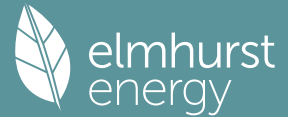


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Property Reference	8517-1				Issued on Date	11/12/2024	
Assessment Reference	Green			Prop Type Ref			
Property	Flat 1, 78, Great North Road, London, N2 0NL						
SAP Rating	65 D		DER	10.56		TER	13.44
Environmental	93 A		% DER < TER				21.43
CO ₂ Emissions (t/year)	0.49		DFEE	62.76		TFEE	39.42
Compliance Check	See BREL		% DFEE < TFEE				-59.20
% DPER < TPER	-54.04		DPER	108.72		TPER	70.58
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)

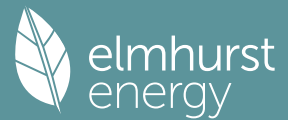
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3343	0.3277	0.3212	0.2884	0.2819	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	68.5716	67.5411	66.0395	63.1664	61.0461	58.6816	57.3376	58.8278	60.4614	63.0002	65.9350	68.3089 (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)												92.7387 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	101.0413	98.8301	96.1478	92.0939	88.7929	85.2477	83.9037	86.5747	89.3890	93.1085	97.2241	100.7786 (44)
Energy content (annual)	160.0248	140.7328	147.7755	126.0720	119.5323	104.8220	101.4742	107.1975	110.2256	126.3474	138.5135	157.7949 (45)
Distribution loss (46)m = 0.15 x (45)m	24.0037	21.1099	22.1663	18.9108	17.9299	15.7233	15.2211	16.0796	16.5338	18.9521	20.7770	23.6692 (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	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463 (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	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463 (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	53.2082	46.7936	49.1354	41.9189	39.7445	34.8533	33.7402	35.6432	36.6500	42.0105	46.0557	52.4668 (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)	71.5164	69.6334	66.0422	58.2207	53.4200	48.4074	45.3497	47.9075	50.9028	56.4657	63.9663	70.5199 (72)
Total internal gains	398.7829	397.1645	384.5534	360.8444	337.5455	316.3806	303.8446	306.1377	318.1529	339.6034	365.6021	388.3080 (73)

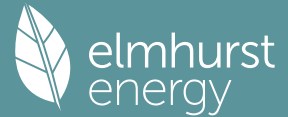
6. Solar gains

[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	478.1803	535.6606	582.6898	620.8271	641.9663	624.4144	598.4024	566.6537	537.5672	495.0006	461.2943	455.8724	(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	0.9414	0.9236	0.8948	0.8452	0.7660	0.6503	0.5293	0.5653	0.7276	0.8618	0.9237	0.9468 (86)
MIT	17.7630	18.0730	18.6050	19.2952	19.9700	20.5107	20.7821	20.7391	20.3228	19.4598	18.4830	17.6895 (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	0.9310	0.9100	0.8751	0.8134	0.7118	0.5564	0.3902	0.4297	0.6464	0.8268	0.9077	0.9372 (89)
MIT 2	15.8892	16.2774	16.9422	17.7950	18.5989	19.1972	19.4453	19.4163	19.0160	18.0159	16.8040	15.7992 (90)
Living area fraction									FLA = Living area / (4) =			0.4934 (91)
MIT	16.8138	17.1634	17.7626	18.5352	19.2755	19.8453	20.1049	20.0690	19.6608	18.7283	17.6325	16.7320 (92)
Temperature adjustment												0.0000
adjusted MIT	16.8138	17.1634	17.7626	18.5352	19.2755	19.8453	20.1049	20.0690	19.6608	18.7283	17.6325	16.7320 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9033	0.8797	0.8438	0.7863	0.7003	0.5781	0.4482	0.4832	0.6540	0.8019	0.8788	0.9108	(94)
Useful gains	431.9439	471.2230	491.6661	488.1648	449.5636	360.9489	268.2271	273.8023	351.5488	396.9446	405.3848	415.1942	(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	1110.4097	1087.0602	997.3240	849.1058	666.9827	459.8754	307.2903	321.4243	488.3314	715.6608	929.0336	1107.5175	(97)
Space heating kWh	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885	(98a)
Space heating requirement - total per year (kWh/year)												2845.7085	
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	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2845.7085	
Space heating per m2												54.9789	(99)
(98c) / (4) =													

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	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885	(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)	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885	(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	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463	(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	53.5120	47.2442	50.0063	43.5460	41.9232	37.4643	36.7550	38.3930	39.0108	43.8736	47.1067	52.8738	(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												2845.7085	(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												531.7087	(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												3509.2375	(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	2845.7085	16.4900	469.2573 (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)	531.7087	16.4900	87.6788 (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			578.6733 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.1530 (257)
SAP value		65.1002
SAP rating (Section 12)		65 (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	2845.7085	0.1538	437.7081 (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)	531.7087	0.1411	75.0266 (264)
Space and water heating			512.7347 (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			531.7604 (272)
CO2 emissions per m2			10.2700 (273)
EI value			92.6358
EI rating			93 (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

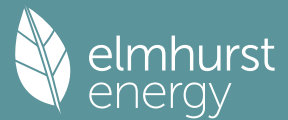
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	51.7600 (1b)	x 2.5000 (2b)	= 129.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	129.4000 (5)

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	(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 23.5536	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 (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
HLP	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 (40)
HLP (average)												1.7012
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

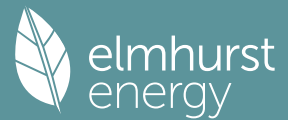
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7420 (42)
Hot water usage for mixer showers	68.5716	67.5411	66.0395	63.1664	61.0461	58.6816	57.3376	58.8278	60.4614	63.0002	65.9350	68.3089 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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)												92.7387 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	101.0413	98.8301	96.1478	92.0939	88.7929	85.2477	83.9037	86.5747	89.3890	93.1085	97.2241	100.7786 (44)
Energy content (annual)	160.0248	140.7328	147.7755	126.0720	119.5323	104.8220	101.4742	107.1975	110.2256	126.3474	138.5135	157.7949 (45)
Distribution loss (46)m = 0.15 x (45)m												1540.5125
	24.0037	21.1099	22.1663	18.9108	17.9299	15.7233	15.2211	16.0796	16.5338	18.9521	20.7770	23.6692 (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												
	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463 (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												
	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463 (64)
Total per year (kWh/year) = Sum(64)m =												1857.8435 (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												
	53.2082	46.7936	49.1354	41.9189	39.7445	34.8533	33.7402	35.6432	36.6500	42.0105	46.0557	52.4668 (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)	71.5164	69.6334	66.0422	58.2207	53.4200	48.4074	45.3497	47.9075	50.9028	56.4657	63.9663	70.5199	(72)
Total internal gains	398.7829	397.1645	384.5534	360.8444	337.5455	316.3806	303.8446	306.1377	318.1529	339.6034	365.6021	388.3080	(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)					

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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	483.6326	530.2046	576.2646	623.5967	636.2251	639.5265	613.4186	586.3308	551.7238	502.8113	471.2342	459.1827	(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	0.9354	0.9206	0.8852	0.8231	0.7255	0.5517	0.3884	0.4138	0.6597	0.8326	0.9122	0.9410	(86)
MIT	17.9711	18.2004	18.8253	19.5388	20.2077	20.7301	20.9212	20.9073	20.5416	19.7399	18.7238	17.9163	(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	0.9235	0.9060	0.8626	0.7850	0.6577	0.4294	0.2147	0.2375	0.5547	0.7875	0.8931	0.9300	(89)
MIT 2	16.1534	16.4401	17.2190	18.0912	18.8699	19.3989	19.5288	19.5240	19.2388	18.3529	17.1070	16.0872	(90)
Living area fraction									fLA = Living area / (4) =			0.4934	(91)
MIT	17.0503	17.3087	18.0116	18.8055	19.5300	20.0558	20.2158	20.2065	19.8817	19.0373	17.9048	16.9897	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0503	17.3087	18.0116	18.8055	19.5300	20.0558	20.2158	20.2065	19.8817	19.0373	17.9048	16.9897	(93)

8. Space heating requirement													

Utilisation	0.8950	0.8758	0.8320	0.7617	0.6572	0.4760	0.2993	0.3227	0.5822	0.7682	0.8639	0.9027	(94)
Useful gains	432.8555	464.3306	479.4612	474.9702	418.1319	304.4457	183.5695	189.2070	321.2158	386.2423	407.0981	414.4842	(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	1067.0731	1052.4380	937.8032	784.0823	583.7420	355.5853	194.4260	202.3863	411.1291	646.0121	880.0954	1058.5719	(97)
Space heating kWh	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(98a)
Space heating requirement - total per year (kWh/year)												2566.8752	
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	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2566.8752	
Space heating per m2										(98c) / (4) =		49.5919	(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	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(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)	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(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	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463	(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	53.5120	47.2442	50.0063	43.5460	41.9232	37.4643	36.7550	38.3930	39.0108	43.8736	47.1067	52.8738	(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												2566.8752	(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	531.7087	(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	3230.4042	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2566.8752	26.0600	668.9277 (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)	531.7087	26.0600	138.5633 (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			841.8433 (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	2566.8752	0.1544	396.2292 (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)	531.7087	0.1411	75.0266 (264)
Space and water heating			471.2558 (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			490.2815 (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	2566.8752	1.5715	4033.8225 (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)	531.7087	1.5218	809.1353 (278)
Space and water heating			4842.9579 (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			5045.1481 (286)

SAP 10 EPC IMPROVEMENTS

Green

Current energy efficiency rating: D 65
Current environmental impact rating: A 93

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 65
Potential environmental impact rating: A 93

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 £842	Potential £842	Saving £0
Electricity			
Space heating	£669	£669	£0
Water heating	£139	£139	£0
Lighting	£34	£34	£0
Total cost of fuels	£842	£842	£0

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Total cost of uses	£842	£842	£0
Delivered energy	62 kWh/m²	62 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m²	9 kg/m²	9 kg/m²	0 kg/m²
Primary energy	97 kWh/m²	97 kWh/m²	0 kWh/m²

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 (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)

	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)

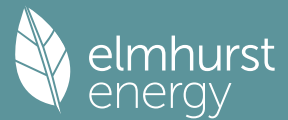
3. Heat losses and heat loss parameter

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	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	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	1.7144	1.7126	1.7108	1.7026	1.7010	1.6938	1.6938	1.6925	1.6966	1.7010	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	68.5716	67.5411	66.0395	63.1664	61.0461	58.6816	57.3376	58.8278	60.4614	63.0002	65.9350	68.3089 (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)												92.7387 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	101.0413	98.8301	96.1478	92.0939	88.7929	85.2477	83.9037	86.5747	89.3890	93.1085	97.2241	100.7786 (44)
Energy content (annual)	160.0248	140.7328	147.7755	126.0720	119.5323	104.8220	101.4742	107.1975	110.2256	126.3474	138.5135	157.7949 (45)
Distribution loss (46)m = 0.15 x (45)m	24.0037	21.1099	22.1663	18.9108	17.9299	15.7233	15.2211	16.0796	16.5338	18.9521	20.7770	23.6692 (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	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463 (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	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463 (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	53.2082	46.7936	49.1354	41.9189	39.7445	34.8533	33.7402	35.6432	36.6500	42.0105	46.0557	52.4668 (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)	71.5164	69.6334	66.0422	58.2207	53.4200	48.4074	45.3497	47.9075	50.9028	56.4657	63.9663	70.5199 (72)
Total internal gains	398.7829	397.1645	384.5534	360.8444	337.5455	316.3806	303.8446	306.1377	318.1529	339.6034	365.6021	388.3080 (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	478.1803	535.6606	582.6898	620.8271	641.9663	624.4144	598.4024	566.6537	537.5672	495.0006	461.2943	455.8724 (84)

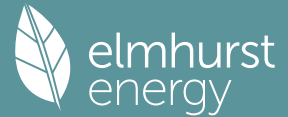
7. Mean internal temperature (heating season)

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	0.9414	0.9236	0.8948	0.8452	0.7660	0.6503	0.5293	0.5653	0.7276	0.8618	0.9237	0.9468 (86)
MIT	17.7630	18.0730	18.6050	19.2952	19.9700	20.5107	20.7821	20.7391	20.3228	19.4598	18.4830	17.6895 (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	0.9310	0.9100	0.8751	0.8134	0.7118	0.5564	0.3902	0.4297	0.6464	0.8268	0.9077	0.9372 (89)
MIT 2	15.8892	16.2774	16.9422	17.7950	18.5989	19.1972	19.4453	19.4163	19.0160	18.0159	16.8040	15.7992 (90)
Living area fraction	16.8138	17.1634	17.7626	18.5352	19.2755	19.8453	20.1049	20.0690	19.6608	18.7283	17.6325	16.7320 (92)
MIT	16.8138	17.1634	17.7626	18.5352	19.2755	19.8453	20.1049	20.0690	19.6608	18.7283	17.6325	16.7320 (93)
Temperature adjustment												0.0000
adjusted MIT	16.8138	17.1634	17.7626	18.5352	19.2755	19.8453	20.1049	20.0690	19.6608	18.7283	17.6325	16.7320 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9033	0.8797	0.8438	0.7863	0.7003	0.5781	0.4482	0.4832	0.6540	0.8019	0.8788	0.9108 (94)
	431.9439	471.2230	491.6661	488.1648	449.5636	360.9489	268.2271	273.8023	351.5488	396.9446	405.3848	415.1942 (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	1110.4097	1087.0602	997.3240	849.1058	666.9827	459.8754	307.2903	321.4243	488.3314	715.6608	929.0336	1107.5175 (97)
Space heating kWh	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885 (98a)
Space heating requirement - total per year (kWh/year)												2845.7085
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	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2845.7085
Space heating per m2											(98c) / (4) =	54.9789 (99)

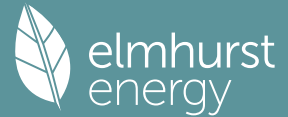
9a. Energy requirements - Individual heating systems, including micro-CHP

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	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885 (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)	504.7785	413.8426	376.2095	259.8775	161.7598	0.0000	0.0000	0.0000	0.0000	237.1249	377.0271	515.0885 (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	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463 (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	53.5120	47.2442	50.0063	43.5460	41.9232	37.4643	36.7550	38.3930	39.0108	43.8736	47.1067	52.8738 (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												2845.7085 (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												531.7087 (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												3509.2375 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2845.7085	16.4900	469.2573 (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)	531.7087	16.4900	87.6788 (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			578.6733 (255)	

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11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):

Energy cost factor (ECF)

SAP value

SAP rating (Section 12)

SAP band

$$\begin{aligned} & [(255) \times (256)] / [(4) + 45.0] = 0.3600 \quad (256) \\ & 2.1530 \quad (257) \\ & 65.1002 \\ & 65 \quad (258) \\ & D \end{aligned}$$

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	2845.7085	0.1538	437.7081 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	531.7087	0.1411	75.0266 (264)
Space and water heating			512.7347 (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 CO ₂ , kg/year			531.7604 (272)
CO ₂ emissions per m ²			10.2700 (273)
EI value			92.6358
EI rating			93 (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 FOR IMPROVED DWELLING

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		(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	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)

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)

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Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$

	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	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	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)
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	68.5716	67.5411	66.0395	63.1664	61.0461	58.6816	57.3376	58.8278	60.4614	63.0002	65.9350	68.3089	(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)												92.7387	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	101.0413	98.8301	96.1478	92.0939	88.7929	85.2477	83.9037	86.5747	89.3890	93.1085	97.2241	100.7786	(44)	
Energy content (annual)	160.0248	140.7328	147.7755	126.0720	119.5323	104.8220	101.4742	107.1975	110.2256	126.3474	138.5135	157.7949	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total =	Sum(45)m =	1540.5125		
	24.0037	21.1099	22.1663	18.9108	17.9299	15.7233	15.2211	16.0796	16.5338	18.9521	20.7770	23.6692	(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														
	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463	(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														
	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463	(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														
	53.2082	46.7936	49.1354	41.9189	39.7445	34.8533	33.7402	35.6432	36.6500	42.0105	46.0557	52.4668	(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)													
	71.5164	69.6334	66.0422	58.2207	53.4200	48.4074	45.3497	47.9075	50.9028	56.4657	63.9663	70.5199	(72)
Total internal gains													
	398.7829	397.1645	384.5534	360.8444	337.5455	316.3806	303.8446	306.1377	318.1529	339.6034	365.6021	388.3080	(73)

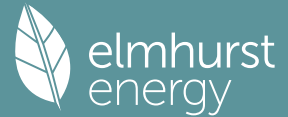
6. Solar gains

[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	483.6326	530.2046	576.2646	623.5967	636.2251	639.5265	613.4186	586.3308	551.7238	502.8113	471.2342	459.1827 (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

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util living area	0.9354	0.9206	0.8852	0.8231	0.7255	0.5517	0.3884	0.4138	0.6597	0.8326	0.9122	0.9410 (86)
MIT	17.9711	18.2004	18.8253	19.5388	20.2077	20.7301	20.9212	20.9073	20.5416	19.7399	18.7238	17.9163 (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	0.9235	0.9060	0.8626	0.7850	0.6577	0.4294	0.2147	0.2375	0.5547	0.7875	0.8931	0.9300 (89)
MIT 2	16.1534	16.4401	17.2190	18.0912	18.8699	19.3989	19.5288	19.5240	19.2388	18.3529	17.1070	16.0872 (90)
Living area fraction	17.0503	17.3087	18.0116	18.8055	19.5300	20.0558	20.2158	20.2065	19.8817	19.0373	17.9048	16.9897 (92)
MIT	17.0503	17.3087	18.0116	18.8055	19.5300	20.0558	20.2158	20.2065	19.8817	19.0373	17.9048	16.9897 (93)
Temperature adjustment												0.0000
adjusted MIT	17.0503	17.3087	18.0116	18.8055	19.5300	20.0558	20.2158	20.2065	19.8817	19.0373	17.9048	16.9897 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8950	0.8758	0.8320	0.7617	0.6572	0.4760	0.2993	0.3227	0.5822	0.7682	0.8639	0.9027	(94)
Useful gains	432.8555	464.3306	479.4612	474.9702	418.1319	304.4457	183.5695	189.2070	321.2158	386.2423	407.0981	414.4842	(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	1067.0731	1052.4380	937.8032	784.0823	583.7420	355.5853	194.4260	202.3863	411.1291	646.0121	880.0954	1058.5719	(97)
Space heating kWh	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(98a)
Space heating requirement - total per year (kWh/year)												2566.8752	
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	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2566.8752	
Space heating per m2										(98c) / (4) =		49.5919	(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	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(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)	471.8579	395.2082	341.0064	222.5607	123.2139	0.0000	0.0000	0.0000	0.0000	193.2688	340.5580	479.2013	(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 requirement	186.9762	165.0760	174.7269	152.1540	146.4837	130.9040	128.4256	134.1489	136.3076	153.2988	164.5955	184.7463	(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	53.5120	47.2442	50.0063	43.5460	41.9232	37.4643	36.7550	38.3930	39.0108	43.8736	47.1067	52.8738	(219)

Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	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												2566.8752	(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												531.7087	(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

3230.4042 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2566.8752	26.0600	668.9277 (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)	531.7087	26.0600	138.5633 (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			841.8433 (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	2566.8752	0.1544	396.2292 (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)	531.7087	0.1411	75.0266 (264)
Space and water heating			471.2558 (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			490.2815 (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	2566.8752	1.5715	4033.8225 (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)	531.7087	1.5218	809.1353 (278)
Space and water heating			4842.9579 (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			5045.1481 (286)