.5362	0.0000	0.0000	(29a)
External Roof 1	56.2600	2.9700	53.2900	0.1700	9.0593	9.0000	479.6100	(30)
Total net area of external elements Aum(A, m2)			160.5900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.3164			(33)
Party Wall 1			6.3900	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			56.2600			0.0000	0.0000	(32d)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		479.6100	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							8.5249	(35)
Thermal bridges (Default value 0.200 * total exposed area)							32.1180	(36)
Point Thermal bridges							0.0000	(36a)
Total fabric heat loss							(33) + (36) + (36a) =	83.4344 (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	33.4418	33.1801	33.1801	32.6895	32.6895	32.1375	32.2424	32.2424	32.3501	32.6895	32.5736	33.0534	(38)
Heat transfer coeff	116.8762	116.6145	116.6145	116.1239	116.1239	115.5719	115.6769	115.6769	115.7845	116.1239	116.0080	116.4878	(39)
Average = Sum(39)m / 12 =												116.1402	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.0774	2.0728	2.0728	2.0641	2.0641	2.0542	2.0561	2.0561	2.0580	2.0641	2.0620	2.0705	(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													1.8742 (42)
Hot water usage for mixer showers	71.4281	70.3547	68.7905	65.7977	63.5891	61.1261	59.7261	61.2784	62.9801	65.6247	68.6817	71.1545	(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	33.8234	32.5934	31.3635	30.1336	28.9036	27.6737	27.6737	28.9036	30.1336	31.3635	32.5934	33.8234	(42c)
Average daily hot water use (litres/day)												96.6029	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	105.2515	102.9481	100.1540	95.9313	92.4927	88.7998	87.3998	90.1821	93.1137	96.9882	101.2752	104.9778	(44)
Energy content (annual)	166.6927	146.5968	153.9330	131.3251	124.5130	109.1897	105.7024	111.6642	114.8185	131.6120	144.2851	164.3699	(45)
Distribution loss (46)m = 0.15 x (45)m	25.0039	21.9895	23.0899	19.6988	18.6769	16.3784	15.8554	16.7496	17.2228	19.7418	21.6428	24.6555	(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													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213	(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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	55.4253	48.7434	51.1827	43.6656	41.4006	36.3056	35.1461	37.1284	38.1771	43.7610	47.9748	54.6530	(65)

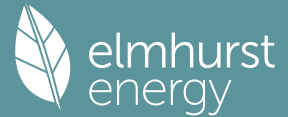
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5675	17.3796	14.1341	10.7004	7.9987	6.7528	7.2967	9.4845	12.7300	16.1637	18.8654	20.1113	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9198	246.4509	240.0726	226.4938	209.3531	193.2432	182.4808	179.9497	186.3280	199.9068	217.0475	233.1574	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	(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)	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	(71)
Water heating gains (Table 5)	74.4964	72.5349	68.7940	60.6467	55.6459	50.4244	47.2393	49.9037	53.0238	58.8185	66.6316	73.4583	(72)
Total internal gains	423.5862	421.9680	408.6032	383.4435	358.6003	336.0230	322.6194	324.9405	337.6845	360.4916	388.1472	412.3296	(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
Southwest	8.6400	39.1209	0.6300	0.7000	0.7700	103.2986 (79)

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Northwest	1.1500	12.4928	0.6300	0.7000	0.7700	4.3906 (81)
Northeast	2.9700	29.0000	0.6300	0.7000	1.0000	34.1850 (82)

Solar gains	141.8743	229.6177	344.9452	488.4619	563.0822	611.2944	584.8696	524.7002	426.6413	286.2902	178.2517	117.4402 (83)
Total gains	565.4605	651.5857	753.5484	871.9054	921.6825	947.3174	907.4890	849.6407	764.3258	646.7819	566.3989	529.7699 (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	1.1399	1.1424	1.1424	1.1473	1.1473	1.1527	1.1517	1.1517	1.1506	1.1473	1.1484	1.1437
alpha	1.0760	1.0762	1.0762	1.0765	1.0765	1.0768	1.0768	1.0768	1.0767	1.0765	1.0766	1.0762
util living area	0.7898	0.7588	0.7005	0.6179	0.5237	0.3923	0.2853	0.3064	0.4849	0.6474	0.7512	0.8005 (86)
MIT	15.5627	15.9284	16.9492	18.1161	19.2397	20.2036	20.6601	20.6209	19.8400	18.4583	16.7896	15.4825 (87)
Th 2	19.2822	19.2853	19.2853	19.2910	19.2910	19.2974	19.2962	19.2962	19.2949	19.2910	19.2923	19.2867 (88)
util rest of house	0.7693	0.7357	0.6701	0.5760	0.4623	0.2961	0.1449	0.1635	0.3964	0.5977	0.7228	0.7808 (89)
MIT 2	13.6875	14.1070	15.2826	16.6073	17.8494	18.8363	19.2117	19.1927	18.5120	17.0333	15.1270	13.5994 (90)
Living area fraction									fLA = Living area / (4) =			0.4575 (91)
MIT	14.5454	14.9404	16.0451	17.2976	18.4855	19.4618	19.8744	19.8461	19.1196	17.6852	15.8877	14.4610 (92)
Temperature adjustment												0.0000
adjusted MIT	14.5454	14.9404	16.0451	17.2976	18.4855	19.4618	19.8744	19.8461	19.1196	17.6852	15.8877	14.4610 (93)

8. Space heating requirement

Utilisation	0.6860	0.6526	0.5929	0.5146	0.4279	0.3066	0.1979	0.2152	0.3857	0.5370	0.6426	0.6979 (94)
Useful gains	387.9213	425.2483	446.8064	448.6494	394.4179	290.4310	179.5950	182.8481	294.7746	347.3477	363.9429	369.7386 (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	1115.6343	1112.5440	1008.1461	859.0370	648.6095	400.0915	216.8217	225.1214	453.8277	695.0297	926.6346	1102.0862 (97)
Space heating kWh	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666 (98a)
Space heating requirement - total per year (kWh/year)												3114.1955
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	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3114.1955
Space heating per m2										(98c) / (4) =		55.3536 (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	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666 (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)	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666 (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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	55.4203	48.9225	51.7685	45.0494	43.3486	38.7143	37.9651	39.6713	40.3253	45.3803	48.7585	54.7555 (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	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033 (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												3114.1955 (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	349.4100	
Water heating fuel used	550.0796	(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)	138.2270	(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	3802.5021	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3114.1955	26.0600	811.5593	(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)	550.0796	26.0600	143.3508	(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	138.2270	26.0600	36.0219	(250)
Additional standing charges			0.0000	(251)
Total energy cost			990.9320	(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	3114.1955	0.1536	478.4338	(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)	550.0796	0.1411	77.6279	(264)
Space and water heating			556.0617	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	138.2270	0.1443	19.9504	(268)
Total CO2, kg/year			576.0121	(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	3114.1955	1.5688	4885.4751	(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)	550.0796	1.5218	837.1254	(278)
Space and water heating			5722.6005	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	138.2270	1.5338	212.0171	(282)
Total Primary energy kWh/year			5934.6177	(286)

SAP 10 EPC IMPROVEMENTS

Green

Current energy efficiency rating: D 61
Current environmental impact rating: A 92

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

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: D 61
Potential environmental impact rating: A 92

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 £991	Potential £991	Saving £0
Electricity			
Space heating	£812	£812	£0
Water heating	£143	£143	£0
Lighting	£36	£36	£0
Total cost of fuels	£991	£991	£0

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Total cost of uses	£991	£991	£0
Delivered energy	68 kWh/m ²	68 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m ²	10 kg/m ²	10 kg/m ²	0 kg/m ²
Primary energy	105 kWh/m ²	105 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	56.2600 (1b)	x 3.2500 (2b)	= 182.8450 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 182.8450 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1641 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.3841 (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) = 0.2689 (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	0.3428	0.3361	0.3293	0.2957	0.2890	0.2554	0.2554	0.2487	0.2689	0.2890	0.3025	0.3159 (22b)
Effective ac	0.5588	0.5565	0.5542	0.5437	0.5418	0.5326	0.5326	0.5309	0.5361	0.5418	0.5457	0.5499 (25)

3. Heat losses and heat loss parameter

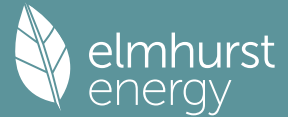
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
DTC			1.8900	1.4000	2.6460		(26)
Opening Type 2 (Uw = 1.40)			9.7900	1.3258	12.9792		(27)
Opening			2.9700	1.2357	3.6702		(27a)
External Wall 1	88.3500	9.7900	78.5600	0.2600	20.4256	0.0000	0.0000 (29a)
External Wall 2	15.9800	1.8900	14.0900	0.1800	2.5362	0.0000	0.0000 (29a)
External Roof 1	56.2600	2.9700	53.2900	0.1700	9.0593	9.0000	479.6100 (30)
Total net area of external elements Aum(A, m ²)			160.5900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.3164		(33)
Party Wall 1			6.3900	0.0000	0.0000	0.0000	0.0000 (32)
Party Floor 1			56.2600			0.0000	0.0000 (32d)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			479.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							8.5249 (35)
Thermal bridges (Default value 0.200 * total exposed area)							32.1180 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =			83.4344 (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	33.7144	33.5767	33.4418	32.8080	32.6895	32.1375	32.1375	32.0353	32.3501	32.6895	32.9293	33.1801 (38)
Average = Sum(39)m / 12 =	117.1488	117.0112	116.8762	116.2425	116.1239	115.5719	115.5719	115.4697	115.7845	116.1239	116.3638	116.6145 (39)
												116.2419
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.0823	2.0798	2.0774	2.0662	2.0641	2.0542	2.0542	2.0524	2.0580	2.0641	2.0683	2.0728 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.8742 (42)
Hot water usage for mixer showers	

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Hot water usage for baths	71.4281	70.3547	68.7905	65.7977	63.5891	61.1261	59.7261	61.2784	62.9801	65.6247	68.6817	71.1545 (42a)
Hot water usage for other uses	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)
Average daily hot water use (litres/day)	33.8234	32.5934	31.3635	30.1336	28.9036	27.6737	27.6737	28.9036	30.1336	31.3635	32.5934	33.8234 (42c)
												96.6029 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	105.2515	102.9481	100.1540	95.9313	92.4927	88.7998	87.3998	90.1821	93.1137	96.9882	101.2752	104.9778 (44)
Distribution loss (46)m = 0.15 x (45)m	166.6927	146.5968	153.9330	131.3251	124.5130	109.1897	105.7024	111.6642	114.8185	131.6120	144.2851	164.3699 (45)
Water storage loss:	25.0039	21.9895	23.0899	19.6988	18.6769	16.3784	15.8554	16.7496	17.2228	19.7418	21.6428	24.6555 (46)
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213 (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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213 (64)
												1922.0333 (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	55.4253	48.7434	51.1827	43.6656	41.4006	36.3056	35.1461	37.1284	38.1771	43.7610	47.9748	54.6530 (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	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5675	17.3796	14.1341	10.7004	7.9987	6.7528	7.2967	9.4845	12.7300	16.1637	18.8654	20.1113 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9198	246.4509	240.0726	226.4938	209.3531	193.2432	182.4808	179.9497	186.3280	199.9068	217.0475	233.1574 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192 (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)	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668 (71)
Water heating gains (Table 5)	74.4964	72.5349	68.7940	60.6467	55.6459	50.4244	47.2393	49.9037	53.0238	58.8185	66.6316	73.4583 (72)
Total internal gains	423.5862	421.9680	408.6032	383.4435	358.6003	336.0230	322.6194	324.9405	337.6845	360.4916	388.1472	412.3296 (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
Southwest			8.6400		36.7938		0.6300		0.7000		0.7700		97.1540 (79)
Northwest			1.1500		11.2829		0.6300		0.7000		0.7700		3.9654 (81)
Northeast			2.9700		26.0000		0.6300		0.7000		1.0000		30.6486 (82)
Solar gains	131.7680	237.2158	354.1364	481.2595	572.6796	581.9598	555.5869	486.2383	398.4571	270.5655	160.2578	111.1366	(83)
Total gains	555.3543	659.1838	762.7396	864.7030	931.2799	917.9828	878.2063	811.1787	736.1416	631.0571	548.4050	523.4662	(84)

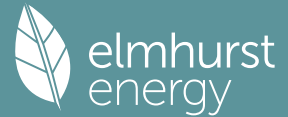
7. Mean internal temperature (heating season)

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	1.1372	1.1386	1.1399	1.1461	1.1473	1.1527	1.1527	1.1538	1.1506	1.1473	1.1449	1.1424
alpha	1.0758	1.0759	1.0760	1.0764	1.0765	1.0768	1.0768	1.0769	1.0767	1.0765	1.0763	1.0762
util living area	0.8006	0.7632	0.7122	0.6411	0.5567	0.4626	0.3796	0.4099	0.5396	0.6793	0.7692	0.8107 (86)
MIT	15.2383	15.7313	16.6014	17.7276	18.8414	19.7835	20.3235	20.2321	19.4516	18.0054	16.4133	15.1246 (87)
Th 2	19.2790	19.2806	19.2822	19.2896	19.2910	19.2974	19.2974	19.2986	19.2949	19.2910	19.2882	19.2853 (88)
util rest of house	0.7817	0.7411	0.6844	0.6038	0.5042	0.3847	0.2700	0.3015	0.4662	0.6371	0.7438	0.7927 (89)
MIT 2	13.3062	13.8735	14.8765	16.1651	17.4117	18.4279	18.9555	18.8853	18.1131	16.5211	14.6886	13.1786 (90)
Living area fraction	14.1902	14.7235	15.6657	16.8800	18.0658	19.0481	19.5814	19.5015	18.7255	17.2002	15.4777	14.0689 (91)
MIT	14.1902	14.7235	15.6657	16.8800	18.0658	19.0481	19.5814	19.5015	18.7255	17.2002	15.4777	14.0689 (92)
Temperature adjustment												0.0000
adjusted MIT	14.1902	14.7235	15.6657	16.8800	18.0658	19.0481	19.5814	19.5015	18.7255	17.2002	15.4777	14.0689 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.6984	0.6575	0.6051	0.5366	0.4587	0.3715	0.2907	0.3164	0.4364	0.5685	0.6622	0.7100 (94)
	387.8779	433.4367	461.4990	463.9802	427.1409	341.0217	255.3330	256.6256	321.2629	358.7573	363.1347	371.6452 (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	1158.6221	1149.4618	1071.2497	927.6127	739.2241	514.0740	344.5660	358.1271	535.5625	766.4395	974.8574	1150.8589 (97)
Space heating kWh	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350 (98a)
Space heating requirement - total per year (kWh/year)												3397.7533
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	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3397.7533
Space heating per m2										(98c) / (4) =		60.3938 (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	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350 (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)	573.4337	481.1689	453.6546	333.8154	232.1899	0.0000	0.0000	0.0000	0.0000	303.3155	440.4404	579.7350 (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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213 (64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)
Fuel for water heating, kWh/month	55.4203	48.9225	51.7685	45.0494	43.3486	38.7143	37.9651	39.6713	40.3253	45.3803	48.7585	54.7555 (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	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033 (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												3397.7533 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												349.4100
Water heating fuel used												550.0796 (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)												138.2270 (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												4086.0599 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3397.7533	16.4900	560.2895 (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)	550.0796	16.4900	90.7081 (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	138.2270	16.4900	22.7936 (250)
Additional standing charges			0.0000 (251)
Total energy cost			673.7913 (255)

$$\frac{[(255) \times (256)]}{[(4) + 45.0]} = \begin{matrix} 0.3600 & (256) \\ 2.3955 & (257) \\ 61.1695 & \\ 61 & (258) \\ D & \end{matrix}$$

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3397.7533	0.1532	520.5047 (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)	550.0796	0.1411	77.6279 (264)
Space and water heating			598.1326 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	138.2270	0.1443	19.9504 (268)
Total CO2, kg/year			618.0830 (272)
CO2 emissions per m2			10.9900 (273)
EI value			91.8207
EI rating			92 (274)
EI band			A

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	56.2600 (1b)	x 3.2500 (2b)	= 182.8450 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 182.8450 (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	3 * 10 =	30.0000 (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) =	30.0000 / (5) =	0.1641 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			4.4000 (17)
Infiltration rate			0.3841 (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) =	0.2689 (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												
	0.3293	0.3159	0.3159	0.2890	0.2890	0.2554	0.2621	0.2621	0.2689	0.2890	0.2823	0.3092 (22b)
Effective ac	0.5542	0.5499	0.5499	0.5418	0.5418	0.5326	0.5344	0.5344	0.5361	0.5418	0.5398	0.5478 (25)

[illegible]

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Total fabric heat loss (33) + (36) + (36a) = 83.4344 (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 33.4418 33.1801 33.1801 32.6895 32.6895 32.1375 32.2424 32.2424 32.3501 32.6895 32.5736 33.0534 (38)
 Average = Sum(39)m / 12 = 116.8762 116.6145 116.6145 116.1239 116.1239 115.5719 115.6769 115.6769 115.7845 116.1239 116.0080 116.4878 (39)
 116.1402

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 2.0774 2.0728 2.0728 2.0641 2.0641 2.0542 2.0561 2.0561 2.0580 2.0641 2.0620 2.0705 (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 1.8742 (42)
 Hot water usage for mixer showers 71.4281 70.3547 68.7905 65.7977 63.5891 61.1261 59.7261 61.2784 62.9801 65.6247 68.6817 71.1545 (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 33.8234 32.5934 31.3635 30.1336 28.9036 27.6737 27.6737 28.9036 30.1336 31.3635 32.5934 33.8234 (42c)
 Average daily hot water use (litres/day) 96.6029 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 105.2515 102.9481 100.1540 95.9313 92.4927 88.7998 87.3998 90.1821 93.1137 96.9882 101.2752 104.9778 (44)
 Energy conte 166.6927 146.5968 153.9330 131.3251 124.5130 109.1897 105.7024 111.6642 114.8185 131.6120 144.2851 164.3699 (45)
 Energy content (annual) Total = Sum(45)m = 1604.7023
 Distribution loss (46)m = 0.15 x (45)m 25.0039 21.9895 23.0899 19.6988 18.6769 16.3784 15.8554 16.7496 17.2228 19.7418 21.6428 24.6555 (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 0.5400 (49)
 Enter (49) or (54) in (55) 0.8694 (55)
 Total storage loss 26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (56)
 If cylinder contains dedicated solar storage 26.9514 24.3432 26.9514 26.0820 26.9514 26.0820 26.9514 26.9514 26.0820 26.9514 26.0820 26.9514 (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 193.6441 170.9400 180.8844 157.4071 151.4644 135.2717 132.6538 138.6156 140.9005 158.5634 170.3671 191.3213 (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 193.6441 170.9400 180.8844 157.4071 151.4644 135.2717 132.6538 138.6156 140.9005 158.5634 170.3671 191.3213 (64)
 Total per year (kWh/year) = Sum(64)m = 1922.0333 (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 55.4253 48.7434 51.1827 43.6656 41.4006 36.3056 35.1461 37.1284 38.1771 43.7610 47.9748 54.6530 (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 112.4502 112.4502 112.4502 112.4502 112.4502 112.4502 112.4502 112.4502 112.4502 112.4502 112.4502 112.4502 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 19.5675 17.3796 14.1341 10.7004 7.9987 6.7528 7.2967 9.4845 12.7300 16.1637 18.8654 20.1113 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 243.9198 246.4509 240.0726 226.4938 209.3531 193.2432 182.4808 179.9497 186.3280 199.9068 217.0475 233.1574 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 48.1192 48.1192 48.1192 48.1192 48.1192 48.1192 48.1192 48.1192 48.1192 48.1192 48.1192 48.1192 (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) -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 -74.9668 (71)
 Water heating gains (Table 5) 74.4964 72.5349 68.7940 60.6467 55.6459 50.4244 47.2393 49.9037 53.0238 58.8185 66.6316 73.4583 (72)
 Total internal gains 423.5862 421.9680 408.6032 383.4435 358.6003 336.0230 322.6194 324.9405 337.6845 360.4916 388.1472 412.3296 (73)

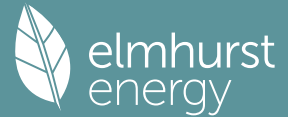
6. Solar gains

[Jan] Area Solar flux g Specific data FF Access Gains
 m2 Table 6a W/m2 or Table 6b or Table 6c factor Table 6d W
 Southwest 8.6400 39.1209 0.6300 0.7000 0.7700 103.2986 (79)
 Northwest 1.1500 12.4928 0.6300 0.7000 0.7700 4.3906 (81)
 Northeast 2.9700 29.0000 0.6300 0.7000 1.0000 34.1850 (82)
 Solar gains 141.8743 229.6177 344.9452 488.4619 563.0822 611.2944 584.8696 524.7002 426.6413 286.2902 178.2517 117.4402 (83)
 Total gains 565.4605 651.5857 753.5484 871.9054 921.6825 947.3174 907.4890 849.6407 764.3258 646.7819 566.3989 529.7699 (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 1.1399 1.1424 1.1424 1.1473 1.1473 1.1527 1.1517 1.1517 1.1506 1.1473 1.1484 1.1437
 alpha 1.0760 1.0762 1.0762 1.0765 1.0765 1.0768 1.0768 1.0768 1.0767 1.0765 1.0766 1.0762

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util living area	0.7898	0.7588	0.7005	0.6179	0.5237	0.3923	0.2853	0.3064	0.4849	0.6474	0.7512	0.8005 (86)
MIT	15.5627	15.9284	16.9492	18.1161	19.2397	20.2036	20.6601	20.6209	19.8400	18.4583	16.7896	15.4825 (87)
Th 2	19.2822	19.2853	19.2853	19.2910	19.2910	19.2974	19.2962	19.2962	19.2949	19.2910	19.2923	19.2867 (88)
util rest of house												
MIT 2	0.7693	0.7357	0.6701	0.5760	0.4623	0.2961	0.1449	0.1635	0.3964	0.5977	0.7228	0.7808 (89)
MIT	13.6875	14.1070	15.2826	16.6073	17.8494	18.8363	19.2117	19.1927	18.5120	17.0333	15.1270	13.5994 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	14.5454	14.9404	16.0451	17.2976	18.4855	19.4618	19.8744	19.8461	19.1196	17.6852	15.8877	14.4610 (92)
Temperature adjustment												0.0000
adjusted MIT	14.5454	14.9404	16.0451	17.2976	18.4855	19.4618	19.8744	19.8461	19.1196	17.6852	15.8877	14.4610 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6860	0.6526	0.5929	0.5146	0.4279	0.3066	0.1979	0.2152	0.3857	0.5370	0.6426	0.6979	(94)
Useful gains	387.9213	425.2483	446.8064	448.6494	394.4179	290.4310	179.5950	182.8481	294.7746	347.3477	363.9429	369.7386	(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	1115.6343	1112.5440	1008.1461	859.0370	648.6095	400.0915	216.8217	225.1214	453.8277	695.0297	926.6346	1102.0862	(97)
Space heating kWh	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666	(98a)
Space heating requirement - total per year (kWh/year)												3114.1955	
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	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3114.1955	
Space heating per m2										(98c) / (4) =		55.3536	(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	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666	(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)	541.4185	461.8627	417.6367	295.4791	189.1185	0.0000	0.0000	0.0000	0.0000	258.6754	405.1380	544.8666	(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	193.6441	170.9400	180.8844	157.4071	151.4644	135.2717	132.6538	138.6156	140.9005	158.5634	170.3671	191.3213	(64)
Efficiency of water heater	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	55.4203	48.9225	51.7685	45.0494	43.3486	38.7143	37.9651	39.6713	40.3253	45.3803	48.7585	54.7555	(219)

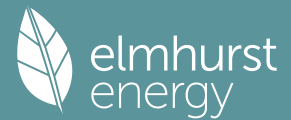
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033	(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												3114.1955	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												550.0796	(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)												138.2270	(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

3802.5021 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3114.1955	26.0600	811.5593 (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)	550.0796	26.0600	143.3508 (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	138.2270	26.0600	36.0219 (250)
Additional standing charges			0.0000 (251)
Total energy cost			990.9320 (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	3114.1955	0.1536	478.4338 (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)	550.0796	0.1411	77.6279 (264)
Space and water heating			556.0617 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	138.2270	0.1443	19.9504 (268)
Total CO2, kg/year			576.0121 (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	3114.1955	1.5688	4885.4751 (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)	550.0796	1.5218	837.1254 (278)
Space and water heating			5722.6005 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	138.2270	1.5338	212.0171 (282)
Total Primary energy kWh/year			5934.6177 (286)