

Full SAP Calculation Printout



Property Reference	The Hermitage 01			Issued on Date	17/01/2025
Assessment Reference	00001	Prop Type Ref			
Property	The Hermitage, Parthings Lane, Tower Hill, RH13 0JS				
SAP Rating	95 A	DER	1.23	TER	7.77
Environmental	99 A	% DER < TER			84.17
CO ₂ Emissions (t/year)	0.21	DFEE	41.15	TFEE	42.76
Compliance Check	See BREL	% DFEE < TFEE			3.76
% DPER < TPER	72.29	DPER	11.52	TPER	41.58
Assessor Details	Mr. Ian Bacon			Assessor ID	T238-0001
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	148.0900 (1b)	x 2.6100 (2b)	= 386.5149 (1b) - (3b)
First floor	107.7100 (1c)	x 2.6500 (2c)	= 285.4315 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	255.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 671.9464 (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	5 * 10 = 50.0000 (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) =	50.0000 / (5) = 0.0744 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2744 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2744 (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	0.3499	0.3430	0.3362	0.3019	0.2950	0.2607	0.2607	0.2538	0.2744	0.2950	0.3087	0.3224 (22b)
Effective ac	0.5612	0.5588	0.5565	0.5456	0.5435	0.5340	0.5340	0.5322	0.5377	0.5435	0.5477	0.5520 (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
Windows and gl doors (Uw = 1.40)			47.2000	1.3258	62.5758		(27)
PGD			3.7800	1.4000	5.2920		(26a)
Opening			2.5700	1.2357	3.1759		(27a)
Heatloss Floor 1			148.0900	0.1100	16.2899	75.0000	11106.7500 (28a)
External Wall 1	216.9100	46.3000	170.6100	0.1900	32.4159	110.0000	18767.1000 (29a)
External Wall dormer	14.4000	4.6800	9.7200	0.1900	1.8468	9.0000	87.4800 (29a)
External Wall sheltered	28.8000		28.8000	0.1100	3.1680	9.0000	259.2000 (29a)
External Roof loft	93.3200		93.3200	0.1100	10.2652	9.0000	839.8800 (30)
External Roof pitched	57.8700	2.5700	55.3000	0.1500	8.2950	9.0000	497.7000 (30)
External Roof sheltered	38.0300		38.0300	0.1100	4.1833	9.0000	342.2700 (30)
Total net area of external elements Aum(A, m ²)			597.4200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	147.5077		(33)
Internal Wall 1			97.3700			9.0000	876.3300 (32c)
Internal Wall 2			37.5000			75.0000	2812.5000 (32c)
Internal Floor 1			107.7100			18.0000	1938.7800 (32d)
Internal Ceiling 1			107.7100			9.0000	969.3900 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	38497.3800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							150.4980 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	35.9000	0.0190	0.6821
E3 Sill	34.1000	0.0220	0.7502
E4 Jamb	67.6000	0.0170	1.1492
E5 Ground floor (normal)	62.7000	0.0670	4.2009
E6 Intermediate floor within a dwelling	62.6000	0.0010	0.0626
E16 Corner (normal)	47.2000	0.0420	1.9824
R1 Head of roof window	2.2500	0.2400	0.5400
R2 Sill of roof window	2.2500	0.2400	0.5400
R3 Jamb of roof window	6.8400	0.2400	1.6416
E17 Corner (inverted - internal area greater than external area)	32.0000	-0.0850	-2.7200
E10 Eaves (insulation at ceiling level)	13.6000	0.0570	0.7752
E11 Eaves (insulation at rafter level)	35.6000	0.0180	0.6408
E12 Gable (insulation at ceiling level)	8.7000	0.0430	0.3741
E13 Gable (insulation at rafter level)	31.6000	0.0430	1.3588
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.9779 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	159.4856 (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	124.4431	123.9161	123.3995	120.9731	120.5192	118.4059	118.4059	118.0145	119.2199	120.5192	121.4375	122.3976	(38)
Heat transfer coeff	283.9287	283.4017	282.8851	280.4587	280.0048	277.8915	277.8915	277.5002	278.7055	280.0048	280.9231	281.8832	(39)
Average = Sum(39)m / 12 =												280.4566	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1100	1.1079	1.1059	1.0964	1.0946	1.0864	1.0864	1.0848	1.0895	1.0946	1.0982	1.1020	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													3.0745 (42)
Hot water usage for mixer showers	75.7686	74.6300	72.9707	69.7961	67.4533	64.8406	63.3555	65.0022	66.8073	69.6125	72.8554	75.4783	(42a)
Hot water usage for baths	32.7062	32.2205	31.5365	30.2753	29.3309	28.2837	27.7181	28.3973	29.1369	30.2574	31.5446	32.5956	(42b)
Hot water usage for other uses	46.1156	44.4387	42.7618	41.0848	39.4079	37.7310	37.7310	39.4079	41.0848	42.7618	44.4387	46.1156	(42c)
Average daily hot water use (litres/day)												142.1033	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	154.5905	151.2892	147.2690	141.1562	136.1921	130.8553	128.8046	132.8075	137.0290	142.6317	148.8386	154.1896	(44)
Energy content (annual)	244.8336	215.4338	226.3469	193.2358	183.3407	160.9018	155.7780	164.4434	168.9705	193.5498	212.0479	241.4237	(45)
Distribution loss (46)m = 0.15 x (45)m												2360.3059	
Water storage loss:	36.7250	32.3151	33.9520	28.9854	27.5011	24.1353	23.3667	24.6665	25.3456	29.0325	31.8072	36.2136	(46)
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5300	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8262	(55)
Total storage loss	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122	(56)
If cylinder contains dedicated solar storage	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(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	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983	(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	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983	(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	120.5068	106.9476	114.3600	102.0893	100.0605	91.3383	90.8959	93.7771	94.0211	103.4550	108.3443	119.3731	(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	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	52.0849	46.2614	37.6223	28.4825	21.2910	17.9748	19.4224	25.2459	33.8850	43.0248	50.2163	53.5325	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	628.9554	635.4820	619.0352	584.0220	539.8240	498.2841	470.5329	464.0064	480.4531	515.4664	559.6644	601.2043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	(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)	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	(71)
Water heating gains (Table 5)	161.9716	159.1482	153.7097	141.7907	134.4899	126.8587	122.1719	126.0445	130.5848	139.0524	150.4782	160.4477	(72)
Total internal gains	961.0226	958.9023	928.3779	872.3058	813.6155	761.1283	730.1378	733.3074	762.9337	815.5543	878.3696	933.1952	(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
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North			13.4500		10.6334		0.6300		0.7000		0.7700		43.7085 (74)
East			3.8900		19.6403		0.6300		0.7000		0.7700		23.3490 (76)
South			24.2700		46.7521		0.6300		0.7000		0.7700		346.7707 (78)
West			5.5900		19.6403		0.6300		0.7000		0.7700		33.5530 (80)
North			2.5700		15.2954		0.6300		0.7000		1.0000		15.6018 (82)

Solar gains	462.9830	791.8118	1099.9270	1403.7905	1619.2819	1630.7640	1562.3909	1396.3899	1203.4452	878.7979	554.9301	396.0752 (83)
Total gains	1424.0057	1750.7141	2028.3049	2276.0963	2432.8974	2391.8922	2292.5287	2129.6974	1966.3789	1694.3523	1433.2997	1329.2703 (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	37.6634	37.7334	37.8023	38.1294	38.1912	38.4816	38.4816	38.5359	38.3692	38.1912	38.0663	37.9367
alpha	3.5109	3.5156	3.5202	3.5420	3.5461	3.5654	3.5654	3.5691	3.5579	3.5461	3.5378	3.5291
util living area	0.9897	0.9785	0.9558	0.9044	0.8057	0.6541	0.5053	0.5566	0.7718	0.9330	0.9815	0.9919 (86)
Living	19.3677	19.5907	19.9087	20.2919	20.6135	20.8138	20.8836	20.8712	20.7245	20.2935	19.7514	19.3253
Non living	18.0664	18.3510	18.7534	19.2332	19.6122	19.8285	19.8865	19.8801	19.7446	19.2455	18.5634	18.0171
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1650	19.5907	19.9087	20.2919	20.6135	20.8138	20.8836	20.8712	20.7245	20.2935	19.7514	19.5596 (87)
Th 2	19.9927	19.9944	19.9960	20.0038	20.0052	20.0120	20.0120	20.0132	20.0094	20.0052	20.0023	19.9992 (88)
util rest of house	0.9875	0.9740	0.9463	0.8832	0.7621	0.5780	0.4030	0.4533	0.7069	0.9137	0.9770	0.9901 (89)
MIT 2	19.2248	18.3510	18.7534	19.2332	19.6122	19.8285	19.8865	19.8801	19.7446	19.2455	18.5634	18.3743 (90)
Living area fraction									fLA = Living area / (4) =			0.1444 (91)
MIT	19.3605	18.5300	18.9202	19.3861	19.7568	19.9708	20.0305	20.0233	19.8861	19.3969	18.7349	18.5455 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3605	18.5300	18.9202	19.3861	19.7568	19.9708	20.0305	20.0233	19.8861	19.3969	18.7349	18.5455 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9652	0.9333	0.8674	0.7497	0.5746	0.4050	0.4544	0.6977	0.8987	0.9689	0.9867 (94)
Useful gains	1403.8637	1689.7403	1893.0689	1974.2437	1823.9100	1374.3425	928.4799	967.7959	1371.8770	1522.6995	1388.6789	1311.5620 (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	4276.1164	3862.7624	3513.4956	2940.9195	2255.9402	1492.4861	953.3132	1005.4540	1612.6198	2463.1665	3268.5255	4043.7452 (97)
Space heating kWh	2136.9560	1460.2708	1205.5975	696.0065	321.4305	0.0000	0.0000	0.0000	0.0000	699.7074	1353.4896	2032.7443 (98a)
Space heating requirement - total per year (kWh/year)												9906.2026
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	2136.9560	1460.2708	1205.5975	696.0065	321.4305	0.0000	0.0000	0.0000	0.0000	699.7074	1353.4896	2032.7443 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9906.2026
Space heating per m2										(98c) / (4) =		38.7264 (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)
Efficiency of main space heating system 1 (in %)												319.3392 (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	2136.9560	1460.2708	1205.5975	696.0065	321.4305	0.0000	0.0000	0.0000	0.0000	699.7074	1353.4896	2032.7443 (98)
Space heating efficiency (main heating system 1)	319.3392	319.3392	319.3392	319.3392	319.3392	0.0000	0.0000	0.0000	0.0000	319.3392	319.3392	319.3392 (210)
Space heating fuel (main heating system)	669.1805	457.2789	377.5288	217.9521	100.6549	0.0000	0.0000	0.0000	0.0000	219.1110	423.8407	636.5470 (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)
Water heating												
Water heating requirement	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (64)
Efficiency of water heater (217)m	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555 (216)
Fuel for water heating, kWh/month	164.7680	145.6216	154.3972	134.9376	130.2710	116.7985	114.8085	119.6698	121.3250	135.9983	145.4911	162.8551 (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	45.5896	36.5737	32.9306	24.1263	18.6359	15.2257	17.0003	22.0976	28.7026	37.6594	42.5362	46.8567 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-81.3856	-146.6272	-274.5028	-394.2696	-496.9674	-482.2502	-472.4709	-406.5171	-304.1957	-193.8204	-98.7016	-66.5368 (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	-0.0994	-0.6252	-3.2504	-12.2016	-31.3073	-46.9431	-45.6466	-29.4361	-13.0907	-2.0416	-0.2474	-0.0636 (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)												

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(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												3102.0938	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												178.2555	
Water heating fuel used												1646.9417	(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)												367.9345	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3603.1984	(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												1513.7716	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3102.0938	16.4900	511.5353 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1646.9417	16.4900	271.5807 (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	367.9345	16.4900	60.6724 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3418.2453	16.4900	-563.6687
PV Unit electricity exported	-184.9531	5.5900	-10.3389
Total			-574.0075 (252)
Total energy cost			269.7808 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		0.3229 (257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	94.7662
SAP rating (Section 12)		95 (258)
SAP band		A

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	3102.0938	0.1554	482.0127 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1646.9417	0.1410	232.2458 (264)
Space and water heating			714.2585 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	367.9345	0.1443	53.1043 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3418.2453	0.1304	-445.7705
PV Unit electricity exported	-184.9531	0.1098	-20.3017
Total			-466.0721 (269)
Total CO2, kg/year			301.2907 (272)
CO2 emissions per m2			1.1800 (273)
EI value			98.6578
EI rating			99 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	148.0900 (1b)	x 2.6100 (2b)	= 386.5149 (1b) - (3b)
First floor	107.7100 (1c)	x 2.6500 (2c)	= 285.4315 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	255.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	671.9464 (5)

2. Ventilation rate

m3 per hour

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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	5 * 10 =	50.0000 (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) =	50.0000 / (5) =	0.0744 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.2744	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2744	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.2000	3.9000	3.9000	3.7000	3.7000	3.3000	3.4000	3.1000	3.2000	3.5000	3.4000	3.8000	(22)
Adj infilt rate	1.0500	0.9750	0.9750	0.9250	0.9250	0.8250	0.8500	0.7750	0.8000	0.8750	0.8500	0.9500	(22a)
Effective ac	0.2881	0.2676	0.2676	0.2538	0.2538	0.2264	0.2332	0.2127	0.2195	0.2401	0.2332	0.2607	(22b)
	0.5415	0.5358	0.5358	0.5322	0.5322	0.5256	0.5272	0.5226	0.5241	0.5288	0.5272	0.5340	(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
Windows and gl doors (Uw = 1.40)			47.2000	1.3258	62.5758		(27)
PGD			3.7800	1.4000	5.2920		(26a)
Opening			2.5700	1.2357	3.1759		(27a)
Heatloss Floor 1			148.0900	0.1100	16.2899	75.0000	11106.7500 (28a)
External Wall 1	216.9100	46.3000	170.6100	0.1900	32.4159	110.0000	18767.1000 (29a)
External Wall dormer	14.4000	4.6800	9.7200	0.1900	1.8468	9.0000	87.4800 (29a)
External Wall sheltered	28.8000		28.8000	0.1100	3.1680	9.0000	259.2000 (29a)
External Roof loft	93.3200		93.3200	0.1100	10.2652	9.0000	839.8800 (30)
External Roof pitched	57.8700	2.5700	55.3000	0.1500	8.2950	9.0000	497.7000 (30)
External Roof sheltered	38.0300		38.0300	0.1100	4.1833	9.0000	342.2700 (30)
Total net area of external elements Aum(A, m2)			597.4200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	147.5077		(33)
Internal Wall 1			97.3700			9.0000	876.3300 (32c)
Internal Wall 2			37.5000			75.0000	2812.5000 (32c)
Internal Floor 1			107.7100			18.0000	1938.7800 (32d)
Internal Ceiling 1			107.7100			9.0000	969.3900 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	38497.3800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		150.4980 (35)

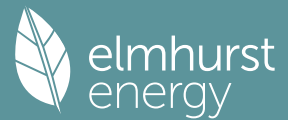
List of Thermal Bridges	Length	Psi-value	Total
K1 Element	35.9000	0.0190	0.6821
E2 Other lintels (including other steel lintels)	34.1000	0.0220	0.7502
E3 Sill	67.6000	0.0170	1.1492
E4 Jamb	62.7000	0.0670	4.2009
E5 Ground floor (normal)	62.6000	0.0010	0.0626
E6 Intermediate floor within a dwelling	47.2000	0.0420	1.9824
E16 Corner (normal)	2.2500	0.2400	0.5400
R1 Head of roof window	2.2500	0.2400	0.5400
R2 Sill of roof window	6.8400	0.2400	1.6416
R3 Jamb of roof window	32.0000	-0.0850	-2.7200
E17 Corner (inverted - internal area greater than external area)	13.6000	0.0570	0.7752
E10 Eaves (insulation at ceiling level)	35.6000	0.0180	0.6408
E11 Eaves (insulation at rafter level)	8.7000	0.0430	0.3741
E12 Gable (insulation at ceiling level)	31.6000	0.0430	1.3588
E13 Gable (insulation at rafter level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.9779 (36)
Point Thermal bridges			0.0000 (36a)
Total fabric heat loss	(33) + (36) + (36a) =		159.4856 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	120.0756	118.8077	118.8077	118.0145	118.0145	116.5535	116.9031	115.8856	116.2143	117.2632	116.9031	118.4059	(38)
Average = Sum(39)m / 12 =	279.5612	278.2933	278.2933	277.5002	277.5002	276.0391	276.3887	275.3712	275.7000	276.7488	276.3887	277.8915	(39)
												277.1397	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0929	1.0879	1.0879	1.0848	1.0848	1.0791	1.0805	1.0765	1.0778	1.0819	1.0805	1.0864	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													3.0745 (42)
Hot water usage for mixer showers													
Hot water usage for baths	75.7686	74.6300	72.9707	69.7961	67.4533	64.8406	63.3555	65.0022	66.8073	69.6125	72.8554	75.4783	(42a)
Hot water usage for other uses	32.7062	32.2205	31.5365	30.2753	29.3309	28.2837	27.7181	28.3973	29.1369	30.2574	31.5446	32.5956	(42b)
Average daily hot water use (litres/day)	46.1156	44.4387	42.7618	41.0848	39.4079	37.7310	37.7310	39.4079	41.0848	42.7618	44.4387	46.1156	(42c)
												142.1033	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	154.5905	151.2892	147.2690	141.1562	136.1921	130.8553	128.8046	132.8075	137.0290	142.6317	148.8386	154.1896	(44)
Energy content (annual)	244.8336	215.4338	226.3469	193.2358	183.3407	160.9018	155.7780	164.4434	168.9705	193.5498	212.0479	241.4237	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	36.7250	32.3151	33.9520	28.9854	27.5011	24.1353	23.3667	24.6665	25.3456	29.0325	31.8072	36.2136	(46)
Store volume												210.0000	(47)

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a) If manufacturer declared loss factor is known (kWh/day):												1.5300 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8262 (55)
Total storage loss												
	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122 (56)
If cylinder contains dedicated solar storage												
	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (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												
	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (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												
	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (64)
												Total per year (kWh/year) = Sum(64)m = 2935.7649 (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												
	120.5068	106.9476	114.3600	102.0893	100.0605	91.3383	90.8959	93.7771	94.0211	103.4550	108.3443	119.3731 (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	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	52.0849	46.2614	37.6223	28.4825	21.2910	17.9748	19.4224	25.2459	33.8850	43.0248	50.2163	53.5325 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	628.9554	635.4820	619.0352	584.0220	539.8240	498.2841	470.5329	464.0064	480.4531	515.4664	559.6644	601.2043 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213 (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)												
	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788 (71)
Water heating gains (Table 5)												
	161.9716	159.1482	153.7097	141.7907	134.4899	126.8587	122.1719	126.0445	130.5848	139.0524	150.4782	160.4477 (72)
Total internal gains												
	961.0226	958.9023	928.3779	872.3058	813.6155	761.1283	730.1378	733.3074	762.9337	815.5543	878.3696	933.1952 (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
North					13.4500	12.6907		0.6300	0.7000	0.7700		52.1652 (74)
East					3.8900	23.7106		0.6300	0.7000	0.7700		28.1880 (76)
South					24.2700	53.4173		0.6300	0.7000	0.7700		396.2081 (78)
West					5.5900	23.7106		0.6300	0.7000	0.7700		40.5067 (80)
North					2.5700	18.0222		0.6300	0.7000	1.0000		18.3832 (82)
Solar gains	535.4512	801.4883	1112.1645	1474.9574	1668.5743	1830.5860	1713.6379	1539.5821	1302.4056	943.8181	632.3893	442.9595 (83)
Total gains	1496.4738	1760.3906	2040.5425	2347.2632	2482.1898	2591.7143	2443.7757	2272.8895	2065.3393	1759.3724	1510.7590	1376.1547 (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	38.2518	38.4261	38.4261	38.5359	38.5359	38.7399	38.6909	38.8338	38.7875	38.6405	38.6909	38.4816
alpha	3.5501	3.5617	3.5617	3.5691	3.5691	3.5827	3.5794	3.5889	3.5858	3.5760	3.5794	3.5654
util living area	0.9868	0.9766	0.9508	0.8874	0.7702	0.5782	0.4375	0.4550	0.7234	0.9133	0.9752	0.9898 (86)
Living	19.4919	19.6649	19.9884	20.3705	20.6791	20.8532	20.8969	20.8956	20.7748	20.3976	19.8847	19.4490
Non living	18.2349	18.4571	18.8645	19.3350	19.6910	19.8672	19.8993	19.9023	19.8021	19.3796	18.7430	18.1842
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.2285	19.6649	19.9884	20.3705	20.6791	20.8532	20.8969	20.8956	20.7748	20.3976	19.8847	19.6659 (87)
Th 2	20.0066	20.0107	20.0107	20.0132	20.0132	20.0179	20.0168	20.0201	20.0190	20.0156	20.0168	20.0120 (88)
util rest of house												
	0.9839	0.9717	0.9402	0.8629	0.7200	0.4979	0.3364	0.3482	0.6507	0.8884	0.9689	0.9876 (89)
MIT 2	19.3003	18.4571	18.8645	19.3350	19.6910	19.8672	19.8993	19.9023	19.8021	19.3796	18.7430	18.5136 (90)
Living area fraction												
	19.4344	18.6315	19.0268	19.4846	19.8337	20.0096	20.0433	20.0458	19.9426	19.5266	18.9078	0.1444 (91)
Temperature adjustment												0.0000
adjusted MIT	19.4344	18.6315	19.0268	19.4846	19.8337	20.0096	20.0433	20.0458	19.9426	19.5266	18.9078	18.6800 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9820	0.9626	0.9267	0.8473	0.7098	0.4971	0.3392	0.3512	0.6443	0.8729	0.9593	0.9835 (94)
Useful gains	1469.4854	1694.5380	1891.0538	1988.7553	1761.8681	1288.4604	828.9255	798.1358	1330.7990	1535.8184	1449.2391	1353.5036 (95)
Ext temp.	4.8000	5.2000	6.9000	9.3000	12.3000	15.1000	17.0000	17.1000	14.5000	11.2000	7.7000	4.8000 (96)
Heat loss rate W												
	4091.1997	3737.8964	3374.8021	2826.2187	2090.5922	1355.2484	841.1435	811.1780	1500.5177	2304.3861	3097.7196	3857.1361 (97)
Space heating kWh												
	1950.5554	1373.1369	1103.9088	602.9736	244.5707	0.0000	0.0000	0.0000	0.0000	571.8144	1186.9059	1862.7026 (98a)
Space heating requirement - total per year (kWh/year)												8896.5683
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

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Space heating kWh	1950.5554	1373.1369	1103.9088	602.9736	244.5707	0.0000	0.0000	0.0000	0.0000	571.8144	1186.9059	1862.7026 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8896.5683
Space heating per m2												(98c) / (4) = 34.7794 (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)
Efficiency of main space heating system 1 (in %)												319.0262 (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	1950.5554	1373.1369	1103.9088	602.9736	244.5707	0.0000	0.0000	0.0000	0.0000	571.8144	1186.9059	1862.7026 (98)
Space heating efficiency (main heating system 1)	319.0262	319.0262	319.0262	319.0262	319.0262	0.0000	0.0000	0.0000	0.0000	319.0262	319.0262	319.0262 (210)
Space heating fuel (main heating system)	611.4091	430.4150	346.0245	189.0044	76.6616	0.0000	0.0000	0.0000	0.0000	179.2374	372.0402	583.8713 (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)
Water heating requirement	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (64)
Efficiency of water heater (217)m	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497 (216)
Fuel for water heating, kWh/month	164.7734	145.6263	154.4022	134.9420	130.2752	116.8023	114.8123	119.6736	121.3289	136.0027	145.4958	162.8604 (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	45.5896	36.5737	32.9306	24.1263	18.6359	15.2257	17.0003	22.0976	28.7026	37.6594	42.5362	46.8567 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-98.8790	-155.7252	-288.8532	-423.6486	-516.5924	-509.2105	-500.9210	-452.3166	-338.7291	-217.4533	-118.0958	-78.1702 (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)	-0.1735	-0.7565	-3.8829	-15.6218	-37.0829	-92.1956	-75.5370	-39.6131	-17.4384	-2.9662	-0.4209	-0.1016 (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												2788.6636 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												178.2497
Water heating fuel used												1646.9953 (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)												367.9345 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3984.3852 (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												819.2082 (238)

10a. Fuel costs - using BEDF prices (560)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2788.6636	26.0600	726.7257 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1646.9953	26.0600	429.2070 (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	367.9345	26.0600	95.8837 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3698.5947	26.0600	-963.8538
PV Unit electricity exported	-285.7904	5.8100	-16.6044
Total			-980.4582 (252)
Total energy cost			271.3582 (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	2788.6636	0.1558	434.3402 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1646.9953	0.1410	232.2534 (264)
Space and water heating			666.5935 (265)

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Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	367.9345	0.1443	53.1043 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3698.5947	0.1305	-482.8395
PV Unit electricity exported	-285.7904	0.1080	-30.8559
Total			-513.6955 (269)
Total CO2, kg/year			206.0024 (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	2788.6636	1.5766	4396.6088 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1646.9953	1.5214	2505.7936 (278)
Space and water heating			6902.4024 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	367.9345	1.5338	564.3502 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3698.5947	1.4822	-5482.1920
PV Unit electricity exported	-285.7904	0.3946	-112.7597
Total			-5594.9517 (283)
Total Primary energy kWh/year			1871.8009 (286)

SAP 10 EPC IMPROVEMENTS

00001

Current energy efficiency rating:	A 95
Current environmental impact rating:	A 99

N Solar water heating	SAP increase too small
U Solar photovoltaic panels	Already installed
V2 Wind turbine	Not applicable

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

Measures omitted - SAP change or cost saving too small:	
N Solar water heating	+ 0.8 -£ 63 -42 kg (20.3%)

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

Potential energy efficiency rating:	A 95
Potential environmental impact rating:	A 99

Fuel prices for cost data on this page from database revision number 560 TEST (06 Jan 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current	Potential	Saving
Electricity	£1252	£1252	£0
Space heating	£727	£727	£0
Water heating	£429	£429	£0
Lighting	£96	£96	£0
Generated (PV)	-£980	-£980	£0
Total cost of fuels	£272	£272	£0
Total cost of uses	£272	£272	£0
Delivered energy	3 kWh/m²	3 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	1 kg/m²	1 kg/m²	0 kg/m²
Primary energy	7 kWh/m²	7 kWh/m²	0 kWh/m²

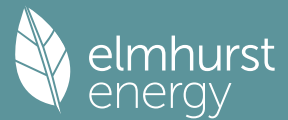
SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	148.0900 (1b)	x 2.6100 (2b)	= 386.5149 (1b) - (3b)
First floor	107.7100 (1c)	x 2.6500 (2c)	= 285.4315 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	255.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 671.9464 (5)

2. Ventilation rate

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											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												5 * 10 =	50.0000 (7a)	
Number of passive vents												0 * 10 =	0.0000 (7b)	
Number of flueless gas fires												0 * 40 =	0.0000 (7c)	
													Air changes per hour	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											50.0000 / (5) =	0.0744 (8)	
Pressure test												Yes		
Pressure Test Method												Blower Door		
Measured/design AP50												4.0000 (17)		
Infiltration rate												0.2744 (18)		
Number of sides sheltered												0 (19)		
Shelter factor												(20) = 1 - [0.075 x (19)] = 1.0000 (20)		
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.2744 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind factor	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)		
Adj infilt rate	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)		
Effective ac	0.3499	0.3430	0.3362	0.3019	0.2950	0.2607	0.2607	0.2538	0.2744	0.2950	0.3087	0.3224 (22b)		
	0.5612	0.5588	0.5565	0.5456	0.5435	0.5340	0.5340	0.5322	0.5377	0.5435	0.5477	0.5520 (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
Windows and gl doors (Uw = 1.40)			47.2000	1.3258	62.5758		(27)
PGD			3.7800	1.4000	5.2920		(26a)
Opening			2.5700	1.2357	3.1759		(27a)
Heatloss Floor 1			148.0900	0.1100	16.2899	75.0000	11106.7500 (28a)
External Wall 1	216.9100	46.3000	170.6100	0.1900	32.4159	110.0000	18767.1000 (29a)
External Wall dormer	14.4000	4.6800	9.7200	0.1900	1.8468	9.0000	87.4800 (29a)
External Wall sheltered	28.8000		28.8000	0.1100	3.1680	9.0000	259.2000 (29a)
External Roof loft	93.3200		93.3200	0.1100	10.2652	9.0000	839.8800 (30)
External Roof pitched	57.8700	2.5700	55.3000	0.1500	8.2950	9.0000	497.7000 (30)
External Roof sheltered	38.0300		38.0300	0.1100	4.1833	9.0000	342.2700 (30)
Total net area of external elements Aum(A, m2)			597.4200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		147.5077		(33)
Internal Wall 1			97.3700			9.0000	876.3300 (32c)
Internal Wall 2			37.5000			75.0000	2812.5000 (32c)
Internal Floor 1			107.7100			18.0000	1938.7800 (32d)
Internal Ceiling 1			107.7100			9.0000	969.3900 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 38497.3800 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 150.4980 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	35.9000	0.0190	0.6821
E3 Sill	34.1000	0.0220	0.7502
E4 Jamb	67.6000	0.0170	1.1492
E5 Ground floor (normal)	62.7000	0.0670	4.2009
E6 Intermediate floor within a dwelling	62.6000	0.0010	0.0626
E16 Corner (normal)	47.2000	0.0420	1.9824
R1 Head of roof window	2.2500	0.2400	0.5400
R2 Sill of roof window	2.2500	0.2400	0.5400
R3 Jamb of roof window	6.8400	0.2400	1.6416
E17 Corner (inverted - internal area greater than external area)	32.0000	-0.0850	-2.7200
E10 Eaves (insulation at ceiling level)	13.6000	0.0570	0.7752
E11 Eaves (insulation at rafter level)	35.6000	0.0180	0.6408
E12 Gable (insulation at ceiling level)	8.7000	0.0430	0.3741
E13 Gable (insulation at rafter level)	31.6000	0.0430	1.3588

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.9779 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 159.4856 (37)

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

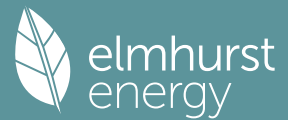
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	124.4431	123.9161	123.3995	120.9731	120.5192	118.4059	118.4059	118.0145	119.2199	120.5192	121.4375	122.3976 (38)
Heat transfer coeff	283.9287	283.4017	282.8851	280.4587	280.0048	277.8915	277.8915	277.5002	278.7055	280.0048	280.9231	281.8832 (39)
Average = Sum(39)m / 12 =												280.4566

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1100	1.1079	1.1059	1.0964	1.0946	1.0864	1.0864	1.0848	1.0895	1.0946	1.0982	1.1020 (40)
HLP (average)												1.0964
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

											3.0745 (42)	
Assumed occupancy												
Hot water usage for mixer showers	75.7686	74.6300	72.9707	69.7961	67.4533	64.8406	63.3555	65.0022	66.8073	69.6125	72.8554	75.4783 (42a)
Hot water usage for baths	32.7062	32.2205	31.5365	30.2753	29.3309	28.2837	27.7181	28.3973	29.1369	30.2574	31.5446	32.5956 (42b)
Hot water usage for other uses	46.1156	44.4387	42.7618	41.0848	39.4079	37.7310	37.7310	39.4079	41.0848	42.7618	44.4387	46.1156 (42c)
Average daily hot water use (litres/day)											142.1033 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	154.5905	151.2892	147.2690	141.1562	136.1921	130.8553	128.8046	132.8075	137.0290	142.6317	148.8386	154.1896 (44)
Energy conte	244.8336	215.4338	226.3469	193.2358	183.3407	160.9018	155.7780	164.4434	168.9705	193.5498	212.0479	241.4237 (45)
Energy content (annual)											Total = Sum(45)m =	2360.3059
Distribution loss (46)m = 0.15 x (45)m												

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	36.7250	32.3151	33.9520	28.9854	27.5011	24.1353	23.3667	24.6665	25.3456	29.0325	31.8072	36.2136 (46)
Water storage loss:												210.0000 (47)
Store volume												1.5300 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8262 (55)
Enter (49) or (54) in (55)												
Total storage loss												
	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122 (56)
If cylinder contains dedicated solar storage												
	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (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												
	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (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												
	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (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												
	120.5068	106.9476	114.3600	102.0893	100.0605	91.3383	90.8959	93.7771	94.0211	103.4550	108.3443	119.3731 (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	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	52.0849	46.2614	37.6223	28.4825	21.2910	17.9748	19.4224	25.2459	33.8850	43.0248	50.2163	53.5325	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	628.9554	635.4820	619.0352	584.0220	539.8240	498.2841	470.5329	464.0064	480.4531	515.4664	559.6644	601.2043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	(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)													
	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	(71)
Water heating gains (Table 5)													
	161.9716	159.1482	153.7097	141.7907	134.4899	126.8587	122.1719	126.0445	130.5848	139.0524	150.4782	160.4477	(72)
Total internal gains													
	961.0226	958.9023	928.3779	872.3058	813.6155	761.1283	730.1378	733.3074	762.9337	815.5543	878.3696	933.1952	(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	
North					13.4500	10.6334		0.6300	0.7000	0.7700		43.7085 (74)	
East					3.8900	19.6403		0.6300	0.7000	0.7700		23.3490 (76)	
South					24.2700	46.7521		0.6300	0.7000	0.7700		346.7707 (78)	
West					5.5900	19.6403		0.6300	0.7000	0.7700		33.5530 (80)	
North					2.5700	15.2954		0.6300	0.7000	1.0000		15.6018 (82)	
Solar gains	462.9830	791.8118	1099.9270	1403.7905	1619.2819	1630.7640	1562.3909	1396.3899	1203.4452	878.7979	554.9301	396.0752	(83)
Total gains	1424.0057	1750.7141	2028.3049	2276.0963	2432.8974	2391.8922	2292.5287	2129.6974	1966.3789	1694.3523	1433.2997	1329.2703	(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	37.6634	37.7334	37.8023	38.1294	38.1912	38.4816	38.4816	38.5359	38.3692	38.1912	38.0663	37.9367	
alpha	3.5109	3.5156	3.5202	3.5420	3.5461	3.5654	3.5654	3.5691	3.5579	3.5461	3.5378	3.5291	
util living area													
	0.9897	0.9785	0.9558	0.9044	0.8057	0.6541	0.5053	0.5566	0.7718	0.9330	0.9815	0.9919	(86)
Living	19.3677	19.5907	19.9087	20.2919	20.6135	20.8138	20.8836	20.8712	20.7245	20.2935	19.7514	19.3253	
Non living	18.0664	18.3510	18.7534	19.2332	19.6122	19.8285	19.8865	19.8801	19.7446	19.2455	18.5634	18.0171	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.1650	19.5907	19.9087	20.2919	20.6135	20.8138	20.8836	20.8712	20.7245	20.2935	19.7514	19.5596	(87)
Th 2	19.9927	19.9944	19.9960	20.0038	20.0052	20.0120	20.0120	20.0132	20.0094	20.0052	20.0023	19.9992	(88)
util rest of house													
	0.9875	0.9740	0.9463	0.8832	0.7621	0.5780	0.4030	0.4533	0.7069	0.9137	0.9770	0.9901	(89)
MIT 2	19.2248	18.3510	18.7534	19.2332	19.6122	19.8285	19.8865	19.8801	19.7446	19.2455	18.5634	18.3743	(90)
Living area fraction													
	FLA = Living area / (4) =											0.1444	(91)
MIT	19.3605	18.5300	18.9202	19.3861	19.7568	19.9708	20.0305	20.0233	19.8861	19.3969	18.7349	18.5455	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3605	18.5300	18.9202	19.3861	19.7568	19.9708	20.0305	20.0233	19.8861	19.3969	18.7349	18.5455	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9859	0.9652	0.9333	0.8674	0.7497	0.5746	0.4050	0.4544	0.6977	0.8987	0.9689	0.9867	(94)
Useful gains	1403.8637	1689.7403	1893.0689	1974.2437	1823.9100	1374.3425	928.4799	967.7959	1371.8770	1522.6995	1388.6789	1311.5620	(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													
	4276.1164	3862.7624	3513.4956	2940.9195	2255.9402	1492.4861	953.3132	1005.4540	1612.6198	2463.1665	3268.5255	4043.7452	(97)
Space heating kWh													
	2136.9560	1460.2708	1205.5975	696.0065	321.4305	0.0000	0.0000	0.0000	0.0000	699.7074	1353.4896	2032.7443	(98a)
Space heating requirement - total per year (kWh/year)												9906.2026	

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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	2136.9560	1460.2708	1205.5975	696.0065	321.4305	0.0000	0.0000	0.0000	0.0000	699.7074	1353.4896	2032.7443 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9906.2026
Space heating per m2										(98c) / (4) =		38.7264 (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)
Efficiency of main space heating system 1 (in %)												319.3392 (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	2136.9560	1460.2708	1205.5975	696.0065	321.4305	0.0000	0.0000	0.0000	0.0000	699.7074	1353.4896	2032.7443 (98)
Space heating efficiency (main heating system 1)	319.3392	319.3392	319.3392	319.3392	319.3392	0.0000	0.0000	0.0000	0.0000	319.3392	319.3392	319.3392 (210)
Space heating fuel (main heating system)	669.1805	457.2789	377.5288	217.9521	100.6549	0.0000	0.0000	0.0000	0.0000	219.1110	423.8407	636.5470 (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)
Water heating requirement	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (64)
Efficiency of water heater (217)m	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555	178.2555 (216)
Fuel for water heating, kWh/month	164.7680	145.6216	154.3972	134.9376	130.2710	116.7985	114.8085	119.6698	121.3250	135.9983	145.4911	162.8551 (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	45.5896	36.5737	32.9306	24.1263	18.6359	15.2257	17.0003	22.0976	28.7026	37.6594	42.5362	46.8567 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-81.3856	-146.6272	-274.5028	-394.2696	-496.9674	-482.2502	-472.4709	-406.5171	-304.1957	-193.8204	-98.7016	-66.5368 (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	-0.0994	-0.6252	-3.2504	-12.2016	-31.3073	-46.9431	-45.6466	-29.4361	-13.0907	-2.0416	-0.2474	-0.0636 (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												3102.0938 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												178.2555
Water heating fuel used												1646.9417 (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)												367.9345 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3603.1984 (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												1513.7716 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3102.0938	16.4900	511.5353 (240)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1646.9417	16.4900	271.5807 (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	367.9345	16.4900	60.6724 (250)	
Additional standing charges			0.0000 (251)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-3418.2453	16.4900	-563.6687	
PV Unit electricity exported	-184.9531	5.5900	-10.3389	
Total			-574.0075 (252)	
Total energy cost			269.7808 (255)	

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.3229 (257)
SAP value		94.7662

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SAP rating (Section 12)
SAP band

95 (258)
A

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	3102.0938	0.1554	482.0127 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1646.9417	0.1410	232.2458 (264)
Space and water heating			714.2585 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	367.9345	0.1443	53.1043 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3418.2453	0.1304	-445.7705
PV Unit electricity exported	-184.9531	0.1098	-20.3017
Total			-466.0721 (269)
Total CO ₂ , kg/year			301.2907 (272)
CO ₂ emissions per m ²			1.1800 (273)
EI value			98.6578
EI rating			99 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	148.0900 (1b)	x 2.6100 (2b)	= 386.5149 (1b) - (3b)
First floor	107.7100 (1c)	x 2.6500 (2c)	= 285.4315 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	255.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	671.9464 (5)

2. Ventilation rate

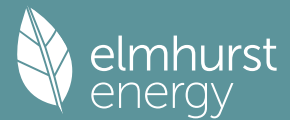
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (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) =	50.0000 / (5) = 0.0744 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2744 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2744 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	3.9000	3.9000	3.7000	3.7000	3.3000	3.4000	3.1000	3.2000	3.5000	3.4000	3.8000 (22)
Wind factor	1.0500	0.9750	0.9750	0.9250	0.9250	0.8250	0.8500	0.7750	0.8000	0.8750	0.8500	0.9500 (22a)
Adj infilt rate	0.2881	0.2676	0.2676	0.2538	0.2538	0.2264	0.2332	0.2127	0.2195	0.2401	0.2332	0.2607 (22b)
Effective ac	0.5415	0.5358	0.5358	0.5322	0.5322	0.5256	0.5272	0.5226	0.5241	0.5288	0.5272	0.5340 (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
Windows and gl doors (Uw = 1.40)			47.2000	1.3258	62.5758		(27)
PGD			3.7800	1.4000	5.2920		(26a)
Opening			2.5700	1.2357	3.1759		(27a)
Heatloss Floor 1			148.0900	0.1100	16.2899	75.0000	11106.7500 (28a)
External Wall 1	216.9100	46.3000	170.6100	0.1900	32.4159	110.0000	18767.1000 (29a)
External Wall dormer	14.4000	4.6800	9.7200	0.1900	1.8468	9.0000	87.4800 (29a)
External Wall sheltered	28.8000		28.8000	0.1100	3.1680	9.0000	259.2000 (29a)
External Roof loft	93.3200		93.3200	0.1100	10.2652	9.0000	839.8800 (30)
External Roof pitched	57.8700	2.5700	55.3000	0.1500	8.2950	9.0000	497.7000 (30)
External Roof sheltered	38.0300		38.0300	0.1100	4.1833	9.0000	342.2700 (30)
Total net area of external elements A _{um} (A, m ²)			597.4200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	147.5077		(33)
Internal Wall 1			97.3700			9.0000	876.3300 (32c)
Internal Wall 2			37.5000			75.0000	2812.5000 (32c)
Internal Floor 1			107.7100			18.0000	1938.7800 (32d)
Internal Ceiling 1			107.7100			9.0000	969.3900 (32e)

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Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) = 38497.3800 (34)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						150.4980 (35)						
List of Thermal Bridges												
K1 Element						Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)						35.9000	0.0190	0.6821				
E3 Sill						34.1000	0.0220	0.7502				
E4 Jamb						67.6000	0.0170	1.1492				
E5 Ground floor (normal)						62.7000	0.0670	4.2009				
E6 Intermediate floor within a dwelling						62.6000	0.0010	0.0626				
E16 Corner (normal)						47.2000	0.0420	1.9824				
R1 Head of roof window						2.2500	0.2400	0.5400				
R2 Sill of roof window						2.2500	0.2400	0.5400				
R3 Jamb of roof window						6.8400	0.2400	1.6416				
E17 Corner (inverted - internal area greater than external area)						32.0000	-0.0850	-2.7200				
E10 Eaves (insulation at ceiling level)						13.6000	0.0570	0.7752				
E11 Eaves (insulation at rafter level)						35.6000	0.0180	0.6408				
E12 Gable (insulation at ceiling level)						8.7000	0.0430	0.3741				
E13 Gable (insulation at rafter level)						31.6000	0.0430	1.3588				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								11.9779 (36)				
Point Thermal bridges								(36a) = 0.0000				
Total fabric heat loss								(33) + (36) + (36a) = 159.4856 (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	120.0756	118.8077	118.8077	118.0145	118.0145	116.5535	116.9031	115.8856	116.2143	117.2632	116.9031	118.4059 (38)
Heat transfer coeff												
	279.5612	278.2933	278.2933	277.5002	277.5002	276.0391	276.3887	275.3712	275.7000	276.7488	276.3887	277.8915 (39)
Average = Sum(39)m / 12 =												277.1397
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0929	1.0879	1.0879	1.0848	1.0848	1.0791	1.0805	1.0765	1.0778	1.0819	1.0805	1.0864 (40)
HLP (average)												1.0834
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Hot water usage for mixer showers												3.0745 (42)
Hot water usage for baths	75.7686	74.6300	72.9707	69.7961	67.4533	64.8406	63.3555	65.0022	66.8073	69.6125	72.8554	75.4783 (42a)
Hot water usage for other uses	32.7062	32.2205	31.5365	30.2753	29.3309	28.2837	27.7181	28.3973	29.1369	30.2574	31.5446	32.5956 (42b)
Average daily hot water use (litres/day)	46.1156	44.4387	42.7618	41.0848	39.4079	37.7310	37.7310	39.4079	41.0848	42.7618	44.4387	46.1156 (42c)
												142.1033 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	154.5905	151.2892	147.2690	141.1562	136.1921	130.8553	128.8046	132.8075	137.0290	142.6317	148.8386	154.1896 (44)
Distribution loss (46)m = 0.15 x (45)m	244.8336	215.4338	226.3469	193.2358	183.3407	160.9018	155.7780	164.4434	168.9705	193.5498	212.0479	241.4237 (45)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5300 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8262 (55)
Total storage loss	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122 (56)
If cylinder contains dedicated solar storage	25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (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	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (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	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (64)
Total per year (kWh/year) = Sum(64)m =												2935.7649 (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	120.5068	106.9476	114.3600	102.0893	100.0605	91.3383	90.8959	93.7771	94.0211	103.4550	108.3443	119.3731 (65)

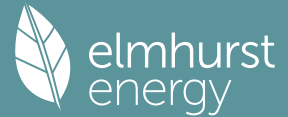
5. Internal gains (see Table 5 and 5a)

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	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682	184.4682 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	52.0849	46.2614	37.6223	28.4825	21.2910	17.9748	19.4224	25.2459	33.8850	43.0248	50.2163	53.5325 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	628.9554	635.4820	619.0352	584.0220	539.8240	498.2841	470.5329	464.0064	480.4531	515.4664	559.6644	601.2043 (68)
Pumps, fans	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213	56.5213 (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)	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788	-122.9788 (71)
Total internal gains	161.9716	159.1482	153.7097	141.7907	134.4899	126.8587	122.1719	126.0445	130.5848	139.0524	150.4782	160.4477 (72)
												933.1952 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W
North	13.4500	12.6907	0.6300	0.7000	0.7700	52.1652 (74)
East	3.8900	23.7106	0.6300	0.7000	0.7700	28.1880 (76)
South	24.2700	53.4173	0.6300	0.7000	0.7700	396.2081 (78)
West	5.5900	23.7106	0.6300	0.7000	0.7700	40.5067 (80)
North	2.5700	18.0222	0.6300	0.7000	1.0000	18.3832 (82)

Solar gains	535.4512	801.4883	1112.1645	1474.9574	1668.5743	1830.5860	1713.6379	1539.5821	1302.4056	943.8181	632.3893	442.9595 (83)
Total gains	1496.4738	1760.3906	2040.5425	2347.2632	2482.1898	2591.7143	2443.7757	2272.8895	2065.3393	1759.3724	1510.7590	1376.1547 (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	38.2518	38.4261	38.4261	38.5359	38.5359	38.7399	38.6909	38.8338	38.7875	38.6405	38.6909	38.4816
alpha	3.5501	3.5617	3.5617	3.5691	3.5691	3.5827	3.5794	3.5889	3.5858	3.5760	3.5794	3.5654
util living area	0.9868	0.9766	0.9508	0.8874	0.7702	0.5782	0.4375	0.4550	0.7234	0.9133	0.9752	0.9898 (86)
Living	19.4919	19.6649	19.9884	20.3705	20.6791	20.8532	20.8969	20.8956	20.7748	20.3976	19.8847	19.4490
Non living	18.2349	18.4571	18.8645	19.3350	19.6910	19.8672	19.8993	19.9023	19.8021	19.3796	18.7430	18.1842
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.2285	19.6649	19.9884	20.3705	20.6791	20.8532	20.8969	20.8956	20.7748	20.3976	19.8847	19.6659 (87)
Th 2	20.0066	20.0107	20.0107	20.0132	20.0132	20.0179	20.0168	20.0201	20.0190	20.0156	20.0168	20.0120 (88)
util rest of house	0.9839	0.9717	0.9402	0.8629	0.7200	0.4979	0.3364	0.3482	0.6507	0.8884	0.9689	0.9876 (89)
MIT 2	19.3003	18.4571	18.8645	19.3350	19.6910	19.8672	19.8993	19.9023	19.8021	19.3796	18.7430	18.5136 (90)
Living area fraction									fLA = Living area / (4) =			0.1444 (91)
MIT	19.4344	18.6315	19.0268	19.4846	19.8337	20.0096	20.0433	20.0458	19.9426	19.5266	18.9078	18.6800 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4344	18.6315	19.0268	19.4846	19.8337	20.0096	20.0433	20.0458	19.9426	19.5266	18.9078	18.6800 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9820	0.9626	0.9267	0.8473	0.7098	0.4971	0.3392	0.3512	0.6443	0.8729	0.9593	0.9835 (94)
Useful gains	1469.4854	1694.5380	1891.0538	1988.7553	1761.8681	1288.4604	828.9255	798.1358	1330.7990	1535.8184	1449.2391	1353.5036 (95)
Ext temp.	4.8000	5.2000	6.9000	9.3000	12.3000	15.1000	17.0000	17.1000	14.5000	11.2000	7.7000	4.8000 (96)
Heat loss rate W	4091.1997	3737.8964	3374.8021	2826.2187	2090.5922	1355.2484	841.1435	811.1780	1500.5177	2304.3861	3097.7196	3857.1361 (97)
Space heating kWh	1950.5554	1373.1369	1103.9088	602.9736	244.5707	0.0000	0.0000	0.0000	0.0000	571.8144	1186.9059	1862.7026 (98a)
Space heating requirement - total per year (kWh/year)												8896.5683
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	1950.5554	1373.1369	1103.9088	602.9736	244.5707	0.0000	0.0000	0.0000	0.0000	571.8144	1186.9059	1862.7026 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8896.5683
Space heating per m2										(98c) / (4) =		34.7794 (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)
Efficiency of main space heating system 1 (in %)												319.0262 (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	1950.5554	1373.1369	1103.9088	602.9736	244.5707	0.0000	0.0000	0.0000	0.0000	571.8144	1186.9059	1862.7026 (98)
Space heating efficiency (main heating system 1)	319.0262	319.0262	319.0262	319.0262	319.0262	0.0000	0.0000	0.0000	0.0000	319.0262	319.0262	319.0262 (210)
Space heating fuel (main heating system)	611.4091	430.4150	346.0245	189.0044	76.6616	0.0000	0.0000	0.0000	0.0000	179.2374	372.0402	583.8713 (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)
Water heating												
Water heating requirement	293.7082	259.5786	275.2215	240.5338	232.2153	208.1998	204.6526	213.3180	216.2685	242.4244	259.3459	290.2983 (64)
Efficiency of water heater	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497	178.2497 (216)
Fuel for water heating, kWh/month	164.7734	145.6263	154.4022	134.9420	130.2752	116.8023	114.8123	119.6736	121.3289	136.0027	145.4958	162.8604 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	45.5896	36.5737	32.9306	24.1263	18.6359	15.2257	17.0003	22.0976	28.7026	37.6594	42.5362	46.8567 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-98.8790	-155.7252	-288.8532	-423.6486	-516.5924	-509.2105	-500.9210	-452.3166	-338.7291	-217.4533	-118.0958	-78.1702 (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)	-0.1735	-0.7565	-3.8829	-15.6218	-37.0829	-92.1956	-75.5370	-39.6131	-17.4384	-2.9662	-0.4209	-0.1016 (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)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	2788.6636	1.5766	4396.6088 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	1646.9953	1.5214	2505.7936 (278)
Space and water heating			6902.4024 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	367.9345	1.5338	564.3502 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3698.5947	1.4822	-5482.1920
PV Unit electricity exported	-285.7904	0.3946	-112.7597
Total			-5594.9517 (283)
Total Primary energy kWh/year			1871.8009 (286)