

Full SAP Calculation Printout



Property Reference	8517-3			Issued on Date	11/12/2024
Assessment Reference	Lean	Prop Type Ref			
Property	Flat 3, 78, Great North Road, London, N2 0NL				
SAP Rating	52 E	DER	13.84	TER	13.83
Environmental	90 B	% DER < TER			-0.07
CO ₂ Emissions (t/year)	0.68	DFEE	62.85	TFEE	40.07
Compliance Check	See BREL	% DFEE < TFEE			-56.86
% DPER < TPER	-99.08	DPER	144.63	TPER	72.65
Assessor Details	Mr. Harry Davey			Assessor ID	R434-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	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)			15.5800	1.3258	20.6553		(27)
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000 (29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000 (29a)
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400 (30)
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) =	47.0795		(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000 (32)
Party Floor 1			51.7600			0.0000	0.0000 (32a)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		465.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							9.0000 (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) =		73.5315 (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 =	97.2685	97.1759	97.0851	96.6585	96.5787	96.2072	96.2072	96.1384	96.3503	96.5787	96.7401	96.9089 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.8792	1.8774	1.8757	1.8674	1.8659	1.8587	1.8587	1.8574	1.8615	1.8659	1.8690	1.8723 (40)
HLP (average)												1.8674
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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1540.5125
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												0.6000 (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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (64)
								Total per year (kWh/year) = Sum(64)m =				1893.1025 (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												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	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)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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)
Pumps, fans	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)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (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)
Total internal gains	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)
	398.2981	396.7340	384.2033	360.5794	337.3474	316.2134	303.6639	305.9028	317.8375	339.2030	365.1348	387.8098 (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				2.0300	11.2829	0.6300	0.7000	0.7700	6.9999 (75)			
Southeast				1.1500	36.7938	0.6300	0.7000	0.7700	12.9314 (77)			
Southwest				11.2500	36.7938	0.6300	0.7000	0.7700	126.5026 (79)			
Northwest				1.1500	11.2829	0.6300	0.7000	0.7700	3.9654 (81)			
Solar gains	150.3993	259.8278	365.1822	468.6943	539.7777	542.3848	520.2075	466.1807	400.8732	289.7736	180.8069	128.2812 (83)
Total gains	548.6974	656.5618	749.3855	829.2737	877.1251	858.5982	823.8714	772.0835	718.7108	628.9766	545.9418	516.0911 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	1.3303	1.3316	1.3329	1.3387	1.3398	1.3450	1.3450	1.3460	1.3430	1.3398	1.3376	1.3353
util living area	1.0887	1.0888	1.0889	1.0892	1.0893	1.0897	1.0897	1.0897	1.0895	1.0893	1.0892	1.0890
	0.7734	0.7306	0.6785	0.6096	0.5276	0.4352	0.3529	0.3790	0.5011	0.6402	0.7375	0.7850 (86)
MIT	15.5163	16.0381	16.8830	17.9470	18.9964	19.8820	20.3876	20.3084	19.5949	18.2312	16.6725	15.3917 (87)
Th 2	19.4151	19.4163	19.4175	19.4232	19.4242	19.4292	19.4292	19.4301	19.4273	19.4242	19.4221	19.4198 (88)

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util rest of house	0.7543	0.7085	0.6513	0.5742	0.4792	0.3652	0.2569	0.2839	0.4341	0.5996	0.7121	0.7668 (89)
MIT 2	13.6830	14.2813	15.2534	16.4697	17.6445	18.6008	19.0974	19.0343	18.3249	16.8281	15.0402	13.5427 (90)
Living area fraction									FLA = Living area / (4) =			0.4934 (91)
MIT	14.5876	15.1482	16.0575	17.1987	18.3116	19.2330	19.7340	19.6630	18.9516	17.5205	15.8457	14.4550 (92)
Temperature adjustment												0.0000
adjusted MIT	14.5876	15.1482	16.0575	17.1987	18.3116	19.2330	19.7340	19.6630	18.9516	17.5205	15.8457	14.4550 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6716	0.6275	0.5766	0.5127	0.4390	0.3553	0.2776	0.2997	0.4104	0.5372	0.6329	0.6842	(94)
Useful gains	368.4844	411.9892	432.0593	425.1542	385.0396	305.0679	228.6664	231.3672	294.9726	337.8814	345.5052	353.0939	(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	1000.6626	995.8744	927.8894	802.1370	638.5395	445.7281	301.5150	313.6994	467.4510	668.3692	846.0562	993.8056	(97)
Space heating kWh	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895	(98a)
Space heating requirement - total per year (kWh/year)												2774.6098	
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	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2774.6098	
Space heating per m2												53.6053	(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	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895	(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)	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895	(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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409	(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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	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	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513	(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												2774.6098	(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												1893.1025	(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)												128.3962	(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												4796.1086	(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	2774.6098	16.4900	457.5332 (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)	1893.1025	16.4900	312.1726 (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	128.3962	16.4900	21.1725 (250)
Additional standing charges			0.0000 (251)
Total energy cost			790.8783 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.9425 (257)
SAP value		52.3021
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	2774.6098	0.1532	425.1564 (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)	1893.1025	0.1411	267.0414 (264)
Space and water heating			692.1978 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	128.3962	0.1443	18.5315 (268)
Total CO2, kg/year			710.7293 (272)
CO2 emissions per m2			13.7300 (273)
EI value			90.1573
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	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)			15.5800	1.3258	20.6553			(27)
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000	(29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000	(29a)
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400	(30)
Total net area of external elements Aum(A, m2)			132.2600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.0795		0.0000	(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			51.7600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 465.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 9.0000 (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) = 73.5315 (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	97.0851	96.9089	96.9089	96.5787	96.5787	96.2072	96.2778	96.2778	96.3503	96.5787	96.5007	96.8236	(39)
Average = Sum(39)m / 12 =												96.5897	
HLP	Jan 1.8757	Feb 1.8723	Mar 1.8723	Apr 1.8659	May 1.8659	Jun 1.8587	Jul 1.8601	Aug 1.8601	Sep 1.8615	Oct 1.8659	Nov 1.8644	Dec 1.8706	(40)
HLP (average)												1.8661	
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	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													0.6000	(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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409	(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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409	(64)	
								Total per year (kWh/year) = Sum(64)m =				1893.1025	(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													
(66)m	Jan 104.5194	Feb 104.5194	Mar 104.5194	Apr 104.5194	May 104.5194	Jun 104.5194	Jul 104.5194	Aug 104.5194	Sep 104.5194	Oct 104.5194	Nov 104.5194	Dec 104.5194	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810	(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	398.2981	396.7340	384.2033	360.5794	337.3474	316.2134	303.6639	305.9028	317.8375	339.2030	365.1348	387.8098	(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	2.0300	12.4928	0.6300	0.7000	0.7700	7.7504 (75)
Southeast	1.1500	39.1209	0.6300	0.7000	0.7700	13.7492 (77)

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Southwest	11.2500	39.1209	0.6300	0.7000	0.7700	134.5034 (79)
Northwest	1.1500	12.4928	0.6300	0.7000	0.7700	4.3906 (81)

Solar gains	160.3938	248.9137	352.1123	471.9621	527.9156	567.3932	545.0967	499.6376	425.1820	303.4138	199.1369	134.3112 (83)
Total gains	558.6919	645.6477	736.3156	832.5415	865.2630	883.6066	848.7606	805.5404	743.0195	642.6168	564.2717	522.1210 (84)

7. Mean internal temperature (heating season)

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

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	1.3329	1.3353	1.3353	1.3398	1.3398	1.3450	1.3440	1.3440	1.3430	1.3398	1.3409	1.3365
alpha	1.0889	1.0890	1.0890	1.0893	1.0893	1.0897	1.0896	1.0896	1.0895	1.0893	1.0894	1.0891
util living area	0.7615	0.7270	0.6673	0.5867	0.4951	0.3667	0.2628	0.2801	0.4474	0.6074	0.7177	0.7739 (86)

MIT	15.8365	16.2196	17.2091	18.3147	19.3716	20.2747	20.6964	20.6639	19.9558	18.6631	17.0438	15.7440 (87)
Th 2	19.4175	19.4198	19.4198	19.4242	19.4242	19.4292	19.4282	19.4282	19.4273	19.4242	19.4253	19.4210 (88)
util rest of house	0.7409	0.7040	0.6378	0.5473	0.4391	0.2817	0.1429	0.1585	0.3683	0.5601	0.6896	0.7540 (89)
MIT 2	14.0585	14.4963	15.6339	16.8879	18.0571	18.9849	19.3393	19.3218	18.6953	17.3147	15.4711	13.9562 (90)
Living area fraction									fLA = Living area / (4) =			0.4934 (91)
MIT	14.9359	15.3466	16.4112	17.5920	18.7057	19.6213	20.0089	19.9840	19.3173	17.9801	16.2471	14.8384 (92)
Temperature adjustment												0.0000
adjusted MIT	14.9359	15.3466	16.4112	17.5920	18.7057	19.6213	20.0089	19.9840	19.3173	17.9801	16.2471	14.8384 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.6588	0.6237	0.5655	0.4917	0.4095	0.2932	0.1911	0.2056	0.3620	0.5063	0.6126	0.6718 (94)
Useful gains	368.0506	402.6635	416.4153	409.3233	354.2918	259.0789	162.1880	165.5912	268.9498	325.3554	345.6985	350.7454 (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	964.6237	963.9161	873.2644	742.8785	560.7091	348.3973	193.4167	200.6455	396.7027	606.5216	805.5029	952.5876 (97)
Space heating kWh	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706 (98a)
Space heating requirement - total per year (kWh/year)												2542.6595
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	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2542.6595
Space heating per m2										(98c) / (4) =		49.1240 (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	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706 (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)	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706 (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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513 (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	2542.6595 (211)
Space heating fuel - main system 2	0.0000 (213)

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Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	100.0000	
Water heating fuel used	1893.1025	(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)	128.3962	(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	4564.1583	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2542.6595	26.0600	662.6171	(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)	1893.1025	26.0600	493.3425	(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	128.3962	26.0600	33.4601	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1189.4196	(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	2542.6595	0.1537	390.7383	(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)	1893.1025	0.1411	267.0414	(264)
Space and water heating			657.7796	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	128.3962	0.1443	18.5315	(268)
Total CO2, kg/year			676.3112	(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	2542.6595	1.5689	3989.2656	(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)	1893.1025	1.5216	2880.5396	(278)
Space and water heating			6869.8052	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	128.3962	1.5338	196.9384	(282)
Total Primary energy kWh/year			7066.7436	(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 £1189	Potential £1189	Saving £0
Electricity			
Space heating	£663	£663	£0
Water heating	£493	£493	£0
Lighting	£33	£33	£0
Total cost of fuels	£1189	£1189	£0

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Total cost of uses	£1189	£1189	£0
Delivered energy	88 kWh/m ²	88 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.7 tonnes	0.7 tonnes	0.0 tonnes
CO2 emissions per m ²	13 kg/m ²	13 kg/m ²	0 kg/m ²
Primary energy	137 kWh/m ²	137 kWh/m ²	0 kWh/m ²

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

1. Overall dwelling characteristics

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

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) =	0.1546 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.4000 (17)
Infiltration rate		0.3746 (18)
Number of sides sheltered		4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2622 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3343	0.3277	0.3212	0.2884	0.2819	0.2491	0.2491	0.2425	0.2622	0.2819	0.2950	0.3081 (22b)
Effective ac	0.5559	0.5537	0.5516	0.5416	0.5397	0.5310	0.5310	0.5294	0.5344	0.5397	0.5435	0.5475 (25)

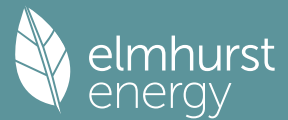
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
DTC			1.8900	1.4000	2.6460		(26)					
Opening Type 2 (Uw = 1.40)			15.5800	1.3258	20.6553		(27)					
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000 (29a)					
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000 (29a)					
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400 (30)					
Total net area of external elements Aum(A, m2)			132.2600				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.0795		(33)					
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000 (32)					
Party Floor 1			51.7600			0.0000	0.0000 (32d)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		465.8400 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							9.0000 (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) =		73.5315 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 23.7370	Feb 23.6444	Mar 23.5536	Apr 23.1270	May 23.0472	Jun 22.6757	Jul 22.6757	Aug 22.6069	Sep 22.8188	Oct 23.0472	Nov 23.2086	Dec 23.3774 (38)
Heat transfer coeff	97.2685	97.1759	97.0851	96.6585	96.5787	96.2072	96.2072	96.1384	96.3503	96.5787	96.7401	96.9089 (39)
Average = Sum(39)m / 12 =												96.6581
HLP	Jan 1.8792	Feb 1.8774	Mar 1.8757	Apr 1.8674	May 1.8659	Jun 1.8587	Jul 1.8587	Aug 1.8574	Sep 1.8615	Oct 1.8659	Nov 1.8690	Dec 1.8723 (40)
HLP (average)												1.8674
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 content (annual)	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)
Distribution loss (46)m = 0.15 x (45)m	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)
Water storage loss:	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)
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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810 (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	398.2981	396.7340	384.2033	360.5794	337.3474	316.2134	303.6639	305.9028	317.8375	339.2030	365.1348	387.8098 (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					2.0300	11.2829	0.6300	0.7000		0.7700		6.9999 (75)				
Southeast					1.1500	36.7938	0.6300	0.7000		0.7700		12.9314 (77)				
Southwest					11.2500	36.7938	0.6300	0.7000		0.7700		126.5026 (79)				
Northwest					1.1500	11.2829	0.6300	0.7000		0.7700		3.9654 (81)				

Solar gains					150.3993	259.8278	365.1822	468.6943	539.7777	542.3848	520.2075	466.1807	400.8732	289.7736	180.8069	128.2812 (83)
Total gains					548.6974	656.5618	749.3855	829.2737	877.1251	858.5982	823.8714	772.0835	718.7108	628.9766	545.9418	516.0911 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	1.3303	1.3316	1.3329	1.3387	1.3398	1.3450	1.3450	1.3460	1.3430	1.3398	1.3376	1.3353
alpha	1.0887	1.0888	1.0889	1.0892	1.0893	1.0897	1.0897	1.0897	1.0895	1.0893	1.0892	1.0890
util living area	0.7734	0.7306	0.6785	0.6096	0.5276	0.4352	0.3529	0.3790	0.5011	0.6402	0.7375	0.7850 (86)
MIT	15.5163	16.0381	16.8830	17.9470	18.9964	19.8820	20.3876	20.3084	19.5949	18.2312	16.6725	15.3917 (87)
Th 2	19.4151	19.4163	19.4175	19.4232	19.4242	19.4292	19.4292	19.4301	19.4273	19.4242	19.4221	19.4198 (88)
util rest of house	0.7543	0.7085	0.6513	0.5742	0.4792	0.3652	0.2569	0.2839	0.4341	0.5996	0.7121	0.7668 (89)
MIT 2	13.6830	14.2813	15.2534	16.4697	17.6445	18.6008	19.0974	19.0343	18.3249	16.8281	15.0402	13.5427 (90)
Living area fraction	14.5876	15.1482	16.0575	17.1987	18.3116	19.2330	19.7340	19.6630	18.9516	17.5205	15.8457	14.4550 (92)
Temperature adjustment												0.0000
adjusted MIT	14.5876	15.1482	16.0575	17.1987	18.3116	19.2330	19.7340	19.6630	18.9516	17.5205	15.8457	14.4550 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.6716	0.6275	0.5766	0.5127	0.4390	0.3553	0.2776	0.2997	0.4104	0.5372	0.6329	0.6842 (94)
	368.4844	411.9892	432.0593	425.1542	385.0396	305.0679	228.6664	231.3672	294.9726	337.8814	345.5052	353.0939 (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	1000.6626	995.8744	927.8894	802.1370	638.5395	445.7281	301.5150	313.6994	467.4510	668.3692	846.0562	993.8056 (97)
Space heating kWh	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895 (98a)
Space heating requirement - total per year (kWh/year)												2774.6098
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	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2774.6098
Space heating per m2										(98c) / (4) =		53.6053 (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	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895 (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)	470.3406	392.3708	368.8976	271.4276	188.6039	0.0000	0.0000	0.0000	0.0000	245.8830	360.3968	476.6895 (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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513 (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												2774.6098 (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												1893.1025 (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)												128.3962 (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												4796.1086 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2774.6098	16.4900	457.5332 (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)	1893.1025	16.4900	312.1726 (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	128.3962	16.4900	21.1725 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			790.8783 (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

$$\begin{aligned} & [(255) \times (256)] / [(4) + 45.0] = 0.3600 \quad (256) \\ & 2.9425 \quad (257) \\ & 52.3021 \\ & 52 \quad (258) \\ & E \end{aligned}$$

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	2774.6098	0.1532	425.1564 (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)	1893.1025	0.1411	267.0414 (264)
Space and water heating			692.1978 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	128.3962	0.1443	18.5315 (268)
Total CO ₂ , kg/year			710.7293 (272)
CO ₂ emissions per m ²			13.7300 (273)
EI value			90.1573
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 (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 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)			15.5800	1.3258	20.6553		(27)
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000 (29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000 (29a)
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400 (30)
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) =	47.0795		(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000 (32)
Party Floor 1			51.7600			0.0000	0.0000 (32d)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			465.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							9.0000 (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) =			73.5315 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.5536	23.3774	23.3774	23.0472	23.0472	22.6757	22.7463	22.7463	22.8188	23.0472	22.9692	23.2921	(38)
Heat transfer coeff	97.0851	96.9089	96.9089	96.5787	96.5787	96.2072	96.2778	96.2778	96.3503	96.5787	96.5007	96.8236	(39)
Average = Sum(39)m / 12 =												96.5897	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8757	1.8723	1.8723	1.8659	1.8659	1.8587	1.8601	1.8601	1.8615	1.8659	1.8644	1.8706	(40)
HLP (average)												1.8661	
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)												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												0.6000 (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												
189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (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												
189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409 (64)	
Total per year (kWh/year) = Sum(64)m =												1893.1025 (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												
	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810 (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												
	398.2981	396.7340	384.2033	360.5794	337.3474	316.2134	303.6639	305.9028	317.8375	339.2030	365.1348	387.8098 (73)

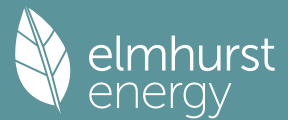
6. Solar gains

[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				2.0300	12.4928		0.6300		0.7000		0.7700		7.7504 (75)
Southeast				1.1500	39.1209		0.6300		0.7000		0.7700		13.7492 (77)
Southwest				11.2500	39.1209		0.6300		0.7000		0.7700		134.5034 (79)
Northwest				1.1500	12.4928		0.6300		0.7000		0.7700		4.3906 (81)
Solar gains	160.3938	248.9137	352.1123	471.9621	527.9156	567.3932	545.0967	499.6376	425.1820	303.4138	199.1369	134.3112	(83)
Total gains	558.6919	645.6477	736.3156	832.5415	865.2630	883.6066	848.7606	805.5404	743.0195	642.6168	564.2717	522.1210	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	1.3329	1.3353	1.3353	1.3398	1.3398	1.3450	1.3440	1.3440	1.3430	1.3398	1.3409	1.3365	
alpha	1.0889	1.0890	1.0890	1.0893	1.0893	1.0897	1.0896	1.0896	1.0895	1.0893	1.0894	1.0891	

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util living area	0.7615	0.7270	0.6673	0.5867	0.4951	0.3667	0.2628	0.2801	0.4474	0.6074	0.7177	0.7739 (86)
MIT	15.8365	16.2196	17.2091	18.3147	19.3716	20.2747	20.6964	20.6639	19.9558	18.6631	17.0438	15.7440 (87)
Th 2	19.4175	19.4198	19.4198	19.4242	19.4242	19.4292	19.4282	19.4282	19.4273	19.4242	19.4253	19.4210 (88)
util rest of house												
MIT 2	0.7409	0.7040	0.6378	0.5473	0.4391	0.2817	0.1429	0.1585	0.3683	0.5601	0.6896	0.7540 (89)
Living area fraction	14.0585	14.4963	15.6339	16.8879	18.0571	18.9849	19.3393	19.3218	18.6953	17.3147	15.4711	13.9562 (90)
MIT	14.9359	15.3466	16.4112	17.5920	18.7057	19.6213	20.0089	19.9840	19.3173	17.9801	16.2471	14.8384 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	14.9359	15.3466	16.4112	17.5920	18.7057	19.6213	20.0089	19.9840	19.3173	17.9801	16.2471	14.8384 (93)

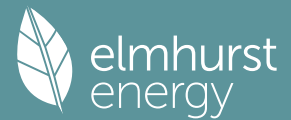
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6588	0.6237	0.5655	0.4917	0.4095	0.2932	0.1911	0.2056	0.3620	0.5063	0.6126	0.6718	(94)
Useful gains	368.0506	402.6635	416.4153	409.3233	354.2918	259.0789	162.1880	165.5912	268.9498	325.3554	345.6985	350.7454	(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	964.6237	963.9161	873.2644	742.8785	560.7091	348.3973	193.4167	200.6455	396.7027	606.5216	805.5029	952.5876	(97)
Space heating kWh	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706	(98a)
Space heating requirement - total per year (kWh/year)												2542.6595	
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	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2542.6595	
Space heating per m2										(98c) / (4) =		49.1240	(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	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706	(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)	443.8504	377.1618	339.8957	240.1598	153.5744	0.0000	0.0000	0.0000	0.0000	209.1877	331.0592	447.7706	(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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409	(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	189.9708	167.7808	177.7215	155.0520	149.4783	133.8020	131.4202	137.1435	139.2056	156.2934	167.4935	187.7409	(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	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513	(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												2542.6595	(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												1893.1025	(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)												128.3962	(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

4564.1583 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2542.6595	26.0600	662.6171 (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)	1893.1025	26.0600	493.3425 (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	128.3962	26.0600	33.4601 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1189.4196 (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	2542.6595	0.1537	390.7383 (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)	1893.1025	0.1411	267.0414 (264)
Space and water heating			657.7796 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	128.3962	0.1443	18.5315 (268)
Total CO2, kg/year			676.3112 (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	2542.6595	1.5689	3989.2656 (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)	1893.1025	1.5216	2880.5396 (278)
Space and water heating			6869.8052 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	128.3962	1.5338	196.9384 (282)
Total Primary energy kWh/year			7066.7436 (286)