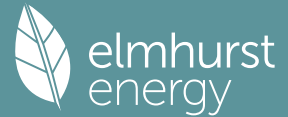


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Property Reference	8517-2				Issued on Date	11/12/2024
Assessment Reference	Lean		Prop Type Ref			
Property	Flat 2, 78, Great North Road, London, N2 0NL					
SAP Rating	52 E	DER	13.50	TER	12.65	
Environmental	90 B	% DER < TER				-6.72
CO ₂ Emissions (t/year)	0.7	DFEE	58.98	TFEE	37.30	
Compliance Check	See BREL	% DFEE < TFEE				-58.12
% DPER < TPER	-112.36	DPER	140.67	TPER	66.24	
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)	2.5000 (2b)	140.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		140.6500 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	140.6500 (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) = 0.2133 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.4333 (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) = 0.3033 (21)

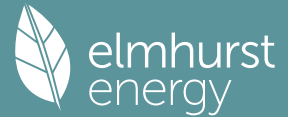
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3867	0.3791	0.3716	0.3336	0.3261	0.2881	0.2881	0.2806	0.3033	0.3261	0.3412	0.3564 (22b)
Effective ac	0.5748	0.5719	0.5690	0.5557	0.5532	0.5415	0.5415	0.5394	0.5460	0.5532	0.5582	0.5635 (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)			11.4800	1.3258	15.2197		(27)
Heatloss Floor 1			56.2600	0.1400	7.8764	110.0000	6188.6000 (28a)
External Wall 1	64.3600	11.4800	52.8800	0.2600	13.7488	0.0000	0.0000 (29a)
External Wall 2	11.2500	1.8900	9.3600	0.1800	1.6848	0.0000	0.0000 (29a)
Total net area of external elements Aum(A, m ²)			131.8700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1757		(33)
Party Wall 1			1.8900	0.0000	0.0000	0.0000	0.0000 (32)
Party Ceiling 1			56.2600			0.0000	0.0000 (32b)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		6188.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							110.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							26.3740 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		67.5497 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	26.6779	26.5431	26.4110	25.7905	25.6745	25.1340	25.1340	25.0340	25.3422	25.6745	25.9093	26.1548 (38)
Heat transfer coeff												

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Average = Sum(39)m / 12 =	94.2276	94.0928	93.9607	93.3402	93.2241	92.6837	92.6837	92.5837	92.8919	93.2241	93.4590	93.7045 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.6749	1.6725	1.6701	1.6591	1.6570	1.6474	1.6474	1.6456	1.6511	1.6570	1.6612	1.6556 (40)
HLP (average)												1.6591
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 content	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												0.6000 (49)	
Enter (49) or (54) in (55)												0.9660 (55)	
Total storage loss													
29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(56)	
If cylinder contains dedicated solar storage													
29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h													
196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(64)	
Electric shower(s)												Total per year (kWh/year) = Sum(64)m = 1957.2923 (64)	
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	19.6667	17.4678	14.2058	10.7547	8.0392	6.7871	7.3337	9.5326	12.7946	16.2457	18.9611	20.2133 (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	423.6855	422.0562	408.6749	383.4978	358.6408	336.0573	322.6564	324.9886	337.7491	360.5736	388.2429	412.4316 (73)

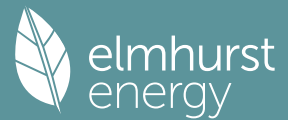
6. Solar gains

[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)	
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)	
Solar gains	106.9469	185.4230	262.3438	339.5388	393.5303	396.4989	379.8476	338.6786	288.9374	207.2615	128.6901	91.1410 (83)
Total gains	530.6324	607.4791	671.0187	723.0365	752.1711	732.5561	702.5040	663.6671	626.6865	567.8351	516.9330	503.5726 (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	18.2437	18.2698	18.2955	18.4171	18.4400	18.5475	18.5475	18.5676	18.5060	18.4400	18.3937	18.3455
alpha	2.2162	2.2180	2.2197	2.2278	2.2293	2.2365	2.2365	2.2378	2.2337	2.2293	2.2262	2.2230
util living area												
	0.9386	0.9167	0.8826	0.8254	0.7378	0.6156	0.4934	0.5299	0.6985	0.8471	0.9184	0.9446 (86)
MIT	17.8611	18.2022	18.7494	19.4387	20.0848	20.5817	20.8200	20.7817	20.4030	19.5672	18.5852	17.7857 (87)
Th 2	19.5589	19.5606	19.5623	19.5703	19.5718	19.5787	19.5787	19.5800	19.5761	19.5718	19.5688	19.5656 (88)
util rest of house												

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MIT 2	0.9278	0.9023	0.8615	0.7916	0.6818	0.5230	0.3619	0.4005	0.6162	0.8102	0.9018	0.9349 (89)
Living area fraction	16.0229	16.4493	17.1309	17.9787	18.7408	19.2836	19.4965	19.4720	19.1147	18.1571	16.9434	15.9316 (90)
MIT	16.8639	17.2513	17.8714	18.6467	19.3557	19.8775	20.1020	20.0712	fLA = Living area / (4) =			0.4575 (91)
Temperature adjustment									19.7041	18.8022	17.6946	16.7799 (92)
adjusted MIT	16.8639	17.2513	17.8714	18.6467	19.3557	19.8775	20.1020	20.0712	19.7041	18.8022	17.6946	16.7799 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8992	0.8708	0.8294	0.7650	0.6720	0.5445	0.4139	0.4490	0.6247	0.7853	0.8718	0.9076	(94)
Useful gains	477.1309	528.9718	556.5328	553.1445	505.4812	398.8442	290.7450	298.0024	391.4762	445.9172	450.6634	457.0258	(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	1183.8692	1162.1689	1068.4623	909.7598	713.6961	489.1382	324.5789	339.8969	520.5779	764.6469	990.1569	1178.7900	(97)
Space heating kWh	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926	(98a)
Space heating requirement - total per year (kWh/year)												2906.4351	
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	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2906.4351	
Space heating per m2											(98c) / (4) =	51.6608	(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	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926	(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)	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926	(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	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(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	17.2141	13.8098	12.4342	9.1098	7.0367	5.7490	6.4191	8.3438	10.8378	14.2198	16.0612	17.6926	(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												2906.4351	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1957.2923	(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)												138.9280	(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												5002.6553	(238)

10a. Fuel costs - using Table 12 prices

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	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2906.4351	16.4900	479.2711 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (243)
Water heating (other fuel)	1957.2923	16.4900	322.7575 (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	138.9280	16.4900	22.9092 (250)
Additional standing charges			0.0000 (251)
Total energy cost			824.9379 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.9328 (257)
SAP value		52.4589
SAP rating (Section 12)		52 (258)
SAP band		E

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2906.4351	0.1540	447.6622 (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)	1957.2923	0.1411	276.1305 (264)
Space and water heating			723.7927 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	138.9280	0.1443	20.0516 (268)
Total CO2, kg/year			743.8443 (272)
CO2 emissions per m2			13.2200 (273)
EI value			90.1565
EI rating			90 (274)
EI band			B

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	56.2600 (1b)	x 2.5000 (2b)	= 140.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	140.6500 (5)

2. Ventilation rate

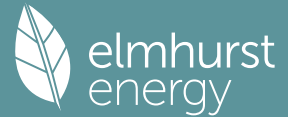
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.2133 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.4333 (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) = 0.3033 (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 infiltr rate	0.3716	0.3564	0.3564	0.3261	0.3261	0.2881	0.2957	0.2957	0.3033	0.3261	0.3185	0.3488 (22b)
Effective ac	0.5690	0.5635	0.5635	0.5532	0.5532	0.5415	0.5437	0.5437	0.5460	0.5532	0.5507	0.5608 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
DTC			1.8900	1.4000	2.6460			(26)
Opening Type 2 (Uw = 1.40)			11.4800	1.3258	15.2197			(27)
Heatloss Floor 1			56.2600	0.1400	7.8764	110.0000	6188.6000	(28a)
External Wall 1	64.3600	11.4800	52.8800	0.2600	13.7488	0.0000	0.0000	(29a)
External Wall 2	11.2500	1.8900	9.3600	0.1800	1.6848	0.0000	0.0000	(29a)
Total net area of external elements Aum(A, m2)			131.8700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		41.1757			(33)
Party Wall 1			1.8900	0.0000	0.0000	0.0000	0.0000	(32)
Party Ceiling 1			56.2600			0.0000	0.0000	(32b)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Default value 0.200 * total exposed area)
Point Thermal bridges
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) = 6188.6000 (34)
110.0000 (35)
26.3740 (36)
(36a) = 0.0000
(33) + (36) + (36a) = 67.5497 (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	26.4110	26.1548	26.1548	25.6745	25.6745	25.1340	25.2368	25.2368	25.3422	25.6745	25.5610	26.0307	(38)
Heat transfer coeff	93.9607	93.7045	93.7045	93.2241	93.2241	92.6837	92.7865	92.7865	92.8919	93.2241	93.1107	93.5804	(39)
Average = Sum(39)m / 12 =												93.2402	
HLP	1.6701	1.6656	1.6656	1.6570	1.6570	1.6474	1.6492	1.6492	1.6511	1.6570	1.6550	1.6634	(40)
HLP (average)												1.6573	
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	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												0.6000	(49)
Enter (49) or (54) in (55)												0.9660	(55)
Total storage loss	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(56)
If cylinder contains dedicated solar storage	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(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	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(64)
										Total per year (kWh/year) = Sum(64)m =		1957.2923	(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)

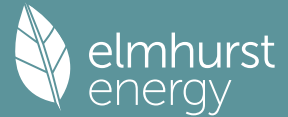
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(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	19.6667	17.4678	14.2058	10.7547	8.0392	6.7871	7.3337	9.5326	12.7946	16.2457	18.9611	20.2133	(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	423.6855	422.0562	408.6749	383.4978	358.6408	336.0573	322.6564	324.9886	337.7491	360.5736	388.2429	412.4316	(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)
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)

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Solar gains	114.1416	177.8144	253.2865	342.3831	385.3549	415.2339	398.4814	363.4735	306.8828	217.2648	141.8555	95.4921 (83)
Total gains	537.8271	599.8706	661.9614	725.8808	743.9958	751.2911	721.1378	688.4620	644.6318	577.8384	530.0984	507.9237 (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	18.2955	18.3455	18.3455	18.4400	18.4400	18.5475	18.5270	18.5270	18.5060	18.4400	18.4625	18.3698
alpha	2.2197	2.2230	2.2230	2.2293	2.2365	2.2351	2.2351	2.2337	2.2337	2.2293	2.2308	2.2247
util living area	0.9319	0.9137	0.8725	0.8014	0.6954	0.5154	0.3564	0.3810	0.6269	0.8151	0.9055	0.9385 (86)
MIT	18.0715	18.3266	18.9612	19.6711	20.3028	20.7758	20.9373	20.9256	20.6044	19.8387	18.8291	18.0119 (87)
Th 2	19.5623	19.5656	19.5656	19.5718	19.5718	19.5787	19.5774	19.5774	19.5761	19.5718	19.5732	19.5672 (88)
util rest of house	0.9196	0.8984	0.8485	0.7613	0.6266	0.3989	0.1984	0.2197	0.5233	0.7680	0.8855	0.9272 (89)
MIT 2	16.2904	16.6088	17.3969	18.2595	18.9862	19.4580	19.5649	19.5609	19.3155	18.4813	17.2503	16.2190 (90)
Living area fraction	17.1053	17.3947	18.1126	18.9053	19.5886	20.0609	20.1928	20.1853	19.9052	19.1023	17.9727	17.0393 (91)
MIT	17.1053	17.3947	18.1126	18.9053	19.5886	20.0609	20.1928	20.1853	19.9052	19.1023	17.9727	17.0393 (92)
Temperature adjustment												0.0000
adjusted MIT	17.1053	17.3947	18.1126	18.9053	19.5886	20.0609	20.1928	20.1853	19.9052	19.1023	17.9727	17.0393 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8902	0.8670	0.8173	0.7389	0.6275	0.4413	0.2700	0.2923	0.5499	0.7490	0.8553	0.8989 (94)
Useful gains	478.7571	520.0587	541.0120	536.3211	466.8834	331.5657	194.6804	201.2526	354.4906	432.8261	453.4160	456.5878 (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	1137.4179	1123.9582	1003.8157	839.5128	623.5349	376.3816	203.4613	212.0444	437.0752	690.0737	937.8722	1126.6398 (97)
Space heating kWh	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187 (98a)
Space heating requirement - total per year (kWh/year)												2613.7562
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	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2613.7562
Space heating per m2										(98c) / (4) =		46.4585 (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	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187 (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)	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187 (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	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (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	17.2141	13.8098	12.4342	9.1098	7.0367	5.7490	6.4191	8.3438	10.8378	14.2198	16.0612	17.6926 (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												2613.7562 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000

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Water heating fuel used	1957.2923 (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)	138.9280 (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	4709.9765 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2613.7562	26.0600	681.1449 (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)	1957.2923	26.0600	510.0704 (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	138.9280	26.0600	36.2046 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1227.4199 (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	2613.7562	0.1546	404.0493 (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)	1957.2923	0.1411	276.1305 (264)
Space and water heating			680.1797 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	138.9280	0.1443	20.0516 (268)
Total CO2, kg/year			700.2313 (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	2613.7562	1.5723	4109.6504 (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)	1957.2923	1.5217	2978.3398 (278)
Space and water heating			7087.9902 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	138.9280	1.5338	213.0924 (282)
Total Primary energy kWh/year			7301.0826 (286)

SAP 10 EPC IMPROVEMENTS

Lean

Current energy efficiency rating: E 52
Current environmental impact rating: B 90

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: E 52
Potential environmental impact rating: B 90

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 £1227	Potential £1227	Saving £0
Electricity			
Space heating	£681	£681	£0
Water heating	£510	£510	£0
Lighting	£36	£36	£0
Total cost of fuels	£1227	£1227	£0
Total cost of uses	£1227	£1227	£0
Delivered energy	84 kWh/m²	84 kWh/m²	0 kWh/m²

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Carbon dioxide emissions	0.7 tonnes	0.7 tonnes	0.0 tonnes
CO2 emissions per m ²	12 kg/m ²	12 kg/m ²	0 kg/m ²
Primary energy	130 kWh/m ²	130 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)	2.5000 (2b)	140.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	140.6500 (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) = 0.2133 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.4333 (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) = 0.3033 (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	0.3867	0.3791	0.3716	0.3336	0.3261	0.2881	0.2881	0.2806	0.3033	0.3261	0.3412	0.3564 (22b)
Effective ac	0.5748	0.5719	0.5690	0.5557	0.5532	0.5415	0.5415	0.5394	0.5460	0.5532	0.5582	0.5635 (25)

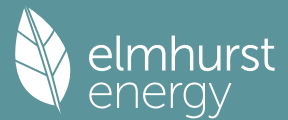
3. Heat losses and heat loss parameter

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)			11.4800	1.3258	15.2197		(27)					
Heatloss Floor 1			56.2600	0.1400	7.8764	110.0000	6188.6000 (28a)					
External Wall 1	64.3600	11.4800	52.8800	0.2600	13.7488	0.0000	0.0000 (29a)					
External Wall 2	11.2500	1.8900	9.3600	0.1800	1.6848	0.0000	0.0000 (29a)					
Total net area of external elements Aum(A, m2)			131.8700				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1757		(33)					
Party Wall 1			1.8900	0.0000	0.0000	0.0000	0.0000 (32)					
Party Ceiling 1			56.2600			0.0000	0.0000 (32b)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		6188.6000 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							110.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							26.3740 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss					(33) + (36) + (36a) =		67.5497 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 26.6779	Feb 26.5431	Mar 26.4110	Apr 25.7905	May 25.6745	Jun 25.1340	Jul 25.1340	Aug 25.0340	Sep 25.3422	Oct 25.6745	Nov 25.9093	Dec 26.1548 (38)
Heat transfer coeff	94.2276	94.0928	93.9607	93.3402	93.2241	92.6837	92.6837	92.5837	92.8919	93.2241	93.4590	93.7045 (39)
Average = Sum(39)m / 12 =												93.3397
HLP	Jan 1.6749	Feb 1.6725	Mar 1.6701	Apr 1.6591	May 1.6570	Jun 1.6474	Jul 1.6474	Aug 1.6456	Sep 1.6511	Oct 1.6570	Nov 1.6612	Dec 1.6656 (40)
HLP (average)												1.6591
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)

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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												0.6000 (49)
Enter (49) or (54) in (55)												0.9660 (55)
Total storage loss												
If cylinder contains dedicated solar storage	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460 (56)
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 (57)
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 (59)
Total heat required for water heating calculated for each month	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (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	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (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	19.6667	17.4678	14.2058	10.7547	8.0392	6.7871	7.3337	9.5326	12.7946	16.2457	18.9611	20.2133 (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	423.6855	422.0562	408.6749	383.4978	358.6408	336.0573	322.6564	324.9886	337.7491	360.5736	388.2429	412.4316 (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)			
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)			
Solar gains	106.9469	185.4230	262.3438	339.5388	393.5303	396.4989	379.8476	338.6786	288.9374	207.2615	128.6901	91.1410 (83)
Total gains	530.6324	607.4791	671.0187	723.0365	752.1711	732.5561	702.5040	663.6671	626.6865	567.8351	516.9330	503.5726 (84)

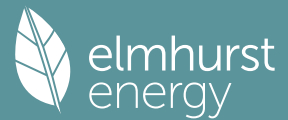
7. Mean internal temperature (heating season)

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	18.2437	18.2698	18.2955	18.4171	18.4400	18.5475	18.5475	18.5676	18.5060	18.4400	18.3937	18.3455
alpha	2.2162	2.2180	2.2197	2.2278	2.2293	2.2365	2.2365	2.2378	2.2337	2.2293	2.2262	2.2230
util living area	0.9386	0.9167	0.8826	0.8254	0.7378	0.6156	0.4934	0.5299	0.6985	0.8471	0.9184	0.9446 (86)
MIT	17.8611	18.2022	18.7494	19.4387	20.0848	20.5817	20.8200	20.7817	20.4030	19.5672	18.5852	17.7857 (87)
Th 2	19.5589	19.5606	19.5623	19.5703	19.5718	19.5787	19.5787	19.5800	19.5761	19.5718	19.5688	19.5656 (88)
util rest of house	0.9278	0.9023	0.8615	0.7916	0.6818	0.5230	0.3619	0.4005	0.6162	0.8102	0.9018	0.9349 (89)
MIT 2	16.0229	16.4493	17.1309	17.9787	18.7408	19.2836	19.4965	19.4720	19.1147	18.1571	16.9434	15.9316 (90)
Living area fraction	16.8639	17.2513	17.8714	18.6467	19.3557	19.8775	20.1020	20.0712	19.7041	18.8022	17.6946	16.7799 (92)
MIT	16.8639	17.2513	17.8714	18.6467	19.3557	19.8775	20.1020	20.0712	19.7041	18.8022	17.6946	16.7799 (93)
Temperature adjustment												0.0000
adjusted MIT	16.8639	17.2513	17.8714	18.6467	19.3557	19.8775	20.1020	20.0712	19.7041	18.8022	17.6946	16.7799 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8992	0.8708	0.8294	0.7650	0.6720	0.5445	0.4139	0.4490	0.6247	0.7853	0.8718	0.9076 (94)
Ext temp.	4.3000	528.9718	556.5328	553.1445	505.4812	398.8442	290.7450	298.0024	391.4762	445.9172	450.6634	457.0258 (95)
Heat loss rate W	1183.8692	1162.1689	1068.4623	909.7598	713.6961	489.1382	324.5789	339.8969	520.5779	764.6469	990.1569	1178.7900 (97)

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Space heating kWh	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926 (98a)
Space heating requirement - total per year (kWh/year)												2906.4351
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	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2906.4351
Space heating per m2										(98c) / (4) =		51.6608 (99)

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

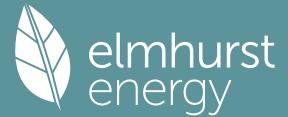
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction 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	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926 (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)	525.8133	425.5085	380.8755	256.7630	154.9119	0.0000	0.0000	0.0000	0.0000	237.1349	388.4353	536.9926 (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	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (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	17.2141	13.8098	12.4342	9.1098	7.0367	5.7490	6.4191	8.3438	10.8378	14.2198	16.0612	17.6926 (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												2906.4351 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1957.2923 (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)												138.9280 (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												5002.6553 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2906.4351	16.4900	479.2711 (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)	1957.2923	16.4900	322.7575 (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	138.9280	16.4900	22.9092 (250)
Additional standing charges			0.0000 (251)
Total energy cost			824.9379 (255)

11a. SAP rating - Individual heating systems

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Energy cost deflator (Table 12):
 Energy cost factor (ECF)
 SAP value
 SAP rating (Section 12)
 SAP band

$[(255) \times (256)] / [(4) + 45.0] =$
 0.3600 (256)
 2.9328 (257)
 52.4589
 52 (258)
 E

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2906.4351	0.1540	447.6622 (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)	1957.2923	0.1411	276.1305 (264)
Space and water heating			723.7927 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	138.9280	0.1443	20.0516 (268)
Total CO2, kg/year			743.8443 (272)
CO2 emissions per m2			13.2200 (273)
EI value			90.1565
EI rating			90 (274)
EI band			B

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	56.2600 (1b)	x 2.5000 (2b)	= 140.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.6500 (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) = 0.2133 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.4000 (17)
Infiltration rate	0.4333 (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) = 0.3033 (21)

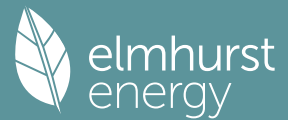
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.7000	4.7000	4.3000	4.3000	3.8000	3.9000	3.9000	4.0000	4.3000	4.2000	4.6000 (22)
Wind factor	1.2250	1.1750	1.1750	1.0750	1.0750	0.9500	0.9750	0.9750	1.0000	1.0750	1.0500	1.1500 (22a)
Adj infilt rate	0.3716	0.3564	0.3564	0.3261	0.3261	0.2881	0.2957	0.2957	0.3033	0.3261	0.3185	0.3488 (22b)
Effective ac	0.5690	0.5635	0.5635	0.5532	0.5532	0.5415	0.5437	0.5437	0.5460	0.5532	0.5507	0.5608 (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)			11.4800	1.3258	15.2197		(27)
Heatloss Floor 1			56.2600	0.1400	7.8764	110.0000	6188.6000 (28a)
External Wall 1	64.3600	11.4800	52.8800	0.2600	13.7488	0.0000	0.0000 (29a)
External Wall 2	11.2500	1.8900	9.3600	0.1800	1.6848	0.0000	0.0000 (29a)
Total net area of external elements Aum(A, m2)			131.8700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1757		(33)
Party Wall 1			1.8900	0.0000	0.0000	0.0000	0.0000 (32)
Party Ceiling 1			56.2600			0.0000	0.0000 (32b)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			6188.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							110.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							26.3740 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =			67.5497 (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
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(38)m	26.4110	26.1548	26.1548	25.6745	25.6745	25.1340	25.2368	25.2368	25.3422	25.6745	25.5610	26.0307 (38)
Heat transfer coeff	93.9607	93.7045	93.7045	93.2241	93.2241	92.6837	92.7865	92.7865	92.8919	93.2241	93.1107	93.5804 (39)
Average = Sum(39)m / 12 =												93.2402
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.6701	1.6656	1.6656	1.6570	1.6570	1.6474	1.6492	1.6492	1.6511	1.6570	1.6550	1.6634 (40)
HLP (average)												1.6573
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 content	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												0.6000 (49)
Enter (49) or (54) in (55)												0.9660 (55)
Total storage loss												
29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460 (56)	
If cylinder contains dedicated solar storage												
29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h												
196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159 (64)	
												Total per year (kWh/year) = Sum(64)m = 1957.2923 (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	19.6667	17.4678	14.2058	10.7547	8.0392	6.7871	7.3337	9.5326	12.7946	16.2457	18.9611	20.2133 (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	423.6855	422.0562	408.6749	383.4978	358.6408	336.0573	322.6564	324.9886	337.7491	360.5736	388.2429	412.4316 (73)

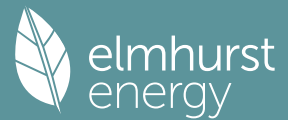
6. Solar gains

[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)			
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)			
Solar gains	114.1416	177.8144	253.2865	342.3831	385.3549	415.2339	398.4814	363.4735	306.8828	217.2648	141.8555	95.4921 (83)
Total gains	537.8271	599.8706	661.9614	725.8808	743.9958	751.2911	721.1378	688.4620	644.6318	577.8384	530.0984	507.9237 (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	18.2955	18.3455	18.3455	18.4400	18.4400	18.5475	18.5270	18.5270	18.5060	18.4400	18.4625	18.3698
alpha	2.2197	2.2230	2.2230	2.2293	2.2293	2.2365	2.2351	2.2351	2.2337	2.2293	2.2308	2.2247
util living area												
	0.9319	0.9137	0.8725	0.8014	0.6954	0.5154	0.3564	0.3810	0.6269	0.8151	0.9055	0.9385 (86)
MIT	18.0715	18.3266	18.9612	19.6711	20.3028	20.7758	20.9373	20.9256	20.6044	19.8387	18.8291	18.0119 (87)

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Th 2	19.5623	19.5656	19.5656	19.5718	19.5718	19.5787	19.5774	19.5774	19.5761	19.5718	19.5732	19.5672 (88)
util rest of house	0.9196	0.8984	0.8485	0.7613	0.6266	0.3989	0.1984	0.2197	0.5233	0.7680	0.8855	0.9272 (89)
MIT 2	16.2904	16.6088	17.3969	18.2595	18.9862	19.4580	19.5649	19.5609	19.3155	18.4813	17.2503	16.2190 (90)
Living area fraction									fLA = Living area / (4) =			0.4575 (91)
MIT	17.1053	17.3947	18.1126	18.9053	19.5886	20.0609	20.1928	20.1853	19.9052	19.1023	17.9727	17.0393 (92)
Temperature adjustment												0.0000
adjusted MIT	17.1053	17.3947	18.1126	18.9053	19.5886	20.0609	20.1928	20.1853	19.9052	19.1023	17.9727	17.0393 (93)

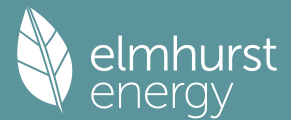
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8902	0.8670	0.8173	0.7389	0.6275	0.4413	0.2700	0.2923	0.5499	0.7490	0.8553	0.8989	(94)
Useful gains	478.7571	520.0587	541.0120	536.3211	466.8834	331.5657	194.6804	201.2526	354.4906	432.8261	453.4160	456.5878	(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	1137.4179	1123.9582	1003.8157	839.5128	623.5349	376.3816	203.4613	212.0444	437.0752	690.0737	937.8722	1126.6398	(97)
Space heating kWh	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187	(98a)
Space heating requirement - total per year (kWh/year)												2613.7562	
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	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2613.7562	
Space heating per m2										(98c) / (4) =		46.4585	(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	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187	(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)	490.0436	405.8205	344.3259	218.2980	116.5488	0.0000	0.0000	0.0000	0.0000	191.3922	348.8085	498.5187	(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	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	196.6387	173.6448	183.8790	160.3051	154.4590	138.1697	135.6484	141.6102	143.7985	161.5580	173.2651	194.3159	(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	17.2141	13.8098	12.4342	9.1098	7.0367	5.7490	6.4191	8.3438	10.8378	14.2198	16.0612	17.6926	(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												2613.7562	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1957.2923	(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)												138.9280	(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												4709.9765	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2613.7562	26.0600	681.1449 (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)	1957.2923	26.0600	510.0704 (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	138.9280	26.0600	36.2046 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1227.4199 (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	2613.7562	0.1546	404.0493 (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)	1957.2923	0.1411	276.1305 (264)
Space and water heating			680.1797 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	138.9280	0.1443	20.0516 (268)
Total CO2, kg/year			700.2313 (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	2613.7562	1.5723	4109.6504 (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)	1957.2923	1.5217	2978.3398 (278)
Space and water heating			7087.9902 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	138.9280	1.5338	213.0924 (282)
Total Primary energy kWh/year			7301.0826 (286)