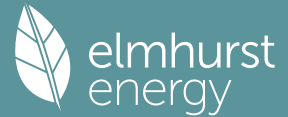


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Plot Reference	L/B Cadwell & 6 Bridge Cottage				Issued on Date	03/06/2026	
Assessment Reference	3716			Plot Type Ref	3716		
Plot Address	L/B Cadwell & 6 Bridge Cottage, Barkham, RG41 4TJ				SAP Version	10.2	
SAP Rating	99 A	DER	0.55	TER	8.75		
Environmental	99 A	% DER < TER				93.71	
CO ₂ Emissions (t/year)	0.04	DFEE	49.95	TFEE	60.86		
Compliance Check	See BREL	% DFEE < TFEE				17.93	
% DPER < TPER	92.66	DPER	3.71	TPER	50.46		
Assessor Details	Mr. Nick Gill				Assessor ID	AW10-0001	
Client	004, Hawkes Architecture						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	283.0000 (1b)	3.6000 (2b)	1018.8000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	283.0000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 1018.8000 (5)

2. Ventilation rate

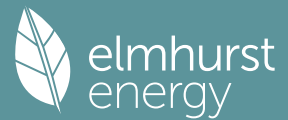
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.0000 (17)
Infiltration rate	0.1000 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.0925 (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	0.1179	0.1156	0.1133	0.1018	0.0994	0.0879	0.0879	0.0856	0.0925	0.0994	0.1041	0.1087 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												83.7000 (23c)
Effective ac	0.1994	0.1971	0.1948	0.1832	0.1809	0.1694	0.1694	0.1671	0.1740	0.1809	0.1856	0.1902 (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
Main dwelling							
Windows			96.5000	0.7752	74.8062		(27)
Ground floor			283.0000	0.1100	31.1300	21225.0000	(28a)
External Walls	343.0000	96.5000	246.5000	0.1200	29.5800	17255.0000	(29a)
Roof	290.0000		290.0000	0.1200	34.8000	9.0000	2610.0000 (30)
Total net area of external elements Aum(A, m ²)			916.0000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 170.3162		(33)
Main dwelling							
Internal Walls Timber			286.0000			9.0000	2574.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 43664.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							154.2898 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				43.0000	0.0210	0.9030	
E3 Sill				25.0000	0.0340	0.8500	

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E4 Jamb						82.0000			0.0430			3.5260	
E14 Flat roof						98.0000			0.1600			15.6800	
E16 Corner (normal)						38.0000			0.0300			1.1400	
E17 Corner (inverted - internal area greater than external area)						28.0000			-0.0150			-0.4200	
E5 Ground floor (normal)						98.0000			0.0210			2.0580	
E24 Eaves (insulation at ceiling level - inverted)						26.0000			0.1500			3.9000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												27.6370	(36)
Point Thermal bridges												0.0000	
Total fabric heat loss									(33) + (36) + (36a) =			197.9532	(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	(38)
Heat transfer coeff	67.0517	66.2742	65.4967	61.6094	60.8319	56.9446	56.9446	56.1671	58.4995	60.8319	62.3869	63.9418	
Average = Sum(39)m / 12 =	265.0049	264.2274	263.4499	259.5626	258.7851	254.8978	254.8978	254.1203	256.4527	258.7851	260.3401	261.8950	(39)
												259.3682	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	0.9364	0.9337	0.9309	0.9172	0.9144	0.9007	0.9007	0.8980	0.9062	0.9144	0.9199	0.9254	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													3.1098 (42)
Hot water usage for mixer showers													
	95.4519	94.0174	91.9272	87.9278	84.9763	81.6849	79.8141	81.8885	84.1625	87.6965	91.7818	95.0862	(42a)
Hot water usage for baths													
	32.9612	32.4717	31.7823	30.5113	29.5595	28.5042	27.9342	28.6187	29.3640	30.4933	31.7905	32.8497	(42b)
Hot water usage for other uses													
	46.4778	44.7877	43.0976	41.4075	39.7174	38.0273	38.0273	39.7174	41.4075	43.0976	44.7877	46.4778	(42c)
Average daily hot water use (litres/day)												160.8162	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	174.8908	171.2768	166.8070	159.8465	154.2532	148.2164	145.7755	150.2246	154.9340	161.2873	168.3599	174.4137	(44)
Energy conte	276.9843	243.8958	256.3762	218.8219	207.6545	182.2494	176.3029	186.0094	191.0492	218.8654	239.8596	273.0897	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	41.5477	36.5844	38.4564	32.8233	31.1482	27.3374	26.4454	27.9014	28.6574	32.8298	35.9789	40.9635	(46)
Water storage loss (or HIU loss):													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8500	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9990	(55)
Total storage loss													
	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690	(56)
If cylinder contains dedicated solar storage													
	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690	(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													
	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211	(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													
	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211	(64)
12Total per year (kWh/year)													
												3309.6893	(64)
Electric shower(s)												3310	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month													
	135.4824	120.2819	128.6302	114.7439	112.4302	102.5835	102.0058	105.2333	105.5094	116.1579	121.7389	134.1874	(65)

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

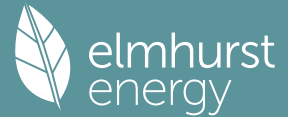
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1228	248.1359	224.1228	231.5935	224.1228	231.5935	224.1228	224.1228	231.5935	224.1228	231.5935	224.1228	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	444.3484	448.9594	437.3399	412.6035	381.3783	352.0309	332.4251	327.8141	339.4336	364.1700	395.3953	424.7426	(68)
Pumps, fans	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	(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)	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	(71)
Total internal gains	182.1000	178.9910	172.8901	159.3665	151.1159	142.4771	137.1046	141.4426	146.5409	156.1262	169.0818	180.3595	(72)
	920.2187	945.7337	904.0002	873.2110	826.2644	795.7490	763.2999	763.0269	787.2154	814.0664	865.7181	898.8723	(73)

6. Solar gains													

[Jan]				Area	Solar flux	g		FF		Access		Gains	
				m2	Table 6a	Specific data		Specific data		factor		W	
					W/m2	or Table 6b		or Table 6c		Table 6d			
North				25.4000	10.6334	0.5700		0.7000		0.7700		74.6813	(74)
East				11.6000	19.6403	0.5700		0.7000		0.7700		62.9958	(76)
South				23.7000	46.7521	0.5700		0.7000		0.7700		306.3764	(78)
West				35.8000	19.6403	0.5700		0.7000		0.7700		194.4180	(80)

Solar gains	638.4714	1148.0412	1710.9609	2321.3949	2759.7661	2803.5414	2676.8677	2344.3625	1923.7535	1308.6020	776.2542	538.6799	(83)
Total gains	1558.6901	2093.7749	2614.9611	3194.6059	3586.0305	3599.2904	3440.1676	3107.3894	2710.9690	2122.6684	1641.9722	1437.5522	(84)

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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	45.7685	45.9032	46.0387	46.7282	46.8686	47.5833	47.5833	47.7289	47.2948	46.8686	46.5886	46.3120
alpha	4.0512	4.0602	4.0692	4.1152	4.1246	4.1722	4.1722	4.1819	4.1530	4.1246	4.1059	4.0875
util living area	0.9905	0.9706	0.9210	0.7976	0.6222	0.4440	0.3240	0.3722	0.6094	0.8872	0.9783	0.9930 (86)
Living	19.6804	19.9646	20.3141	20.6679	20.8489	20.9114	20.9229	20.9208	20.8745	20.5743	20.0526	19.6381
Non living	18.5684	18.9299	19.3659	19.7945	19.9919	20.0619	20.0704	20.0717	20.0278	19.6998	19.0532	18.5214
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	4	0	0	0	0	0	0	0	0	0	0	0
16 / 9	27	0	0	0	0	0	0	0	0	0	0	20
MIT	20.3491	19.9646	20.3141	20.6679	20.8489	20.9114	20.9229	20.9208	20.8745	20.5743	20.0526	20.0191 (87)
Th 2	20.1367	20.1390	20.1413	20.1529	20.1552	20.1669	20.1669	20.1692	20.1622	20.1552	20.1506	20.1459 (88)
util rest of house	0.9886	0.9650	0.9067	0.7669	0.5765	0.3893	0.2635	0.3067	0.5477	0.8610	0.9733	0.9916 (89)
MIT 2	19.5338	18.9299	19.3659	19.7945	19.9919	20.0619	20.0704	20.0717	20.0278	19.6998	19.0532	19.1069 (90)
Living area fraction									fLA =	Living area / (4) =		0.2827 (91)
MIT	19.7643	19.2224	19.6339	20.0414	20.2341	20.3021	20.3114	20.3117	20.2671	19.9470	19.3357	19.3648 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7643	19.2224	19.6339	20.0414	20.2341	20.3021	20.3114	20.3117	20.2671	19.9470	19.3357	19.3648 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9876	0.9575	0.8969	0.7625	0.5809	0.3983	0.2741	0.3180	0.5558	0.8536	0.9670	0.9899 (94)
Useful gains	1539.3076	2004.7457	2345.4374	2436.0054	2083.1589	1433.5476	942.8847	988.2819	1506.6271	1811.8814	1587.7740	1423.0650 (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	4098.1032	3784.3661	3460.1300	2891.8863	2208.5087	1453.4398	946.0291	994.0518	1581.5777	2418.8645	3185.4441	3971.5784 (97)
Space heating kWh	1903.7439	1195.9049	829.3313	328.2343	93.2602	0.0000	0.0000	0.0000	0.0000	451.5954	1150.3225	1896.0940 (98a)
Space heating requirement - total per year (kWh/year)												7848.4865
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	1903.7439	1195.9049	829.3313	328.2343	93.2602	0.0000	0.0000	0.0000	0.0000	451.5954	1150.3225	1896.0940 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7848.4865
Space heating per m2										(98c) / (4) =		27.7332 (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 %)												333.2788 (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	1903.7439	1195.9049	829.3313	328.2343	93.2602	0.0000	0.0000	0.0000	0.0000	451.5954	1150.3225	1896.0940 (98)
Space heating efficiency (main heating system 1)	333.2788	333.2788	333.2788	333.2788	333.2788	0.0000	0.0000	0.0000	0.0000	333.2788	333.2788	333.2788 (210)
Space heating fuel (main heating system)	571.2166	358.8301	248.8401	98.4864	27.9826	0.0000	0.0000	0.0000	0.0000	135.5008	345.1532	568.9212 (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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (64)
Efficiency of water heater (217)m	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266 (216)
Fuel for water heating, kWh/month	183.7774	162.5060	172.3428	150.5348	145.3092	130.2423	127.9135	133.2993	135.1250	151.5297	162.2078	181.6164 (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	127.0996	114.7996	127.0996	122.9996	127.0996	122.9996	127.0996	127.0996	122.9996	127.0996	122.9996	127.0996 (231)
Lighting	53.8112	43.1694	38.8692	28.4773	21.9967	17.9715	20.0661	26.0827	33.8788	44.4508	50.2071	55.3068 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-147.6434	-273.0801	-519.0276	-724.5230	-765.0047	-668.0146	-663.3359	-669.6180	-557.6231	-360.7832	-180.3591	-119.4258 (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												2354.9310 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												180.2266
Water heating fuel used												1836.4041 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

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(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2040)	
mechanical ventilation fans (SFP = 1.2040)	1496.4949 (230a)
Total electricity for the above, kWh/year	1496.4949 (231)
Electricity for lighting (calculated in Appendix L)	434.2873 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-5648.4383 (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	473.6790 (238)

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	2354.9310	0.1570	369.6513 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1836.4041	0.1410	258.9795 (264)
Space and water heating			628.6308 (265)
Pumps, fans and electric keep-hot	1496.4949	0.1387	207.5823 (267)
Energy for lighting	434.2873	0.1443	62.6811 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5648.4383	0.1318	-744.3437
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-744.3437 (269)
Total CO2, kg/year			154.5505 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5500 (273)

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	2354.9310	1.5811	3723.2724 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1836.4041	1.5215	2794.0281 (278)
Space and water heating			6517.3006 (279)
Pumps, fans and electric keep-hot	1496.4949	1.5128	2263.8976 (281)
Energy for lighting	434.2873	1.5338	666.1244 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5648.4383	1.4869	-8398.7137
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-8398.7137 (283)
Total Primary energy kWh/year			1048.6088 (286)
Dwelling Primary energy Rate (DPER)			3.7100 (287)

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

1. Overall dwelling characteristics

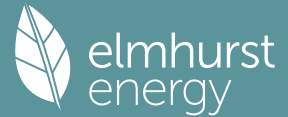
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	283.0000 (1b)	x 3.6000 (2b)	= 1018.8000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	283.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	1018.8000 (5)

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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.0393 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.2893 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2676 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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)

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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 infiltr rate												
Effective ac	0.3411	0.3345	0.3278	0.2943	0.2876	0.2542	0.2542	0.2475	0.2676	0.2876	0.3010	0.3144 (22b)
	0.5582	0.5559	0.5537	0.5433	0.5414	0.5323	0.5323	0.5306	0.5358	0.5414	0.5453	0.5494 (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
Main dwelling							
TER Opening Type			70.7500	1.1450	81.0115		(27)
Ground floor			283.0000	0.1300	36.7900		(28a)
External Walls	343.0000	70.7500	272.2500	0.1800	49.0050		(29a)
Roof	290.0000		290.0000	0.1100	31.9000		(30)
Total net area of external elements Aum(A, m2)			916.0000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 198.7065		(33)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	43.0000	0.0500	2.1500
E3 Sill	25.0000	0.0500	1.2500
E4 Jamb	82.0000	0.0500	4.1000
E14 Flat roof	98.0000	0.0800	7.8400
E16 Corner (normal)	38.0000	0.0900	3.4200
E17 Corner (inverted - internal area greater than external area)	28.0000	-0.0900	-2.5200
E5 Ground floor (normal)	98.0000	0.1600	15.6800
E24 Eaves (insulation at ceiling level - inverted)	26.0000	0.2400	6.2400

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

Point Thermal bridges

Total fabric heat loss

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	187.6661	186.9064	186.1617	182.6641	182.0097	178.9634	178.9634	178.3993	180.1368	182.0097	183.3335	184.7175 (38)
Average = Sum(39)m / 12 =	424.5325	423.7728	423.0282	419.5306	418.8762	415.8299	415.8299	415.2657	417.0032	418.8762	420.2000	421.5840 (39)
												419.5274

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.5001	1.4974	1.4948	1.4824	1.4801	1.4694	1.4694	1.4674	1.4735	1.4801	1.4848	1.4897 (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													3.1098 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													143.2155 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	155.8005	152.4733	148.4216	142.2610	137.2580	131.8794	129.8127	133.8469	138.1015	143.7480	150.0036	155.3965 (44)
Energy content (annual)	246.7498	217.1199	228.1185	194.7481	184.7756	162.1611	156.9972	165.7304	170.2930	195.0647	213.7076	243.3133 (45)
Distribution loss (46)m = 0.15 x (45)m	37.0125	32.5680	34.2178	29.2122	27.7163	24.3242	23.5496	24.8596	25.5439	29.2597	32.0561	36.4970 (46)

Water storage loss (or HIU loss):

Store volume

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b

Enter (49) or (54) in (55)

Total storage loss

If cylinder contains dedicated solar storage

Primary loss

Combi loss

Total heat required for water heating calculated for each month

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

12Total per year (kWh/year)

Electric shower(s)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =

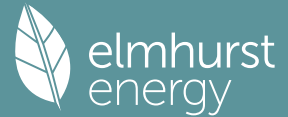
Heat gains from water heating, kWh/month

125.9698 111.8670 119.7748 107.2622 105.3633 96.4271 96.1270 99.0308 99.1309 108.7845 113.5663 124.8271 (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	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	224.1228	248.1359	224.1228	231.5935	224.1228	231.5935	224.1228	224.1228	231.5935	224.1228	231.5935	224.1228 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	444.3484	448.9594	437.3399	412.6035	381.3783	352.0309	332.4251	327.8141	339.4336	364.1700	395.3953	424.7426 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												

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Water heating gains (Table 5)	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932 (71)
Total internal gains	169.3142	166.4687	160.9877	148.9753	141.6174	133.9265	129.2030	133.1059	137.6818	146.2157	157.7309	167.7784 (72)
	910.4328	936.2114	895.0978	865.8198	819.7659	787.1984	755.3983	754.6903	778.3564	807.1559	857.3671	889.2912 (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				18.6200	10.6334	0.6300	0.7000	0.7700	60.5095 (74)			
East				8.5000	19.6403	0.6300	0.7000	0.7700	51.0197 (76)			
South				17.3800	46.7521	0.6300	0.7000	0.7700	248.3261 (78)			
West				26.2500	19.6403	0.6300	0.7000	0.7700	157.5609 (80)			
Solar gains	517.4162	930.3588	1386.5151	1881.1567	2236.3652	2271.8273	2169.1827	1899.7575	1558.9434	1060.4677	629.0729	436.5469 (83)
Total gains	1427.8490	1866.5702	2281.6130	2746.9765	3056.1310	3059.0257	2924.5810	2654.4477	2337.2998	1867.6236	1486.4400	1325.8380 (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	28.5700	28.6212	28.6716	28.9106	28.9558	29.1679	29.1679	29.2075	29.0858	28.9558	28.8646	28.7698
alpha	2.9047	2.9081	2.9114	2.9274	2.9304	2.9445	2.9445	2.9472	2.9391	2.9304	2.9243	2.9180
util living area	0.9924	0.9831	0.9640	0.9165	0.8279	0.6924	0.5558	0.6144	0.8178	0.9505	0.9863	0.9939 (86)
MIT	18.1768	18.5162	19.0394	19.7212	20.3172	20.7277	20.8976	20.8599	20.5162	19.7092	18.8148	18.1238 (87)
Th 2	19.6874	19.6894	19.6914	19.7007	19.7024	19.7106	19.7106	19.7121	19.7074	19.7024	19.6989	19.6952 (88)
util rest of house	0.9905	0.9791	0.9549	0.8942	0.7789	0.5995	0.4190	0.4793	0.7463	0.9329	0.9824	0.9924 (89)
MIT 2	16.4190	16.8523	17.5163	18.3700	19.0790	19.5232	19.6668	19.6457	19.3257	18.3739	17.2416	16.3554 (90)
Living area fraction	16.9159	17.3227	17.9469	18.7520	19.4290	19.8637	20.0147	19.9889	19.6622	18.7514	17.6863	16.8553 (92)
MIT	16.9159	17.3227	17.9469	18.7520	19.4290	19.8637	20.0147	19.9889	19.6622	18.7514	17.6863	16.8553 (93)
Temperature adjustment												0.0000
adjusted MIT	16.9159	17.3227	17.9469	18.7520	19.4290	19.8637	20.0147	19.9889	19.6622	18.7514	17.6863	16.8553 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9841	0.9678	0.9376	0.8731	0.7666	0.6119	0.4539	0.5114	0.7433	0.9147	0.9726	0.9870 (94)
Ext temp.	1405.2121	1806.4536	2139.1981	2398.2895	2342.9815	1871.7749	1327.5708	1357.4812	1737.2355	1708.3563	1445.7658	1308.6246 (95)
Heat loss rate W	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)
Space heating kWh	5355.8529	5264.3845	4842.3563	4133.2085	3237.5116	2188.8086	1419.9437	1490.3529	2319.4562	3414.4169	4448.3717	5335.2816 (97)
Space heating requirement - total per year (kWh/year)	2939.2768	2323.7296	2011.1497	1249.1417	665.5304	0.0000	0.0000	0.0000	0.0000	1269.3090	2161.8762	2995.8328 (98a)
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)	2939.2768	2323.7296	2011.1497	1249.1417	665.5304	0.0000	0.0000	0.0000	0.0000	1269.3090	2161.8762	2995.8328 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)
Space heating per m2												

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 %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	2939.2768	2323.7296	2011.1497	1249.1417	665.5304	0.0000	0.0000	0.0000	0.0000	1269.3090	2161.8762	2995.8328 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	3184.4819	2517.5835	2178.9271	1353.3497	721.0514	0.0000	0.0000	0.0000	0.0000	1375.1994	2342.2277	3245.7560 (211)
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 (212)
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 (213)
Space heating 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 (215)
Water heating												
Water heating requirement	266.7473	235.8391	250.6957	221.1136	214.7336	193.9479	191.8928	199.3573	201.3402	223.9318	237.3433	263.9573 (64)
Efficiency of water heater (217)m	87.9745	87.8867	87.7037	87.3189	86.4223	79.8000	79.8000	79.8000	79.8000	87.3231	87.8202	79.8000 (216)
Fuel for water heating, kWh/month	303.2099	268.3444	285.8440	253.2252	248.4701	243.0424	240.4672	249.8212	252.3060	256.4405	270.2605	299.9638 (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	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	46.5683	37.3588	33.6375	24.6442	19.0359	15.5525	17.3652	22.5720	29.3187	38.4678	43.4493	47.8626 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-172.6391	-208.2250	-256.3387	-245.2957	-232.8144	-206.3904	-203.1041	-205.4761	-208.1166	-213.2745	-176.3013	-153.6726 (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)												

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(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	-241.7286	-479.7607	-905.7698	-1297.6287	-1660.2701	-1649.3347	-1630.4212	-1405.2978	-1064.4169	-663.6509	-314.5215	-193.5345	(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												16918.5768	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												3171.3954	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												375.8327	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-13987.9840	(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												6563.8209	(238)

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	16918.5768	0.2100	3552.9011	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3171.3954	0.2100	665.9930	(264)
Space and water heating			4218.8942	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	375.8327	0.1443	54.2443	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-2481.6486	0.1382	-342.8752	
PV Unit electricity exported	-11506.3355	0.1273	-1465.2261	
Total			-1808.1013	(269)
Total CO2, kg/year			2476.9664	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.7500	(273)

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	16918.5768	1.1300	19117.9918	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3171.3954	1.1300	3583.6768	(278)
Space and water heating			22701.6686	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	375.8327	1.5338	576.4648	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-2481.6486	1.5108	-3749.3240	
PV Unit electricity exported	-11506.3355	0.4675	-5379.0720	
Total			-9128.3960	(283)
Total Primary energy kWh/year			14279.8381	(286)
Target Primary Energy Rate (TPER)			50.4600	(287)

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

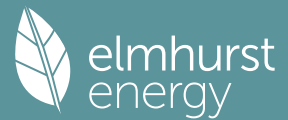
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	283.0000	3.6000	1018.8000	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	283.0000			(4)
Dwelling volume				(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)

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Number of intermittent extract fans 4 * 10 = 40.0000 (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) = 40.0000 / (5) = 0.0393 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.0000 (17)
Infiltration rate 0.1393 (18)
Number of sides sheltered 1 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1288 (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	0.1642	0.1610	0.1578	0.1417	0.1385	0.1224	0.1224	0.1192	0.1288	0.1385	0.1449	0.1514 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5135	0.5130	0.5125	0.5100	0.5096	0.5075	0.5075	0.5071	0.5083	0.5096	0.5105	0.5115 (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
Main dwelling							
Windows			96.5000	0.7752	74.8062		(27)
Ground floor			283.0000	0.1100	31.1300	75.0000	21225.0000 (28a)
External Walls	343.0000	96.5000	246.5000	0.1200	29.5800	70.0000	17255.0000 (29a)
Roof	290.0000		290.0000	0.1200	34.8000	9.0000	2610.0000 (30)
Total net area of external elements Aum(A, m2)			916.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	170.3162		(33)
Main dwelling							
Internal Walls Timber			286.0000			9.0000	2574.0000 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 43664.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 154.2898 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	43.0000	0.0210	0.9030
E3 Sill	25.0000	0.0340	0.8500
E4 Jamb	82.0000	0.0430	3.5260
E14 Flat roof	98.0000	0.1600	15.6800
E16 Corner (normal)	38.0000	0.0300	1.1400
E17 Corner (inverted - internal area greater than external area)	28.0000	-0.0150	-0.4200
E5 Ground floor (normal)	98.0000	0.0210	2.0580
E24 Eaves (insulation at ceiling level - inverted)	26.0000	0.1500	3.9000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			27.6370 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 197.9532 (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	172.6366	172.4605	172.2879	171.4773	171.3256	170.6195	170.6195	170.4887	170.8915	171.3256	171.6324	171.9532 (38)
Heat transfer coeff	370.5898	370.4137	370.2411	369.4305	369.2788	368.5727	368.5727	368.4419	368.8447	369.2788	369.5856	369.9064 (39)
Average = Sum(39)m / 12 =												369.4297

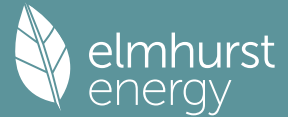
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3095	1.3089	1.3083	1.3054	1.3049	1.3024	1.3024	1.3019	1.3033	1.3049	1.3060	1.3071 (40)
HLP (average)												1.3054
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.1098 (42)
Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)
Hot water usage for baths 32.9612 32.4717 31.7823 30.5113 29.5595 28.5042 27.9342 28.6187 29.3640 30.4933 31.7905 32.8497 (42b)
Hot water usage for other uses 46.4778 44.7877 43.0976 41.4075 39.7174 38.0273 38.0273 39.7174 41.4075 43.0976 44.7877 46.4778 (42c)
Average daily hot water use (litres/day) 72.8127 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	79.4389	77.2593	74.8799	71.9187	69.2769	66.5315	65.9615	68.3361	70.7715	73.5908	76.5781	79.3275 (44)
Energy conte	125.8119	110.0162	115.0876	98.4532	93.2600	81.8082	79.7747	84.6143	87.2683	99.8621	109.0996	124.2077 (45)
Energy content (annual)										Total = Sum(45)m =		1209.2638
Distribution loss (46)m = 0.15 x (45)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 (46)
Water storage loss (or HIU loss):												
Total storage 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 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
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	106.9401	93.5138	97.8244	83.6852	79.2710	69.5370	67.8085	71.9222	74.1781	84.8828	92.7347	105.5766 (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	106.9401	93.5138	97.8244	83.6852	79.2710	69.5370	67.8085	71.9222	74.1781	84.8828	92.7347	105.5766 (64)
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			1027.8743 (64)
Electric shower(s)	61.1529	54.4877	59.4985	56.7787	57.8441	55.1777	57.0169	57.8441	56.7787	59.4985	58.3797	61.1529 (64a)
												695.6101 (64a)

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Heat gains from water heating, kWh/month
42.0232 37.0004 39.3307 35.1160 34.2788 31.1787 31.2063 32.4416 32.7392 36.0953 37.7786 41.6824 (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	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	224.1228	248.1359	224.1228	231.5935	224.1228	231.5935	224.1228	224.1228	231.5935	224.1228	231.5935	224.1228	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	444.3484	448.9594	437.3399	412.6035	381.3783	352.0309	332.4251	327.8141	339.4336	364.1700	395.3953	424.7426	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	(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)	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	(71)
Water heating gains (Table 5)	56.4828	55.0601	52.8639	48.7722	46.0736	43.3037	41.9440	43.6043	45.4711	48.5152	52.4703	56.0247	(72)
Total internal gains	794.6015	821.8028	783.9740	762.6167	721.2221	696.5756	668.1393	665.1886	686.1456	706.4554	749.1065	774.5375	(73)

6. Solar gains

[Jan]				Area	Solar flux		g		FF		Access		Gains		
				m2	Table 6a		Specific data		Specific data		factor		W		
					W/m2		or Table 6b		or Table 6c		Table 6d				
North				25.4000	10.6334		0.5700		0.7000		0.7700		74.6813 (74)		
East				11.6000	19.6403		0.5700		0.7000		0.7700		62.9958 (76)		
South				23.7000	46.7521		0.5700		0.7000		0.7700		306.3764 (78)		
West				35.8000	19.6403		0.5700		0.7000		0.7700		194.4180 (80)		
Solar gains				638.4714	1148.0412	1710.9609	2321.3949	2759.7661	2803.5414	2676.8677	2344.3625	1923.7535	1308.6020	776.2542	538.6799 (83)
Total gains				1433.0729	1969.8441	2494.9350	3084.0116	3480.9882	3500.1170	3345.0070	3009.5511	2609.8992	2015.0574	1525.3606	1313.2174 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9927	0.9801	0.9514	0.8796	0.7562	0.5969	0.4588	0.5200	0.7518	0.9349	0.9853	0.9944	(85)
tau	32.7286	32.7442	32.7594	32.8313	32.8448	32.9077	32.9077	32.9194	32.8835	32.8448	32.8175	32.7891	
alpha	3.1819	3.1829	3.1840	3.1888	3.1897	3.1938	3.1938	3.1946	3.1922	3.1897	3.1878	3.1859	
util living area	0.9927	0.9801	0.9514	0.8796	0.7562	0.5969	0.4588	0.5200	0.7518	0.9349	0.9853	0.9944	(86)
MIT	18.5146	18.8966	19.4378	20.0827	20.5812	20.8592	20.9546	20.9321	20.6956	19.9785	19.1031	18.4388	(87)
Th 2	19.8334	19.8339	19.8344	19.8366	19.8370	19.8390	19.8390	19.8393	19.8382	19.8370	19.8362	19.8353	(88)
util rest of house	0.9910	0.9756	0.9403	0.8523	0.7027	0.5113	0.3482	0.4053	0.6766	0.9142	0.9812	0.9931	(89)
MIT 2	17.5722	17.9512	18.4828	19.0997	19.5453	19.7652	19.8238	19.8145	19.6551	19.0180	18.1606	17.4980	(90)
Living area fraction	17.8386	18.2184	18.7528	19.3776	19.8381	20.0745	20.1435	20.1304	19.9492	19.2895	18.4270	17.7640	(91)
MIT	17.8386	18.2184	18.7528	19.3776	19.8381	20.0745	20.1435	20.1304	19.9492	19.2895	18.4270	17.7640	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.8386	18.2184	18.7528	19.3776	19.8381	20.0745	20.1435	20.1304	19.9492	19.2895	18.4270	17.7640	(93)

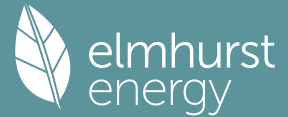
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9867	0.9670	0.9269	0.8396	0.7027	0.5298	0.3784	0.4356	0.6847	0.9016	0.9742	0.9896	(94)
Useful gains	1413.9782	1904.7618	2312.6757	2589.2832	2446.1666	1854.3889	1265.7654	1311.0109	1787.0166	1816.8757	1485.9855	1299.6196	(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	5017.2546	4933.3290	4536.4819	3870.7340	3005.2327	2017.7370	1306.0332	1374.4468	2157.4546	3208.8422	4186.3101	5017.4083	(97)
Space heating kWh	2680.8376	2035.1972	1654.5118	922.6446	415.9452	0.0000	0.0000	0.0000	0.0000	1035.6231	1944.2338	2766.0348	(98a)
Space heating requirement - total per year (kWh/year)												13455.0280	
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	2680.8376	2035.1972	1654.5118	922.6446	415.9452	0.0000	0.0000	0.0000	0.0000	1035.6231	1944.2338	2766.0348	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												13455.0280	
Space heating per m2										(98c) / (4) =		47.5443	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	3464.5833	2727.4379	2800.1587	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8118	0.8702	0.8314	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	2812.5297	2373.4209	2328.1546	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	3984.1649	3807.0618	3419.5510	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	843.5773	1066.6288	811.9989	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	210.8943	266.6572	202.9997	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												680.5513	(107)
Energy for space heating												47.5443	(99)

Full SAP Calculation Printout



Energy for space cooling 2.4048 (108)
 Total 49.9490 (109)
 Fabric Energy Efficiency (DFEE) 49.9 (109)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	283.0000 (1b)	x 3.6000 (2b)	= 1018.8000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	283.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 1018.8000 (5)
Dwelling volume			

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	4 * 10 = 40.0000 (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) =	Air changes per hour 40.0000 / (5) = 0.0393 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.2893 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2676 (21)

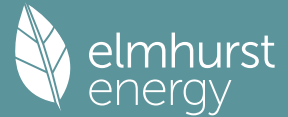
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3411	0.3345	0.3278	0.2943	0.2876	0.2542	0.2542	0.2475	0.2676	0.2876	0.3010	0.3144 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5582	0.5559	0.5537	0.5433	0.5414	0.5323	0.5323	0.5306	0.5358	0.5414	0.5453	0.5494 (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
Main dwelling							
TER Opening Type			70.7500	1.1450	81.0115		(27)
Ground floor			283.0000	0.1300	36.7900		(28a)
External Walls	343.0000	70.7500	272.2500	0.1800	49.0050		(29a)
Roof	290.0000		290.0000	0.1100	31.9000		(30)
Total net area of external elements Aum(A, m ²)			916.0000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 198.7065		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							154.2898 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				43.0000	0.0500	2.1500	
E3 Sill				25.0000	0.0500	1.2500	
E4 Jamb				82.0000	0.0500	4.1000	
E14 Flat roof				98.0000	0.0800	7.8400	
E16 Corner (normal)				38.0000	0.0900	3.4200	
E17 Corner (inverted - internal area greater than external area)				28.0000	-0.0900	-2.5200	
E5 Ground floor (normal)				98.0000	0.1600	15.6800	
E24 Eaves (insulation at ceiling level - inverted)				26.0000	0.2400	6.2400	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							38.1600 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	236.8665 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	187.6661	186.9064	186.1617	182.6641	182.0097	178.9634	178.9634	178.3993	180.1368	182.0097	183.3335	184.7175 (38)
Heat transfer coeff	424.5325	423.7728	423.0282	419.5306	418.8762	415.8299	415.8299	415.2657	417.0032	418.8762	420.2000	421.5840 (39)
Average = Sum(39)m / 12 =												419.5274
HLP	1.5001	1.4974	1.4948	1.4824	1.4801	1.4694	1.4694	1.4674	1.4735	1.4801	1.4848	1.4897 (40)
HLP (average)												1.4824
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.1098 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	32.9612	32.4717	31.7823	30.5113	29.5595	28.5042	27.9342	28.6187	29.3640	30.4933	31.7905	32.8497 (42b)
Hot water usage for other uses	46.4778	44.7877	43.0976	41.4075	39.7174	38.0273	38.0273	39.7174	41.4075	43.0976	44.7877	46.4778 (42c)
Average daily hot water use (litres/day)												72.8127 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	79.4389	77.2593	74.8799	71.9187	69.2769	66.5315	65.9615	68.3361	70.7715	73.5908	76.5781	79.3275 (44)
Distribution loss (46)m = 0.15 x (45)m	125.8119	110.0162	115.0876	98.4532	93.2600	81.8082	79.7747	84.6143	87.2683	99.8621	109.0996	124.2077 (45)
Total = Sum(45)m =												1209.2638
Water storage loss (or HIU 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 (46)
Total storage 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 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
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	106.9401	93.5138	97.8244	83.6852	79.2710	69.5370	67.8085	71.9222	74.1781	84.8828	92.7347	105.5766 (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	106.9401	93.5138	97.8244	83.6852	79.2710	69.5370	67.8085	71.9222	74.1781	84.8828	92.7347	105.5766 (64)
Total per year (kWh/year)												1027.8743 (64)
Electric shower(s)	61.1529	54.4877	59.4985	56.7787	57.8441	55.1777	57.0169	57.8441	56.7787	59.4985	58.3797	61.1529 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												695.6101 (64a)
Heat gains from water heating, kWh/month	42.0232	37.0004	39.3307	35.1160	34.2788	31.1787	31.2063	32.4416	32.7392	36.0953	37.7786	41.6824 (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	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915	155.4915 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	224.1228	248.1359	224.1228	231.5935	224.1228	231.5935	224.1228	224.1228	231.5935	224.1228	231.5935	224.1228 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	444.3484	448.9594	437.3399	412.6035	381.3783	352.0309	332.4251	327.8141	339.4336	364.1700	395.3953	424.7426 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491	38.5491 (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)	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932 (71)
Water heating gains (Table 5)	56.4828	55.0601	52.8639	48.7722	46.0736	43.3037	41.9440	43.6043	45.4711	48.5152	52.4703	56.0247 (72)
Total internal gains	794.6015	821.8028	783.9740	762.6167	721.2221	696.5756	668.1393	665.1886	686.1456	706.4554	749.1065	774.5375 (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				18.6200	10.6334		0.6300		0.7000		0.7700		60.5095 (74)
East				8.5000	19.6403		0.6300		0.7000		0.7700		51.0197 (76)
South				17.3800	46.7521		0.6300		0.7000		0.7700		248.3261 (78)
West				26.2500	19.6403		0.6300		0.7000		0.7700		157.5609 (80)
Solar gains	517.4162	930.3588	1386.5151	1881.1567	2236.3652	2271.8273	2169.1827	1899.7575	1558.9434	1060.4677	629.0729		436.5469 (83)
Total gains	1312.0177	1752.1616	2170.4892	2643.7733	2957.5873	2968.4029	2837.3220	2564.9461	2245.0890	1766.9231	1378.1793	1211.0843	(84)

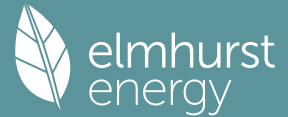
7. Mean internal temperature (heating season)

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	28.5700	28.6212	28.6716	28.9106	28.9558	29.1679	29.1679	29.2075	29.0858	28.9558	28.8646	28.7698
alpha	2.9047	2.9081	2.9114	2.9274	2.9304	2.9445	2.9445	2.9472	2.9391	2.9304	2.9243	2.9180
util living area	0.9939	0.9857	0.9681	0.9231	0.8376	0.7044	0.5684	0.6287	0.8301	0.9565	0.9888	0.9952 (86)
MIT	18.1206	18.4624	18.9905	19.6826	20.2907	20.7141	20.8912	20.8508	20.4923	19.6667	18.7632	18.0677 (87)
Th 2	19.6874	19.6894	19.6914	19.7007	19.7024	19.7106	19.7106	19.7121	19.7074	19.7024	19.6989	19.6952 (88)
util rest of house	0.9924	0.9822	0.9599	0.9022	0.7902	0.6121	0.4302	0.4929	0.7611	0.9408	0.9855	0.9940 (89)
MIT 2	17.0844	17.4253	17.9489	18.6281	19.1949	19.5561	19.6740	19.6563	19.3921	18.6270	17.7329	17.0367 (90)
Living area fraction	17.3773	17.7185	18.2433	18.9262	19.5047	19.8834	20.0181	19.9940	19.7031	18.9209	18.0242	17.3281 (91)
MIT	17.3773	17.7185	18.2433	18.9262	19.5047	19.8834	20.0181	19.9940	19.7031	18.9209	18.0242	17.3281 (92)
Temperature adjustment	17.3773	17.7185	18.2433	18.9262	19.5047	19.8834	20.0181	19.9940	19.7031	18.9209	18.0242	17.3281 (93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Utilisation	0.9884	0.9745	0.9474	0.8862	0.7816	0.6260	0.4660	0.5259	0.7608	0.9276	0.9791	0.9907 (94)
Useful gains	1296.7891	1707.4236	2056.3217	2343.0117	2311.7209	1858.2716	1322.1972	1349.0286	1708.1198	1639.0747	1349.3338	1199.8269 (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	5551.7546	5432.1317	4967.7598	4206.3015	3269.1916	2197.0029	1421.3394	1492.4506	2336.5127	3485.4450	4590.3333	5534.6073 (97)
Space heating kWh	3165.6943	2503.0038	2166.1099	1341.5687	712.3582	0.0000	0.0000	0.0000	0.0000	1373.6996	2333.5196	3225.0766 (98a)
Space heating requirement - total per year (kWh/year)												16821.0308
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	3165.6943	2503.0038	2166.1099	1341.5687	712.3582	0.0000	0.0000	0.0000	0.0000	1373.6996	2333.5196	3225.0766 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												16821.0308
Space heating per m2										(98c) / (4) =		59.4383 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	3908.8006	3077.1409	3156.0195	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6879	0.7625	0.7142	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	2688.9004	2346.1712	2254.1712	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	3362.6809	3213.6638	2899.8827	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	485.1219	645.4145	480.4094	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	121.2805	161.3536	120.1023	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												402.7364 (107)
Energy for space heating												59.4383 (99)
Energy for space cooling												1.4231 (108)
Total												60.8614 (109)
Fabric Energy Efficiency (TFEE)												60.9 (109)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	283.0000 (1b)	x 3.6000 (2b)	= 1018.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	283.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	1018.8000 (5)

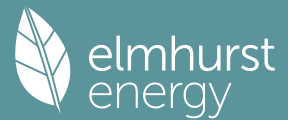
2. Ventilation rate

	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	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.0000 (17)
Infiltration rate	0.1000 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.0925 (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	0.1179	0.1156	0.1133	0.1018	0.0994	0.0879	0.0879	0.0856	0.0925	0.0994	0.1041	0.1087 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												83.7000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.1994	0.1971	0.1948	0.1832	0.1809	0.1694	0.1694	0.1671	0.1740	0.1809	0.1856	0.1902 (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				
Main dwelling													
Windows					96.5000	0.7752	74.8062			(27)			
Ground floor					283.0000	0.1100	31.1300	75.0000	21225.0000	(28a)			
External Walls		343.0000	96.5000		246.5000	0.1200	29.5800	70.0000	17255.0000	(29a)			
Roof		290.0000			290.0000	0.1200	34.8000	9.0000	2610.0000	(30)			
Total net area of external elements Aum(A, m2)					916.0000					(31)			
Fabric heat loss, W/K = Sum (A x U)					(26)...	(30) + (32) =	170.3162			(33)			
Main dwelling													
Internal Walls Timber					286.0000			9.0000	2574.0000	(32c)			
Heat capacity Cm = Sum(A x k)							(28)...	(30) + (32) + (32a)...	(32e) =	43664.0000 (34)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K										154.2898 (35)			
List of Thermal Bridges													
K1 Element						Length	Psi-value	Total					
E2 Other lintels (including other steel lintels)						43.0000	0.0210	0.9030					
E3 Sill						25.0000	0.0340	0.8500					
E4 Jamb						82.0000	0.0430	3.5260					
E14 Flat roof						98.0000	0.1600	15.6800					
E16 Corner (normal)						38.0000	0.0300	1.1400					
E17 Corner (inverted - internal area greater than external area)						28.0000	-0.0150	-0.4200					
E5 Ground floor (normal)						98.0000	0.0210	2.0580					
E24 Eaves (insulation at ceiling level - inverted)						26.0000	0.1500	3.9000					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)										27.6370 (36)			
Point Thermal bridges								(36a) =		0.0000			
Total fabric heat loss								(33) + (36) + (36a) =		197.9532 (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	67.0517	66.2742	65.4967	61.6094	60.8319	56.9446	56.9446	56.1671	58.4995	60.8319	62.3869	63.9418	(38)
Average = Sum(39)m / 12 =	265.0049	264.2274	263.4499	259.5626	258.7851	254.8978	254.8978	254.1203	256.4527	258.7851	260.3401	261.8950	(39)
						239.3682							
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9364	0.9337	0.9309	0.9172	0.9144	0.9007	0.9007	0.8980	0.9062	0.9144	0.9199	0.9254	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

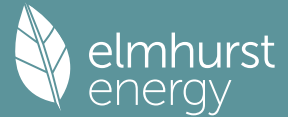
4. Water heating energy requirements (kWh/year)													

Assumed occupancy													3.1098 (42)
Hot water usage for mixer showers													
	95.4519	94.0174	91.9272	87.9278	84.9763	81.6849	79.8141	81.8885	84.1625	87.6965	91.7818	95.0862	(42a)
Hot water usage for baths													
	32.9612	32.4717	31.7823	30.5113	29.5595	28.5042	27.9342	28.6187	29.3640	30.4933	31.7905	32.8497	(42b)
Hot water usage for other uses													
	46.4778	44.7877	43.0976	41.4075	39.7174	38.0273	38.0273	39.7174	41.4075	43.0976	44.7877	46.4778	(42c)
Average daily hot water use (litres/day)													160.8162 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	174.8908	171.2768	166.8070	159.8465	154.2532	148.2164	145.7755	150.2246	154.9340	161.2873	168.3599	174.4137	(44)
Energy conte	276.9843	243.8958	256.3762	218.8219	207.6545	182.2494	176.3029	186.0094	191.0492	218.8654	239.8596	273.0897	(45)
Energy content (annual)										Total = Sum(45)m =		2671.1583	
Distribution loss (46)m = 0.15 x (45)m													
	41.5477	36.5844	38.4564	32.8233	31.1482	27.3374	26.4454	27.9014	28.6574	32.8298	35.9789	40.9635	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8500 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9990 (55)
Total storage loss													
	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690	(56)
If cylinder contains dedicated solar storage													
	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690	(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													
	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211	(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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211	(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													
	135.4824	120.2819	128.6302	114.7439	112.4302	102.5835	102.0058	105.2333	105.5094	116.1579	121.7389	134.1874	(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	
	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	61.4779	54.6041	44.4070	33.6190	25.1306	21.2163	22.9250	29.7987	39.9958	50.7838	59.2722	63.1865	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	663.2066	670.0886	652.7462	615.8262	569.2213	525.4193	496.1569	489.2749	506.6173	543.5373	590.1422	633.9442	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	(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)													
	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	(71)
Water heating gains (Table 5)													
	182.1000	178.9910	172.8901	159.3665	151.1159	142.4771	137.1046	141.4426	146.5409	156.1262	169.0818	180.3595	(72)
Total internal gains	1025.7499	1022.6491	989.0087	927.7771	864.4332	808.0781	775.1518	779.4815	812.1194	869.4127	937.4617	996.4556	(73)

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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				25.4000	10.6334	0.5700		0.7000		0.7700		74.6813 (74)
East				11.6000	19.6403	0.5700		0.7000		0.7700		62.9958 (76)
South				23.7000	46.7521	0.5700		0.7000		0.7700		306.3764 (78)
West				35.8000	19.6403	0.5700		0.7000		0.7700		194.4180 (80)

Solar gains	638.4714	1148.0412	1710.9609	2321.3949	2759.7661	2803.5414	2676.8677	2344.3625	1923.7535	1308.6020	776.2542	538.6799 (83)
Total gains	1664.2213	2170.6903	2699.9696	3249.1720	3624.1993	3611.6195	3452.0195	3123.8441	2735.8729	2178.0147	1713.7158	1535.1355 (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	45.7685	45.9032	46.0387	46.7282	46.8686	47.5833	47.5833	47.7289	47.2948	46.8686	46.5886	46.3120
alpha	4.0512	4.0602	4.0692	4.1152	4.1246	4.1722	4.1722	4.1819	4.1530	4.1246	4.1059	4.0875
util living area	0.9880	0.9670	0.9137	0.7906	0.6171	0.4426	0.3229	0.3703	0.6050	0.8796	0.9750	0.9912 (86)
Living	19.7238	19.9935	20.3394	20.6769	20.8512	20.9116	20.9229	20.9209	20.8758	20.5885	20.0805	19.6788
Non living	18.6235	18.9659	19.3963	19.8044	19.9940	20.0620	20.0705	20.0718	20.0289	19.7158	19.0882	18.5733
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	4	0	0	0	0	0	0	0	0	0	0	0
16 / 9	27	0	0	0	0	0	0	0	0	0	0	20
MIT	20.3705	19.9935	20.3394	20.6769	20.8512	20.9116	20.9229	20.9209	20.8758	20.5885	20.0805	20.0484 (87)
Th 2	20.1367	20.1390	20.1413	20.1529	20.1552	20.1669	20.1669	20.1692	20.1622	20.1552	20.1506	20.1459 (88)
util rest of house	0.9856	0.9608	0.8985	0.7595	0.5715	0.3880	0.2626	0.3051	0.5434	0.8523	0.9692	0.9894 (89)
MIT 2	19.5550	18.9659	19.3963	19.8044	19.9940	20.0620	20.0705	20.0718	20.0289	19.7158	19.0882	19.1401 (90)
Living area fraction									fLA =	Living area / (4) =		0.2827 (91)
MIT	19.7855	19.2564	19.6629	20.0510	20.2363	20.3022	20.3114	20.3118	20.2683	19.9625	19.3687	19.3968 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7855	19.2564	19.6629	20.0510	20.2363	20.3022	20.3114	20.3118	20.2683	19.9625	19.3687	19.3968 (93)

8. Space heating requirement

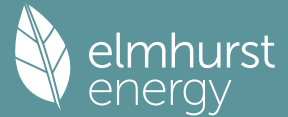
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9845	0.9529	0.8888	0.7554	0.5760	0.3970	0.2732	0.3164	0.5515	0.8452	0.9625	0.9874 (94)
Useful gains	1638.4015	2068.3456	2399.6007	2454.5419	2087.5075	1433.8194	942.9317	988.4109	1508.9661	1840.8775	1649.4209	1515.7795 (95)
Ext temp.	4.3000	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	4103.7287	3793.3560	3467.7773	2894.3833	2209.0664	1453.4741	946.0353	994.0688	1581.8777	2422.8721	3194.0375	3979.9777 (97)
Space heating kWh	1834.2035	1159.2070	794.7234	316.6859	90.4399	0.0000	0.0000	0.0000	0.0000	433.0040	1112.1239	1833.3635 (98a)
Space heating requirement - total per year (kWh/year)												7573.7510
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	1834.2035	1159.2070	794.7234	316.6859	90.4399	0.0000	0.0000	0.0000	0.0000	433.0040	1112.1239	1833.3635 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7573.7510
Space heating per m2										(98c) / (4) =		26.7624 (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 %)												333.2788 (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	1834.2035	1159.2070	794.7234	316.6859	90.4399	0.0000	0.0000	0.0000	0.0000	433.0040	1112.1239	1833.3635 (98)
Space heating efficiency (main heating system 1)	333.2788	333.2788	333.2788	333.2788	333.2788	0.0000	0.0000	0.0000	0.0000	333.2788	333.2788	333.2788 (210)
Space heating fuel (main heating system)	550.3510	347.8190	238.4560	95.0213	27.1364	0.0000	0.0000	0.0000	0.0000	129.9224	333.6917	550.0990 (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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (64)
Efficiency of water heater	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266 (216)
Fuel for water heating, kWh/month	183.7774	162.5060	172.3428	150.5348	145.3092	130.2423	127.9135	133.2993	135.1250	151.5297	162.2078	181.6164 (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	127.0996	114.7996	127.0996	122.9996	127.0996	122.9996	127.0996	127.0996	122.9996	127.0996	122.9996	127.0996 (231)
Lighting	53.8112	43.1694	38.8692	28.4773	21.9967	17.9715	20.0661	26.0827	33.8788	44.4508	50.2071	55.3068 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-147.6249	-273.0059	-518.6476	-723.9785	-764.1585	-668.0146	-663.3359	-669.6180	-557.6231	-360.6430	-180.3292	-119.4153 (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)

1. Overall dwelling characteristics									
		Area (m2)		Storey height (m)		Volume (m3)			
Main dwelling		283.0000	(1b)	x	3.6000	(2b)	=	1018.8000	(1b) - (3b)
Ground floor									
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	283.0000								(4)
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	=	1018.8000		(5)

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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											0 * 10 =	0.0000 (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) =											0.0000 / (5) =	0.0000 (8)	
Pressure test											Yes		
Pressure Test Method											Blower Door		
Measured/design AP50											2.0000 (17)		
Infiltration rate											0.1000 (18)		
Number of sides sheltered											1 (19)		
Shelter factor											(20) = 1 - [0.075 x (19)] =	0.9250 (20)	
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.0925 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.0000	3.8000	3.8000	3.5000	3.5000	3.2000	3.2000	3.0000	3.1000	3.4000	3.3000	3.6000 (22)	
Wind factor	1.0000	0.9500	0.9500	0.8750	0.8750	0.8000	0.8000	0.7500	0.7750	0.8500	0.8250	0.9000 (22a)	
Adj infilt rate													
	0.0925	0.0879	0.0879	0.0809	0.0809	0.0740	0.0740	0.0694	0.0717	0.0786	0.0763	0.0833 (22b)	
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													83.7000 (23c)
Effective ac	0.1740	0.1694	0.1694	0.1624	0.1624	0.1555	0.1555	0.1509	0.1532	0.1601	0.1578	0.1647 (25)	

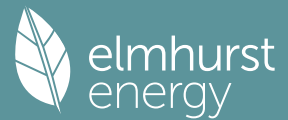
3. Heat losses and heat loss parameter

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						
Main dwelling													
Windows			96.5000	0.7752	74.8062			(27)					
Ground floor			283.0000	0.1100	31.1300	75.0000	21225.0000	(28a)					
External Walls	343.0000	96.5000	246.5000	0.1200	29.5800	70.0000	17255.0000	(29a)					
Roof	290.0000		290.0000	0.1200	34.8000	9.0000	2610.0000	(30)					
Total net area of external elements Aum(A, m2)			916.0000					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	170.3162				(33)					
Main dwelling													
Internal Walls Timber			286.0000			9.0000	2574.0000	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	43664.0000	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							154.2898	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				43.0000	0.0210	0.9030							
E3 Sill				25.0000	0.0340	0.8500							
E4 Jamb				82.0000	0.0430	3.5260							
E14 Flat roof				98.0000	0.1600	15.6800							
E16 Corner (normal)				38.0000	0.0300	1.1400							
E17 Corner (inverted - internal area greater than external area)				28.0000	-0.0150	-0.4200							
E5 Ground floor (normal)				98.0000	0.0210	2.0580							
E24 Eaves (insulation at ceiling level - inverted)				26.0000	0.1500	3.9000							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.6370	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	197.9532	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 58.4995	Feb 56.9446	Mar 56.9446	Apr 54.6121	May 54.6121	Jun 52.2797	Jul 52.2797	Aug 50.7248	Sep 51.5023	Oct 53.8347	Nov 53.0572	Dec 55.3896	(38)
Heat transfer coeff	256.4527	254.8978	254.8978	252.5653	252.5653	250.2329	250.2329	248.6780	249.4555	251.7879	251.0104	253.3428	(39)
Average = Sum(39)m / 12 =												252.1766	
HLP	Jan 0.9062	Feb 0.9007	Mar 0.9007	Apr 0.8925	May 0.8925	Jun 0.8842	Jul 0.8842	Aug 0.8787	Sep 0.8815	Oct 0.8897	Nov 0.8870	Dec 0.8952	(40)
HLP (average)												0.8911	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	3.1098 (42)											
Hot water usage for mixer showers	95.4519 94.0174 91.9272 87.9278 84.9763 81.6849 79.8141 81.8885 84.1625 87.6965 91.7818 95.0862 (42a)											
Hot water usage for baths	32.9612 32.4717 31.7823 30.5113 29.5595 28.5042 27.9342 28.6187 29.3640 30.4933 31.7905 32.8497 (42b)											
Hot water usage for other uses	46.4778 44.7877 43.0976 41.4075 39.7174 38.0273 38.0273 39.7174 41.4075 43.0976 44.7877 46.4778 (42c)											
Average daily hot water use (litres/day)	160.8162 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	174.8908	171.2768	166.8070	159.8465	154.2532	148.2164	145.7755	150.2246	154.9340	161.2873	168.3599	174.4137
Energy content (annual)	276.9843	243.8958	256.3762	218.8219	207.6545	182.2494	176.3029	186.0094	191.0492	218.8654	239.8596	273.0897
Distribution loss (46)m = 0.15 x (45)m	41.5477 36.5844 38.4564 32.8233 31.1482 27.3374 26.4454 27.9014 28.6574 32.8298 35.9789 40.9635 (46)											
Water storage loss (or HIU loss):	250.0000 (47)											
Store volume	1.8500 (48)											
a) If manufacturer declared loss factor is known (kWh/day):												

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Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9990 (55)
Total storage loss	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690 (56)
If cylinder contains dedicated solar storage	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690 (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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (64)
Total per year (kWh/year) = Sum(64)m =												3309.6893 (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	135.4824	120.2819	128.6302	114.7439	112.4302	102.5835	102.0058	105.2333	105.5094	116.1579	121.7389	134.1874 (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	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.4779	54.6041	44.4070	33.6190	25.1306	21.2163	22.9250	29.7987	39.9958	50.7838	59.2722	63.1865	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	663.2066	670.0886	652.7462	615.8262	569.2213	525.4193	496.1569	489.2749	506.6173	543.5373	590.1422	633.9442	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	(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)	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	(71)
Water heating gains (Table 5)	182.1000	178.9910	172.8901	159.3665	151.1159	142.4771	137.1046	141.4426	146.5409	156.1262	169.0818	180.3595	(72)
Total internal gains	1025.7499	1022.6491	989.0087	927.7771	864.4332	808.0781	775.1518	779.4815	812.1194	869.4127	937.4617	996.4556	(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				25.4000	12.7500		0.5700		0.7000		0.7700		89.5466 (74)
East				11.6000	23.7835		0.5700		0.7000		0.7700		76.2851 (76)
South				23.7000	54.0600		0.5700		0.7000		0.7700		354.2669 (78)
West				35.8000	23.7835		0.5700		0.7000		0.7700		235.4316 (80)
Solar gains	755.5302	1189.1722	1765.3949	2442.3182	2837.5921	3038.9490	2898.7022	2584.1608	2119.6248	1456.5017	905.2909	640.8837	(83)
Total gains	1781.2801	2211.8213	2754.4036	3370.0952	3702.0253	3847.0271	3673.8541	3363.6424	2931.7441	2325.9144	1842.7525	1637.3392	(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	47.2948	47.5833	47.5833	48.0228	48.0228	48.4704	48.4704	48.7735	48.6215	48.1711	48.3203	47.8754
alpha	4.1530	4.1722	4.1722	4.2015	4.2015	4.2314	4.2314	4.2516	4.2414	4.2114	4.2214	4.1917
util living area												
	0.9824	0.9597	0.8910	0.7435	0.5537	0.3548	0.2447	0.2727	0.5249	0.8312	0.9618	0.9871 (86)
Living	19.8906	20.1181	20.4626	20.7522	20.8841	20.9219	20.9262	20.9261	20.9019	20.6931	20.2417	19.8405
Non living	18.8551	19.1447	19.5674	19.9073	20.0442	20.0842	20.0869	20.0919	20.0719	19.8533	19.3124	18.7988
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	13
MIT	20.4325	20.1181	20.4626	20.7522	20.8841	20.9219	20.9262	20.9261	20.9019	20.6931	20.2417	20.0513 (87)
Th 2	20.1622	20.1669	20.1669	20.1739	20.1739	20.1809	20.1809	20.1856	20.1833	20.1763	20.1786	20.1716 (88)
util rest of house												
	0.9789	0.9521	0.8724	0.7087	0.5065	0.3031	0.1893	0.2131	0.4642	0.7963	0.9532	0.9845 (89)
MIT 2	19.6411	19.1447	19.5674	19.9073	20.0442	20.0842	20.0869	20.0919	20.0719	19.8533	19.3124	19.1204 (90)
Living area fraction									fLA =	Living area / (4) =		
MIT	19.8648	19.4198	19.8205	20.1461	20.2816	20.3210	20.3242	20.3277	20.3066	20.0907	19.5751	19.3836 (91)
Temperature adjustment												0.0000
adjusted MIT	19.8648	19.4198	19.8205	20.1461	20.2816	20.3210	20.3242	20.3277	20.3066	20.0907	19.5751	19.3836 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9775	0.9438	0.8637	0.7075	0.5128	0.3120	0.1990	0.2235	0.4736	0.7923	0.9454	0.9814	(94)
Ext temp.	1741.1201	2087.5531	2378.9534	2384.3093	1898.4167	1200.2460	731.0936	751.9218	1388.5468	1842.9156	1742.2045	1606.8057	(95)
Heat loss rate W	4.9000	5.4000	7.2000	9.5000	12.5000	15.5000	17.4000	17.3000	14.6000	11.2000	7.7000	4.8000	(96)
Space heating kWh	3837.7689	3573.6271	3216.9252	2688.8419	1965.3659	1206.3836	731.7286	752.9290	1423.5313	2238.5773	2980.7859	3694.6431	(97)
Space heating requirement - total per year (kWh/year)	1559.9067	998.6417	623.4510	219.2635	49.8103	0.0000	0.0000	0.0000	0.0000	294.3723	891.7786	1553.3510	(98a)
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)	1559.9067	998.6417	623.4510	219.2635	49.8103	0.0000	0.0000	0.0000	0.0000	294.3723	891.7786	1553.3510	(98c)

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Space heating requirement after solar contribution - total per year (kWh/year)
Space heating per m2

6190.5751
(98c) / (4) = 21.8748 (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 %)												332.2947 (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	1559.9067	998.6417	623.4510	219.2635	49.8103	0.0000	0.0000	0.0000	0.0000	294.3723	891.7786	1553.3510 (98)
Space heating efficiency (main heating system 1)	332.2947	332.2947	332.2947	332.2947	332.2947	0.0000	0.0000	0.0000	0.0000	332.2947	332.2947	332.2947 (210)
Space heating fuel (main heating system)	469.4347	300.5289	187.6199	65.9846	14.9898	0.0000	0.0000	0.0000	0.0000	88.5877	268.3698	467.4619 (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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (64)
Efficiency of water heater	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899 (216)
Fuel for water heating, kWh/month	182.8003	161.6420	171.4265	149.7345	144.5367	129.5499	127.2335	132.5906	134.4066	150.7241	161.3454	180.6508 (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	127.0996	114.7996	127.0996	122.9996	127.0996	122.9996	127.0996	127.0996	122.9996	127.0996	122.9996	127.0996 (231)
Lighting	53.8112	43.1694	38.8692	28.4773	21.9967	17.9715	20.0661	26.0827	33.8788	44.4508	50.2071	55.3068 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-181.1827	-292.1954	-546.0534	-760.6192	-751.2393	-667.3222	-662.6558	-668.9093	-615.1697	-409.7636	-217.5014	-147.5199 (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												1862.9773 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												181.1899
Water heating fuel used												1826.6409 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2040)												
mechanical ventilation fans (SFP = 1.2040)												1496.4949 (230a)
Total electricity for the above, kWh/year												1496.4949 (231)
Electricity for lighting (calculated in Appendix L)												434.2873 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-5920.1318 (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												-299.7313 (238)

10a. Fuel costs - using BEDF prices (595)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1862.9773	27.6700	515.4858 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1826.6409	27.6700	505.4315 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	1496.4949	27.6700	414.0802 (249)
Energy for lighting	434.2873	27.6700	120.1673 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5920.1318	27.6700	-1638.1005
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-1638.1005 (252)
Total energy cost			-82.9357 (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	1862.9773	0.1575	293.4908 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1826.6409	0.1410	257.6027 (264)
Space and water heating			551.0935 (265)

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Pumps, fans and electric keep-hot	1496.4949	0.1387	207.5823 (267)
Energy for lighting	434.2873	0.1443	62.6811 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5920.1318	0.1324	-783.9806
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-783.9806 (269)
Total CO2, kg/year			37.3762 (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	1862.9773	1.5832	2949.3761 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1826.6409	1.5215	2779.1738 (278)
Space and water heating			5728.5500 (279)
Pumps, fans and electric keep-hot	1496.4949	1.5128	2263.8976 (281)
Energy for lighting	434.2873	1.5338	666.1244 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5920.1318	1.4893	-8817.0531
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-8817.0531 (283)
Total Primary energy kWh/year			-158.4812 (286)

SAP 10 EPC IMPROVEMENTS

3716

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

N Solar water heating Cancelled by user
U Solar photovoltaic panels Already installed
V2 Wind turbine Cancelled by user

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

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

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

Fuel prices for cost data on this page from database revision number 595 TEST (29 May 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £1555	Potential £1555	£0	Saving
Electricity				
Space heating	£930	£930	£0	
Water heating	£505	£505	£0	
Lighting	£120	£120	£0	
Generated (PV)	-£1638	-£1638	£0	
Total cost of fuels	-£83	-£83	£0	
Total cost of uses	-£83	-£83	£0	
Delivered energy	-1 kWh/m²	-1 kWh/m²	0 kWh/m²	
Carbon dioxide emissions	0.0 tonnes	0.0 tonnes	0.0 tonnes	
CO2 emissions per m²	0 kg/m²	0 kg/m²	0 kg/m²	
Primary energy	-1 kWh/m²	-1 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

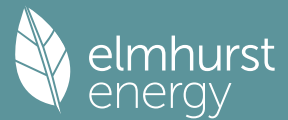
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	283.0000 (1b)	x 3.6000 (2b)	= 1018.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	283.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 1018.8000 (5)
Dwelling volume			

2. Ventilation rate

Number of open chimneys m3 per hour
0 * 80 = 0.0000 (6a)

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Number of open flues
Number of chimneys / flues attached to closed fire
Number of flues attached to solid fuel boiler
Number of flues attached to other heater
Number of blocked chimneys
Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

0 * 20 = 0.0000 (6b)
0 * 10 = 0.0000 (6c)
0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
0 * 10 = 0.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Shelter factor
Infiltration rate adjusted to include shelter factor

Air changes per hour
Blower Door
Yes
2.0000 (17)
0.1000 (18)
1 (19)
(20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.0925 (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
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
Adj infilt rate	0.1179	0.1156	0.1133	0.1018	0.0994	0.0879	0.0879	0.0856	0.0925	0.0994	0.1041	0.1087
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												83.7000 (23c)
Effective ac	0.1994	0.1971	0.1948	0.1832	0.1809	0.1694	0.1694	0.1671	0.1740	0.1809	0.1856	0.1902 (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
Main dwelling							
Windows			96.5000	0.7752	74.8062		(27)
Ground floor			283.0000	0.1100	31.1300	75.0000	21225.0000 (28a)
External Walls	343.0000	96.5000	246.5000	0.1200	29.5800	70.0000	17255.0000 (29a)
Roof	290.0000		290.0000	0.1200	34.8000	9.0000	2610.0000 (30)
Total net area of external elements Aum(A, m2)			916.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	170.3162		(33)
Main dwelling							
Internal Walls Timber			286.0000			9.0000	2574.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	43664.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							154.2898 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				43.0000	0.0210	0.9030	
E3 Sill				25.0000	0.0340	0.8500	
E4 Jamb				82.0000	0.0430	3.5260	
E14 Flat roof				98.0000	0.1600	15.6800	
E16 Corner (normal)				38.0000	0.0300	1.1400	
E17 Corner (inverted - internal area greater than external area)				28.0000	-0.0150	-0.4200	
E5 Ground floor (normal)				98.0000	0.0210	2.0580	
E24 Eaves (insulation at ceiling level - inverted)				26.0000	0.1500	3.9000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.6370 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	197.9532 (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	67.0517	66.2742	65.4967	61.6094	60.8319	56.9446	56.9446	56.1671	58.4995	60.8319	62.3869	63.9418
Heat transfer coeff	265.0049	264.2274	263.4499	259.5626	258.7851	254.8978	254.8978	254.1203	256.4527	258.7851	260.3401	261.8950
Average = Sum(39)m / 12 =						259.3682						

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9364	0.9337	0.9309	0.9172	0.9144	0.9007	0.9007	0.8980	0.9062	0.9144	0.9199	0.9254
HLP (average)												0.9165
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.1098 (42)

Hot water usage for mixer showers
95.4519 94.0174 91.9272 87.9278 84.9763 81.6849 79.8141 81.8885 84.1625 87.6965 91.7818 95.0862 (42a)

Hot water usage for baths
32.9612 32.4717 31.7823 30.5113 29.5595 28.5042 27.9342 28.6187 29.3640 30.4933 31.7905 32.8497 (42b)

Hot water usage for other uses
46.4778 44.7877 43.0976 41.4075 39.7174 38.0273 38.0273 39.7174 41.4075 43.0976 44.7877 46.4778 (42c)

Average daily hot water use (litres/day) 160.8162 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	174.8908	171.2768	166.8070	159.8465	154.2532	148.2164	145.7755	150.2246	154.9340	161.2873	168.3599	174.4137
Energy conte	276.9843	243.8958	256.3762	218.8219	207.6545	182.2494	176.3029	186.0094	191.0492	218.8654	239.8596	273.0897
Energy content (annual)										Total = Sum(45)m =		2671.1583
Distribution loss (46)m = 0.15 x (45)m												
41.5477 36.5844			38.4564	32.8233	31.1482	27.3374	26.4454	27.9014	28.6574	32.8298	35.9789	40.9635
Water storage loss (or HIU loss):												
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8500 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9990 (55)
Total storage loss												
30.9690 27.9720 30.9690 29.9700 30.9690 29.9700 30.9690 30.9690 29.9700 30.9690 29.9700 30.9690												(56)
If cylinder contains dedicated solar storage												
30.9690 27.9720 30.9690 29.9700 30.9690 29.9700 30.9690 30.9690 29.9700 30.9690 29.9700 30.9690												(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624
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
Total heat required for water heating calculated for each month												(61)

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WWHRS	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (62)
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 (63a)
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 (63b)
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 (63c)
Output from w/h	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)
	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	135.4824	120.2819	128.6302	114.7439	112.4302	102.5835	102.0058	105.2333	105.5094	116.1579	121.7389	134.1874 (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	
(66m)	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.4779	54.6041	44.4070	33.6190	25.1306	21.2163	22.9250	29.7987	39.9958	50.7838	59.2722	63.1865	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	663.2066	670.0886	652.7462	615.8262	569.2213	525.4193	496.1569	489.2749	506.6173	543.5373	590.1422	633.9442	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	(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)	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	(71)
Water heating gains (Table 5)	182.1000	178.9910	172.8901	159.3665	151.1159	142.4771	137.1046	141.4426	146.5409	156.1262	169.0818	180.3595	(72)
Total internal gains	1025.7499	1022.6491	989.0087	927.7771	864.4332	808.0781	775.1518	779.4815	812.1194	869.4127	937.4617	996.4556	(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					25.4000	10.6334		0.5700	0.7000	0.7700		74.6813 (74)
East					11.6000	19.6403		0.5700	0.7000	0.7700		62.9958 (76)
South					23.7000	46.7521		0.5700	0.7000	0.7700		306.3764 (78)
West					35.8000	19.6403		0.5700	0.7000	0.7700		194.4180 (80)
Solar gains	638.4714	1148.0412	1710.9609	2321.3949	2759.7661	2803.5414	2676.8677	2344.3625	1923.7535	1308.6020	776.2542	538.6799 (83)
Total gains	1664.2213	2170.6903	2699.9696	3249.1720	3624.1993	3611.6195	3452.0195	3123.8441	2735.8729	2178.0147	1713.7158	1535.1355 (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	45.7685	45.9032	46.0387	46.7282	46.8686	47.5833	47.5833	47.7289	47.2948	46.8686	46.5886	46.3120	
alpha	4.0512	4.0602	4.0692	4.1152	4.1246	4.1722	4.1722	4.1819	4.1530	4.1246	4.1059	4.0875	
util living area	0.9880	0.9670	0.9137	0.7906	0.6171	0.4426	0.3229	0.3703	0.6050	0.8796	0.9750	0.9912 (86)	
Living	19.7238	19.9935	20.3394	20.6769	20.8512	20.9116	20.9229	20.9209	20.8758	20.5885	20.0805	19.6788	
Non living	18.6235	18.9659	19.3963	19.8044	19.9940	20.0620	20.0705	20.0718	20.0289	19.7158	19.0882	18.5733	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	4	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	27	0	0	0	0	0	0	0	0	0	0	20	
MIT	20.3705	19.9935	20.3394	20.6769	20.8512	20.9116	20.9229	20.9209	20.8758	20.5885	20.0805	20.0484 (87)	
Th 2	20.1367	20.1390	20.1413	20.1529	20.1552	20.1669	20.1669	20.1692	20.1622	20.1552	20.1506	20.1459 (88)	
util rest of house	0.9856	0.9608	0.8985	0.7595	0.5715	0.3880	0.2626	0.3051	0.5434	0.8523	0.9692	0.9894 (89)	
MIT 2	19.5550	18.9659	19.3963	19.8044	19.9940	20.0620	20.0705	20.0718	20.0289	19.7158	19.0882	19.1401 (90)	
Living area fraction	19.7855	19.2564	19.6629	20.0510	20.2363	20.3022	20.3114	20.3118	fLA = Living area / (4) =	19.9625	19.3687	0.2827 (91)	
MIT	19.7855	19.2564	19.6629	20.0510	20.2363	20.3022	20.3114	20.3118	20.2683	19.9625	19.3687	19.3968 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.7855	19.2564	19.6629	20.0510	20.2363	20.3022	20.3114	20.3118	20.2683	19.9625	19.3687	19.3968 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	1638.4015	2068.3456	2399.6007	2454.5419	2087.5075	1433.8194	942.9317	988.4109	1508.9661	1840.8775	1649.4209	1515.7795 (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	4103.7287	3793.3560	3467.7773	2894.3833	2209.0664	1453.4741	946.0353	994.0688	1581.8777	2422.8721	3194.0375	3979.9777 (97)	
Space heating kWh	1834.2035	1159.2070	794.7234	316.6859	90.4399	0.0000	0.0000	0.0000	0.0000	433.0040	1112.1239	1833.3635 (98a)	
Space heating requirement - total per year (kWh/year)												7573.7510	
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	1834.2035	1159.2070	794.7234	316.6859	90.4399	0.0000	0.0000	0.0000	0.0000	433.0040	1112.1239	1833.3635 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												7573.7510	
Space heating per m2												(98c) / (4) =	26.7624 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
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Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												333.2788 (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	1834.2035	1159.2070	794.7234	316.6859	90.4399	0.0000	0.0000	0.0000	0.0000	433.0040	1112.1239	1833.3635 (98)
Space heating efficiency (main heating system 1)	333.2788	333.2788	333.2788	333.2788	333.2788	0.0000	0.0000	0.0000	0.0000	333.2788	333.2788	333.2788 (210)
Space heating fuel (main heating system)	550.3510	347.8190	238.4560	95.0213	27.1364	0.0000	0.0000	0.0000	0.0000	129.9224	333.6917	550.0990 (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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211 (64)
Efficiency of water heater	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266	180.2266 (216)
Fuel for water heating, kWh/month	183.7774	162.5060	172.3428	150.5348	145.3092	130.2423	127.9135	133.2993	135.1250	151.5297	162.2078	181.6164 (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	127.0996	114.7996	127.0996	122.9996	127.0996	122.9996	127.0996	127.0996	122.9996	127.0996	122.9996	127.0996 (231)
Lighting	53.8112	43.1694	38.8692	28.4773	21.9967	17.9715	20.0661	26.0827	33.8788	44.4508	50.2071	55.3068 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-147.6249	-273.0059	-518.6476	-723.9785	-764.1585	-668.0146	-663.3359	-669.6180	-557.6231	-360.6430	-180.3292	-119.4153 (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												2272.4969 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												180.2266
Water heating fuel used												1836.4041 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2040)												
mechanical ventilation fans (SFP = 1.2040)												1496.4949 (230a)
Total electricity for the above, kWh/year												1496.4949 (231)
Electricity for lighting (calculated in Appendix L)												434.2873 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-5646.3943 (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												393.2889 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2272.4969	16.4900	374.7347 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1836.4041	16.4900	302.8230 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	1496.4949	16.4900	246.7720 (249)
Energy for lighting	434.2873	16.4900	71.6140 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5646.3943	16.4900	-931.0904
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-931.0904 (252)
Total energy cost			64.8533 (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] =	0.0712 (257)
SAP value		98.8462
SAP rating (Section 12)		99 (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	2272.4969	0.1570	356.7351 (261)
Total CO2 associated with community systems			0.0000 (373)

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Water heating (other fuel)	1836.4041	0.1410	258.9795 (264)
Space and water heating			615.7146 (265)
Pumps, fans and electric keep-hot	1496.4949	0.1387	207.5823 (267)
Energy for lighting	434.2873	0.1443	62.6811 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5646.3943	0.1318	-744.0558
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-744.0558 (269)
Total CO2, kg/year			141.9222 (272)
CO2 emissions per m2			0.5000 (273)
EI value			99.4202
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 (m2)	Storey height (m)	Volume (m3)
Main dwelling	283.0000 (1b)	x 3.6000 (2b)	= 1018.8000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	283.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	1018.8000 (5)

2. Ventilation rate

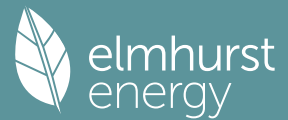
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (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)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.0000 (17)
Infiltration rate	0.1000 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.0925 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.0000	3.8000	3.8000	3.5000	3.5000	3.2000	3.2000	3.0000	3.1000	3.4000	3.3000	3.6000 (22)
Wind factor	1.0000	0.9500	0.9500	0.8750	0.8750	0.8000	0.8000	0.7500	0.7750	0.8500	0.8250	0.9000 (22a)
Adj infilt rate	0.0925	0.0879	0.0879	0.0809	0.0809	0.0740	0.0740	0.0694	0.0717	0.0786	0.0763	0.0833 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												83.7000 (23c)
Effective ac	0.1740	0.1694	0.1694	0.1624	0.1624	0.1555	0.1555	0.1509	0.1532	0.1601	0.1578	0.1647 (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
Main dwelling							
Windows			96.5000	0.7752	74.8062		(27)
Ground floor			283.0000	0.1100	31.1300	75.0000	21225.0000 (28a)
External Walls	343.0000	96.5000	246.5000	0.1200	29.5800	70.0000	17255.0000 (29a)
Roof	290.0000		290.0000	0.1200	34.8000	9.0000	2610.0000 (30)
Total net area of external elements Aum(A, m2)			916.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	170.3162		(33)
Main dwelling			286.0000			9.0000	2574.0000 (32c)
Internal Walls Timber							
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	43664.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							154.2898 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				43.0000	0.0210	0.9030	
E3 Sill				25.0000	0.0340	0.8500	
E4 Jamb				82.0000	0.0430	3.5260	
E14 Flat roof				98.0000	0.1600	15.6800	
E16 Corner (normal)				38.0000	0.0300	1.1400	
E17 Corner (inverted - internal area greater than external area)				28.0000	-0.0150	-0.4200	
E5 Ground floor (normal)				98.0000	0.0210	2.0580	
E24 Eaves (insulation at ceiling level - inverted)				26.0000	0.1500	3.9000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.6370 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	197.9532 (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	58.4995	56.9446	56.9446	54.6121	54.6121	52.2797	52.2797	50.7248	51.5023	53.8347	53.0572	55.3896	(38)
Heat transfer coeff	256.4527	254.8978	254.8978	252.5653	252.5653	250.2329	250.2329	248.6780	249.4555	251.7879	251.0104	253.3428	(39)
Average = Sum(39)m / 12 =												252.1766	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9062	0.9007	0.9007	0.8925	0.8925	0.8842	0.8842	0.8787	0.8815	0.8897	0.8870	0.8952	(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													3.1098 (42)
Hot water usage for mixer showers	95.4519	94.0174	91.9272	87.9278	84.9763	81.6849	79.8141	81.8885	84.1625	87.6965	91.7818	95.0862	(42a)
Hot water usage for baths	32.9612	32.4717	31.7823	30.5113	29.5595	28.5042	27.9342	28.6187	29.3640	30.4933	31.7905	32.8497	(42b)
Hot water usage for other uses	46.4778	44.7877	43.0976	41.4075	39.7174	38.0273	38.0273	39.7174	41.4075	43.0976	44.7877	46.4778	(42c)
Average daily hot water use (litres/day)												160.8162	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	174.8908	171.2768	166.8070	159.8465	154.2532	148.2164	145.7755	150.2246	154.9340	161.2873	168.3599	174.4137	(44)
Energy content (annual)	276.9843	243.8958	256.3762	218.8219	207.6545	182.2494	176.3029	186.0094	191.0492	218.8654	239.8596	273.0897	(45)
Distribution loss (46)m = 0.15 x (45)m	41.5477	36.5844	38.4564	32.8233	31.1482	27.3374	26.4454	27.9014	28.6574	32.8298	35.9789	40.9635	(46)
Water storage loss (or HIU loss):													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8500	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9990	(55)
Total storage loss	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690	(56)
If cylinder contains dedicated solar storage	30.9690	27.9720	30.9690	29.9700	30.9690	29.9700	30.9690	30.9690	29.9700	30.9690	29.9700	30.9690	(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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211	(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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211	(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	135.4824	120.2819	128.6302	114.7439	112.4302	102.5835	102.0058	105.2333	105.5094	116.1579	121.7389	134.1874	(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	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	186.5898	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.4779	54.6041	44.4070	33.6190	25.1306	21.2163	22.9250	29.7987	39.9958	50.7838	59.2722	63.1865	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	663.2066	670.0886	652.7462	615.8262	569.2213	525.4193	496.1569	489.2749	506.6173	543.5373	590.1422	633.9442	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	56.7688	(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)	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	-124.3932	(71)
Water heating gains (Table 5)	182.1000	178.9910	172.8901	159.3665	151.1159	142.4771	137.1046	141.4426	146.5409	156.1262	169.0818	180.3595	(72)
Total internal gains	1025.7499	1022.6491	989.0087	927.7771	864.4332	808.0781	775.1518	779.4815	812.1194	869.4127	937.4617	996.4556	(73)

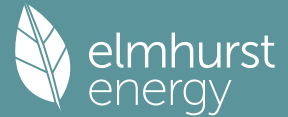
6. Solar gains

[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				25.4000	12.7500	0.5700	0.7000	0.7700	89.5466 (74)			
East				11.6000	23.7835	0.5700	0.7000	0.7700	76.2851 (76)			
South				23.7000	54.0600	0.5700	0.7000	0.7700	354.2669 (78)			
West				35.8000	23.7835	0.5700	0.7000	0.7700	235.4316 (80)			
Solar gains	755.5302	1189.1722	1765.3949	2442.3182	2837.5921	3038.9490	2898.7022	2584.1608	2119.6248	1456.5017	905.2909	640.8837 (83)
Total gains	1781.2801	2211.8213	2754.4036	3370.0952	3702.0253	3847.0271	3673.8541	3363.6424	2931.7441	2325.9144	1842.7525	1637.3392 (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	47.2948	47.5833	47.5833	48.0228	48.0228	48.4704	48.4704	48.7735	48.6215	48.1711	48.3203	47.8754	
alpha	4.1530	4.1722	4.1722	4.2015	4.2015	4.2314	4.2314	4.2516	4.2414	4.2114	4.2214	4.1917	

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util living area	0.9824	0.9597	0.8910	0.7435	0.5537	0.3548	0.2447	0.2727	0.5249	0.8312	0.9618	0.9871 (86)
Living	19.8906	20.1181	20.4626	20.7522	20.8841	20.9219	20.9262	20.9261	20.9019	20.6931	20.2417	19.8405
Non living	18.8551	19.1447	19.5674	19.9073	20.0442	20.0842	20.0869	20.0919	20.0719	19.8533	19.3124	18.7988
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	13
MIT	20.4325	20.1181	20.4626	20.7522	20.8841	20.9219	20.9262	20.9261	20.9019	20.6931	20.2417	20.0513 (87)
Th 2	20.1622	20.1669	20.1669	20.1739	20.1739	20.1809	20.1809	20.1856	20.1833	20.1763	20.1786	20.1716 (88)
util rest of house												
MIT	0.9789	0.9521	0.8724	0.7087	0.5065	0.3031	0.1893	0.2131	0.4642	0.7963	0.9532	0.9845 (89)
MIT 2	19.6411	19.1447	19.5674	19.9073	20.0442	20.0842	20.0869	20.0919	20.0719	19.8533	19.3124	19.1204 (90)
Living area fraction									fLA = Living area / (4) =			0.2827 (91)
MIT	19.8648	19.4198	19.8205	20.1461	20.2816	20.3210	20.3242	20.3277	20.3066	20.0907	19.5751	19.3836 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8648	19.4198	19.8205	20.1461	20.2816	20.3210	20.3242	20.3277	20.3066	20.0907	19.5751	19.3836 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9775	0.9438	0.8637	0.7075	0.5128	0.3120	0.1990	0.2235	0.4736	0.7923	0.9454	0.9814	(94)
Useful gains	1741.1201	2087.5531	2378.9534	2384.3093	1898.4167	1200.2460	731.0936	751.9218	1388.5468	1842.9156	1742.2045	1606.8057	(95)
Ext temp.	4.9000	5.4000	7.2000	9.5000	12.5000	15.5000	17.4000	17.3000	14.6000	11.2000	7.7000	4.8000	(96)
Heat loss rate W	3837.7689	3573.6271	3216.9252	2688.8419	1965.3659	1206.3836	731.7286	752.9290	1423.5313	2238.5773	2980.7859	3694.6431	(97)
Space heating kWh	1559.9067	998.6417	623.4510	219.2635	49.8103	0.0000	0.0000	0.0000	0.0000	294.3723	891.7786	1553.3510	(98a)
Space heating requirement - total per year (kWh/year)												6190.5751	
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	1559.9067	998.6417	623.4510	219.2635	49.8103	0.0000	0.0000	0.0000	0.0000	294.3723	891.7786	1553.3510	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6190.5751	
Space heating per m2										(98c) / (4) =		21.8748	(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 %)													332.2947 (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	1559.9067	998.6417	623.4510	219.2635	49.8103	0.0000	0.0000	0.0000	0.0000	294.3723	891.7786	1553.3510	(98)
Space heating efficiency (main heating system 1)	332.2947	332.2947	332.2947	332.2947	332.2947	0.0000	0.0000	0.0000	0.0000	332.2947	332.2947	332.2947	(210)
Space heating fuel (main heating system)	469.4347	300.5289	187.6199	65.9846	14.9898	0.0000	0.0000	0.0000	0.0000	88.5877	268.3698	467.4619	(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	331.2157	292.8790	310.6076	271.3039	261.8859	234.7314	230.5343	240.2408	243.5312	273.0968	292.3416	327.3211	(64)
Efficiency of water heater (217)m	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	181.1899	(216)
Fuel for water heating, kWh/month	182.8003	161.6420	171.4265	149.7345	144.5367	129.5499	127.2335	132.5906	134.4066	150.7241	161.3454	180.6508	(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	127.0996	114.7996	127.0996	122.9996	127.0996	122.9996	127.0996	127.0996	122.9996	127.0996	122.9996	127.0996	(231)
Lighting	53.8112	43.1694	38.8692	28.4773	21.9967	17.9715	20.0661	26.0827	33.8788	44.4508	50.2071	55.3068	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-181.1827	-292.1954	-546.0534	-760.6192	-751.2393	-667.3222	-662.6558	-668.9093	-615.1697	-409.7636	-217.5014	-147.5199	(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												1862.9773	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												181.1899	
Water heating fuel used												1826.6409	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2040) mechanical ventilation fans (SFP = 1.2040)												1496.4949	(230a)
Total electricity for the above, kWh/year												1496.4949	(231)
Electricity for lighting (calculated in Appendix L)												434.2873	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-5920.1318	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)

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Appendix Q - special features

Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	-299.7313 (238)

10a. Fuel costs - using BEDF prices (595)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1862.9773	27.6700	515.4858 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1826.6409	27.6700	505.4315 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	1496.4949	27.6700	414.0802 (249)
Energy for lighting	434.2873	27.6700	120.1673 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5920.1318	27.6700	-1638.1005
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-1638.1005 (252)
Total energy cost			-82.9357 (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	1862.9773	0.1575	293.4908 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1826.6409	0.1410	257.6027 (264)
Space and water heating			551.0935 (265)
Pumps, fans and electric keep-hot	1496.4949	0.1387	207.5823 (267)
Energy for lighting	434.2873	0.1443	62.6811 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5920.1318	0.1324	-783.9806
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-783.9806 (269)
Total CO2, kg/year			37.3762 (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	1862.9773	1.5832	2949.3761 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1826.6409	1.5215	2779.1738 (278)
Space and water heating			5728.5500 (279)
Pumps, fans and electric keep-hot	1496.4949	1.5128	2263.8976 (281)
Energy for lighting	434.2873	1.5338	666.1244 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-5920.1318	1.4893	-8817.0531
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-8817.0531 (283)
Total Primary energy kWh/year			-158.4812 (286)