

Full SAP Calculation Printout



Property Reference	19856	Issued on Date	04/12/2024
Assessment Reference	19856 ashp	Prop Type Ref	19856
Property			
SAP Rating	77 C	DER	5.22
Environmental	95 A	% DER < TER	57.35
CO ₂ Emissions (t/year)	0.47	DFEE	43.25
Compliance Check	See BREL	% DFEE < TFEE	6.18
% DPER < TPER	14.76	DPER	54.61
Assessor Details	Mr. Thomas Gibson	Assessor ID	AV80-0001
Client			

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)
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 256.0350 (5)

2. Ventilation rate

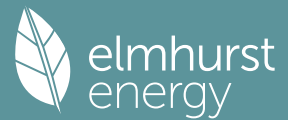
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1953 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4453 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.4453 (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	0.5677	0.5566	0.5455	0.4898	0.4787	0.4230	0.4230	0.4119	0.4453	0.4787	0.5009	0.5232 (22b)
Effective ac	0.6612	0.6549	0.6488	0.6200	0.6146	0.5895	0.5895	0.5848	0.5991	0.6146	0.6255	0.6369 (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
Door			4.2000	1.1000	4.6200		(26)
Window (Uw = 1.10)			30.5500	1.0536	32.1887		(27)
Heatloss Floor 1			50.7000	0.1300	6.5910	110.0000	5577.0000 (28a)
External Wall 1	160.6000	34.7500	125.8500	0.1800	22.6530	60.0000	7551.0000 (29a)
External Roof 1	50.7000		50.7000	0.1500	7.6050	9.0000	456.3000 (30)
Total net area of external elements Aum(A, m ²)			262.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		73.6577		(33)
Block			93.0600			75.0000	6979.5000 (32c)
Stud			82.4800			9.0000	742.3200 (32c)
Internal Floor 1			50.7000			18.0000	912.6000 (32d)
Internal Ceiling 1			50.7000			9.0000	456.3000 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22675.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							223.6195 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.1500	0.0230	0.5094	
E3 Sill				20.1500	0.0250	0.5038	
E4 Jamb				48.5000	0.0200	0.9700	

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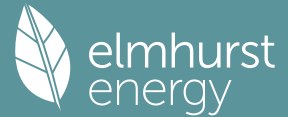
E5 Ground floor (normal)	31.8000	0.0510	1.6218										
E6 Intermediate floor within a dwelling	31.8000	0.0010	0.0318										
E10 Eaves (insulation at ceiling level)	18.7900	0.0530	0.9959										
E12 Gable (insulation at ceiling level)	13.0100	0.0370	0.4814										
E16 Corner (normal)	25.2500	0.0400	1.0100										
E17 Corner (inverted - internal area greater than external area)	5.0500	-0.0820	-0.4141										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.7099 (36)									
Point Thermal bridges				0.0000									
Total fabric heat loss		(33) + (36) + (36a) =		79.3676 (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	55.8628	55.3340	54.8157	52.3813	51.9258	49.8055	49.8055	49.4129	50.6222	51.9258	52.8472	53.8105	(38)
Average = Sum(39)m / 12 =	135.2304	134.7016	134.1834	131.7489	131.2935	129.1732	129.1732	128.7805	129.9899	131.2935	132.2149	133.1782	(39)
												131.7468	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3336	1.3284	1.3233	1.2993	1.2948	1.2739	1.2739	1.2700	1.2820	1.2948	1.3039	1.3134	(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												2.7521 (42)
Hot water usage for mixer showers												
	70.3637	69.3063	67.7654	64.8172	62.6415	60.2152	58.8360	60.3653	62.0416	64.6467	67.6582	70.0941 (42a)
Hot water usage for baths												
	30.3819	29.9307	29.2953	28.1237	27.2465	26.2737	25.7483	26.3793	27.0663	28.1071	29.3028	30.2792 (42b)
Hot water usage for other uses												
	42.8144	41.2575	39.7006	38.1437	36.5868	35.0300	35.0300	36.5868	38.1437	39.7006	41.2575	42.8144 (42c)
Average daily hot water use (litres/day)												131.9640 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	143.5600	140.4945	136.7613	131.0846	126.4748	121.5188	119.6143	123.3314	127.2516	132.4544	138.2185	143.1877 (44)
Energy conte	227.3639	200.0622	210.1970	179.4483	170.2594	149.4216	144.6631	152.7100	156.9139	179.7394	196.9177	224.1973 (45)
Energy content (annual)										Total = Sum(45)m =		2191.8938
Distribution loss (46)m = 0.15 x (45)m												
	34.1046	30.0093	31.5295	26.9172	25.5389	22.4132	21.6995	22.9065	23.5371	26.9609	29.5376	33.6296 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1556 (55)
Total storage loss												
	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236 (56)
If cylinder contains dedicated solar storage												
	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236 (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												
	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833 (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	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2887.5838 (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												
	122.8673	109.2151	117.1593	105.4106	103.8800	95.4267	95.3693	98.0449	97.9179	107.0322	111.2191	121.8144 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	130.4196	144.3931	130.4196	134.7669	130.4196	130.4196	130.4196	130.4196	134.7669	130.4196	134.7669	130.4196 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	258.5714	261.2546	254.4931	240.0987	221.9283	204.8508	193.4419	190.7588	197.5203	211.9146	230.0850	247.1625 (68)
Pumps, fans	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606 (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)	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845 (71)
Total internal gains	165.1442	162.5225	157.4722	146.4036	139.6237	132.5371	128.1845	131.7807	135.9970	143.8604	154.4710	163.7290 (72)
	618.4169	632.4518	606.6665	585.5508	556.2533	536.4364	516.3277	517.2408	532.5659	550.4763	583.6046	605.5928 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	17.0500											55.4074 (74)
East	3.9000											23.4090 (76)
South	9.6000											137.1652 (78)
Solar gains	215.9817	376.3207	541.4946	722.4117	861.1340	879.1003	837.3800	729.3067	602.9615	422.6779	260.1280	183.9642 (83)
Total gains	834.3985	1008.7725	1148.1612	1307.9625	1417.3873	1415.5367	1353.7077	1246.5475	1135.5274	973.1543	843.7326	789.5570 (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	46.5769	46.7598	46.9404	47.8077	47.9736	48.7610	48.7610	48.9097	48.4547	47.9736	47.6392	47.2947
alpha	4.1051	4.1173	4.1294	4.1872	4.1982	4.2507	4.2507	4.2606	4.2303	4.1982	4.1759	4.1530
util living area	0.9894	0.9766	0.9502	0.8778	0.7432	0.5578	0.4137	0.4645	0.7035	0.9163	0.9787	0.9914 (86)
Living	19.4056	19.6817	20.0471	20.5004	20.8120	20.9582	20.9906	20.9850	20.8898	20.4689	19.8674	19.3750
Non living	17.9938	18.3448	18.8024	19.3567	19.6944	19.8383	19.8584	19.8592	19.7840	19.3380	18.5962	17.9656
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1844	19.6817	20.0471	20.5004	20.8120	20.9582	20.9906	20.9850	20.8898	20.4689	19.8674	19.6023 (87)
Th 2	19.8146	19.8186	19.8226	19.8414	19.8449	19.8613	19.8613	19.8644	19.8550	19.8449	19.8378	19.8304 (88)
util rest of house	0.9862	0.9699	0.9359	0.8443	0.6806	0.4688	0.3097	0.3550	0.6155	0.8852	0.9714	0.9888 (89)
MIT 2	19.0887	18.3448	18.8024	19.3567	19.6944	19.8383	19.8584	19.8592	19.7840	19.3380	18.5962	18.3016 (90)
Living area fraction									fLA = Living area / (4) =			0.1430 (91)
MIT	19.2454	18.5360	18.9804	19.5203	19.8542	19.9984	20.0203	20.0202	19.9421	19.4997	18.7780	18.4876 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2454	18.5360	18.9804	19.5203	19.8542	19.9984	20.0203	20.0202	19.9421	19.4997	18.7780	18.4876 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9843	0.9599	0.9227	0.8334	0.6812	0.4800	0.3245	0.3704	0.6228	0.8736	0.9620	0.9847 (94)
Useful gains	821.2864	968.3257	1059.3965	1090.0822	965.5055	679.4495	439.2541	461.7618	707.1822	850.1427	811.6455	777.4567 (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	2021.0683	1836.7941	1674.6552	1399.2098	1070.5906	697.3319	441.8114	466.2057	759.4185	1168.4723	1544.0025	1902.8005 (97)
Space heating kWh	892.6378	583.6108	457.7525	222.5719	78.1833	0.0000	0.0000	0.0000	0.0000	236.8372	527.2970	837.2558 (98a)
Space heating requirement - total per year (kWh/year)												3836.1463
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	892.6378	583.6108	457.7525	222.5719	78.1833	0.0000	0.0000	0.0000	0.0000	236.8372	527.2970	837.2558 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3836.1463
Space heating per m2										(98c) / (4) =		37.8318 (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 %)													241.6401 (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	892.6378	583.6108	457.7525	222.5719	78.1833	0.0000	0.0000	0.0000	0.0000	236.8372	527.2970	837.2558 (98)	
Space heating efficiency (main heating system 1)	241.6401	241.6401	241.6401	241.6401	241.6401	0.0000	0.0000	0.0000	0.0000	241.6401	241.6401	241.6401 (210)	
Space heating fuel (main heating system)	369.4079	241.5206	189.4356	92.1088	32.3553	0.0000	0.0000	0.0000	0.0000	98.0124	218.2159	346.4887 (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	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833 (64)	
Efficiency of water heater	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784 (216)	
Fuel for water heating, kWh/month	176.4089	156.0738	165.8367	145.7264	141.2413	127.2346	125.4780	130.4336	131.8487	147.0795	156.4849	174.4587 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	26.4350	21.2072	19.0947	13.9896	10.8060	8.8286	9.8576	12.8132	16.6431	21.8367	24.6645	27.1698 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													1587.5452 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													162.3784
Water heating fuel used													1778.3052 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)

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Electricity for lighting (calculated in Appendix L)	213.3460 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3579.1964 (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	1587.5452	0.1562	248.0408 (261)	
Total CO2 associated with community systems			0.0000 (273)	
Water heating (other fuel)	1778.3052	0.1409	250.5413 (264)	
Space and water heating			498.5822 (265)	
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)	
Energy for lighting	213.3460	0.1443	30.7924 (268)	
Total CO2, kg/year			529.3746 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.2200 (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	1587.5452	1.5784	2505.7666 (275)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1778.3052	1.5210	2704.7152 (278)	
Space and water heating			5210.4817 (279)	
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)	
Energy for lighting	213.3460	1.5338	327.2372 (282)	
Total Primary energy kWh/year			5537.7189 (286)	
Dwelling Primary energy Rate (DPER)			54.6100 (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)	
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)	
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.4000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 256.0350 (5)	

2. Ventilation rate

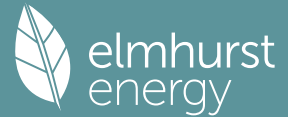
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1562 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4062	(18)
Number of sides sheltered	0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.4062 (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	0.5179	0.5078	0.4976	0.4469	0.4367	0.3859	0.3859	0.3758	0.4062	0.4367	0.4570	0.4773	(22b)
Effective ac	0.6341	0.6289	0.6238	0.5998	0.5954	0.5745	0.5745	0.5706	0.5825	0.5954	0.6044	0.6139	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K
TER Opaque door			4.2000	1.0000	4.2000		(26)
TER Opening Type (Uw = 1.20)			21.1500	1.1450	24.2176		(27)
Heatloss Floor 1			50.7000	0.1300	6.5910		(28a)
External Wall 1	160.6000	25.3500	135.2500	0.1800	24.3450		(29a)
External Roof 1	50.7000		50.7000	0.1100	5.5770		(30)
Total net area of external elements Aum(A, m2)			262.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		64.9306		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 223.6195 (35)

List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.1500	0.0500	1.1075	
E3 Sill				20.1500	0.0500	1.0075	
E4 Jamb				48.5000	0.0500	2.4250	
E5 Ground floor (normal)				31.8000	0.1600	5.0880	
E6 Intermediate floor within a dwelling				31.8000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)				18.7900	0.0600	1.1274	
E12 Gable (insulation at ceiling level)				13.0100	0.0600	0.7806	
E16 Corner (normal)				25.2500	0.0900	2.2725	
E17 Corner (inverted - internal area greater than external area)				5.0500	-0.0900	-0.4545	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							13.3540 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	78.2846 (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	53.3788	53.1387	52.7073	50.6813	50.3022	48.5375	48.5375	48.2107	49.2172	50.3022	51.0690	51.8708
Average = Sum(39)m / 12 =	131.8633	131.4233	130.9919	128.9658	128.5867	126.8221	126.8221	126.4953	127.5018	128.5867	129.3536	130.1553
												128.9640

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3004	1.2961	1.2918	1.2719	1.2681	1.2507	1.2507	1.2475	1.2574	1.2681	1.2757	1.2836
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

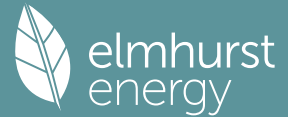
Assumed occupancy													2.7521 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													131.9640 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.5600	140.4945	136.7613	131.0846	126.4748	121.5188	119.6143	123.3314	127.2516	132.4544	138.2185	143.1877	(44)
Energy conte	227.3639	200.0622	210.1970	179.4483	170.2594	149.4216	144.6631	152.7100	156.9139	179.7394	196.9177	224.1973	(45)
Energy content (annual)													2191.8938
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (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)													2442 (64)
Electric shower(s)													
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	130.8418	144.8606	130.8418	135.2032	130.8418	135.2032	130.8418	130.8418	135.2032	130.8418	135.2032	130.8418	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	258.5714	261.2546	254.4931	240.0987	221.9283	204.8508	193.4419	190.7588	197.5203	211.9146	230.0850	247.1625	(68)
Pumps, fans	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	(71)
Total internal gains	151.7129	149.0912	144.0409	132.9723	126.1924	119.1058	114.7532	118.3495	122.5658	130.4291	141.0397	150.2978	(72)
	608.4079	622.4880	596.6575	575.5559	546.2443	523.4415	503.3187	504.2318	519.5709	540.4673	573.6096	595.5838	(73)

6. Solar gains

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[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	11.8000				10.6334	0.6300		0.7000		0.7700	38.3465 (74)	
East	2.7000				19.6403	0.6300		0.7000		0.7700	16.2063 (76)	
South	6.6500				46.7521	0.6300		0.7000		0.7700	95.0155 (78)	

Solar gains	149.5682	260.5958	374.9550	500.1955	596.2169	608.6438	579.7638	504.9583	417.5058	292.6918	180.1384	127.3969 (83)
Total gains	757.9761	883.0839	971.6125	1075.7514	1142.4612	1132.0853	1083.0825	1009.1901	937.0768	833.1591	753.7480	722.9807 (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	47.7662	47.9262	48.0840	48.8394	48.9834	49.6650	49.6650	49.7933	49.4002	48.9834	48.6930	48.3931
alpha	4.1844	4.1951	4.2056	4.2560	4.2656	4.3110	4.3110	4.3196	4.2933	4.2656	4.2462	4.2262
util living area	0.9924	0.9849	0.9699	0.9257	0.8281	0.6587	0.5005	0.5527	0.7846	0.9454	0.9854	0.9938 (86)
MIT	19.3763	19.6033	19.9265	20.3641	20.7185	20.9254	20.9819	20.9727	20.8368	20.3806	19.8125	19.3505 (87)
Th 2	19.8405	19.8439	19.8472	19.8629	19.8659	19.8796	19.8796	19.8822	19.8743	19.8659	19.8599	19.8537 (88)
util rest of house	0.9901	0.9804	0.9606	0.9020	0.7744	0.5647	0.3802	0.4295	0.7028	0.9229	0.9802	0.9919 (89)
MIT 2	17.9742	18.2645	18.6740	19.2220	19.6269	19.8357	19.8736	19.8720	19.7618	19.2548	18.5435	17.9502 (90)
Living area fraction	fLA = Living area / (4) = 0.1430 (91)											
MIT	18.1747	18.4559	18.8531	19.3853	19.7830	19.9915	20.0321	20.0294	19.9155	19.4158	18.7249	18.1504 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.1747	18.4559	18.8531	19.3853	19.7830	19.9915	20.0321	20.0294	19.9155	19.4158	18.7249	18.1504 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9852	0.9727	0.9497	0.8896	0.7699	0.5748	0.3971	0.4465	0.7062	0.9112	0.9727	0.9876 (94)
Useful gains	746.7423	859.0106	922.7406	956.9684	879.6294	650.6849	430.1101	450.6444	661.7484	759.1635	733.1777	714.0274 (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	1829.5581	1781.5619	1618.1590	1352.2471	1039.3686	683.7627	435.2652	459.1060	741.4866	1133.5983	1503.7258	1815.7205 (97)
Space heating kWh	805.6149	619.9545	517.3913	284.6007	118.8460	0.0000	0.0000	0.0000	0.0000	278.5795	554.7947	819.6597 (98a)
Space heating requirement - total per year (kWh/year)	3999.4414											
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	805.6149	619.9545	517.3913	284.6007	118.8460	0.0000	0.0000	0.0000	0.0000	278.5795	554.7947	819.6597 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3999.4414											
Space heating per m2	(98c) / (4) = 39.4422 (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 %)												92.3000 (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	805.6149	619.9545	517.3913	284.6007	118.8460	0.0000	0.0000	0.0000	0.0000	278.5795	554.7947	819.6597 (98)
Space heating efficiency (main heating system 1)	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 fuel (main heating system)	872.8223	671.6734	560.5540	308.3431	128.7605	0.0000	0.0000	0.0000	0.0000	301.8197	601.0776	888.0387 (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	241.7915	213.6989	227.0017	199.8727	193.8651	174.8414	172.8186	179.6965	181.6523	202.3399	214.8267	239.2206 (64)
Water heating requirement	86.5467	86.3049	85.8475	84.8519	82.9969	79.8000	79.8000	79.8000	79.8000	84.7772	86.0898	79.8000 (216)
Efficiency of water heater (217)m	279.3769	247.6093	264.4244	235.5547	233.5810	219.0995	216.5647	225.1835	227.6345	238.6725	249.5379	276.2565 (219)
Fuel for water heating, kWh/month	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)
Space cooling fuel requirement (221)m	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)
Pumps and Fa	27.1863	21.8099	19.6374	14.3872	11.1131	9.0795	10.1377	13.1774	17.1161	22.4573	25.3655	27.9419 (232)
Lighting	-46.3004	-64.7048	-92.1987	-102.7188	-109.9440	-102.2857	-100.9625	-95.6709	-86.2710	-73.4781	-50.6749	-40.0917 (233a)
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 (234a)
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 (235a)
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 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-27.9344	-58.5492	-115.9953	-173.6991	-229.2057	-230.1711	-227.5171	-192.9023	-141.7058	-83.6248	-37.2570	-22.1111 (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)

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Annual totals kWh/year	
Space heating fuel - main system 1	4333.0893 (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	2913.4954 (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)	219.4094 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2505.9745 (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	5046.0196 (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	4333.0893	0.2100	909.9487 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2913.4954	0.2100	611.8340 (264)
Space and water heating			1521.7828 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	219.4094	0.1443	31.6676 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-965.3016	0.1348	-130.1087
PV Unit electricity exported	-1540.6729	0.1260	-194.0920
Total			-324.2007 (269)
Total CO2, kg/year			1241.1789 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.2400 (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	4333.0893	1.1300	4896.3909 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2913.4954	1.1300	3292.2498 (278)
Space and water heating			8188.6407 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	219.4094	1.5338	336.5375 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-965.3016	1.4982	-1446.1723
PV Unit electricity exported	-1540.6729	0.4624	-712.4562
Total			-2158.6285 (283)
Total Primary energy kWh/year			6496.6504 (286)
Target Primary Energy Rate (TPER)			64.0700 (287)

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

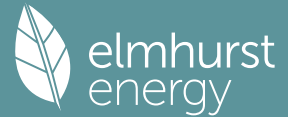
1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	101.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 256.0350 (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	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) = 0.1562 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4062 (18)

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Number of sides sheltered

0 (19)

Shelter factor

(20) = 1 - [0.075 x (19)] = 1.0000 (20)

Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.4062 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.5179	0.5078	0.4976	0.4469	0.4367	0.3859	0.3859	0.3758	0.4062	0.4367	0.4570	0.4773	(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	0.6341	0.6289	0.6238	0.5998	0.5954	0.5745	0.5745	0.5706	0.5825	0.5954	0.6044	0.6139	(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	
Door			4.2000	1.1000	4.6200			(26)
Window (Uw = 1.10)			30.5500	1.0536	32.1887			(27)
Heatloss Floor 1			50.7000	0.1300	6.5910	110.0000	5577.0000	(28a)
External Wall 1	160.6000	34.7500	125.8500	0.1800	22.6530	60.0000	7551.0000	(29a)
External Roof 1	50.7000		50.7000	0.1500	7.6050	9.0000	456.3000	(30)
Total net area of external elements Aum(A, m2)			262.0000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	73.6577		(33)
Block			93.0600			75.0000	6979.5000	(32c)
Stud			82.4800			9.0000	742.3200	(32c)
Internal Floor 1			50.7000			18.0000	912.6000	(32d)
Internal Ceiling 1			50.7000			9.0000	456.3000	(32e)

Heat capacity Cm = Sum(A x k)

(28)...(30) + (32) + (32a)...(32e) = 22675.0200 (34)

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

223.6195 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	22.1500	0.0230	0.5094
E3 Sill	20.1500	0.0250	0.5038
E4 Jamb	48.5000	0.0200	0.9700
E5 Ground floor (normal)	31.8000	0.0510	1.6218
E6 Intermediate floor within a dwelling	31.8000	0.0010	0.0318
E10 Eaves (insulation at ceiling level)	18.7900	0.0530	0.9959
E12 Gable (insulation at ceiling level)	13.0100	0.0370	0.4814
E16 Corner (normal)	25.2500	0.0400	1.0100
E17 Corner (inverted - internal area greater than external area)	5.0500	-0.0820	-0.4141

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

5.7099 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 79.3676 (37)

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

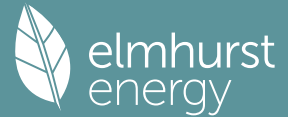
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	53.5788	53.1387	52.7073	50.6813	50.3022	48.5375	48.5375	48.2107	49.2172	50.3022	51.0690	51.8708	(38)
Average = Sum(39)m / 12 =	132.9464	132.5063	132.0750	130.0489	129.6698	127.9052	127.9052	127.5784	128.5849	129.6698	130.4367	131.2384	(39)
												130.0471	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3111	1.3068	1.3025	1.2825	1.2788	1.2614	1.2614	1.2582	1.2681	1.2788	1.2864	1.2943	(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													2.7521 (42)
Hot water usage for mixer showers													(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	30.3819	29.9307	29.2953	28.1237	27.2465	26.2737	25.7483	26.3793	27.0663	28.1071	29.3028	30.2792	(42c)
Average daily hot water use (litres/day)	42.8144	41.2575	39.7006	38.1437	36.5868	35.0300	35.0300	36.5868	38.1437	39.7006	41.2575	42.8144	(43)
												67.0910	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	73.1963	71.1882	68.9959	66.2675	63.8333	61.3037	60.7783	62.9661	65.2100	67.8077	70.5603	73.0936	(44)
Energy content (annual)	115.9251	101.3710	106.0441	90.7168	85.9319	75.3800	73.5060	77.9652	80.4104	92.0145	100.5261	114.4469	(45)
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:													
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	98.5363	86.1654	90.1375	77.1093	73.0421	64.0730	62.4801	66.2704	68.3489	78.2123	85.4472	97.2799	(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	98.5363	86.1654	90.1375	77.1093	73.0421	64.0730	62.4801	66.2704	68.3489	78.2123	85.4472	97.2799	(64)
12Total per year (kWh/year)													(64)
Electric shower(s)	56.3496	50.2079	54.8252	52.3190	53.3007	50.8437	52.5385	53.3007	52.3190	54.8252	53.7942	56.3496	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												640.9732	(64a)
Heat gains from water heating, kWh/month	38.7215	34.0933	36.2407	32.3571	31.5857	28.7292	28.7547	29.8928	30.1670	33.2594	34.8104	38.4074	(65)

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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	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.4196	144.3931	130.4196	134.7669	130.4196	134.7669	130.4196	130.4196	134.7669	130.4196	134.7669	130.4196 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	258.5714	261.2546	254.4931	240.0987	221.9283	204.8508	193.4419	190.7588	197.5203	211.9146	230.0850	247.1625 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606 (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)	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845 (71)
Water heating gains (Table 5)	52.0450	50.7341	48.7106	44.9404	42.4539	39.9016	38.6487	40.1785	41.8986	44.7034	48.3477	51.6228 (72)
Total internal gains	505.3176	520.6635	497.9049	484.0876	459.0835	443.8010	426.7919	425.6385	438.4674	451.3194	477.4813	493.4866 (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				17.0500	10.6334	0.6300	0.7000	0.7700	55.4074 (74)			
East				3.9000	19.6403	0.6300	0.7000	0.7700	23.4090 (76)			
South				9.6000	46.7521	0.6300	0.7000	0.7700	137.1652 (78)			
Solar gains	215.9817	376.3207	541.4946	722.4117	861.1340	879.1003	837.3800	729.3067	602.9615	422.6779	260.1280	183.9642 (83)
Total gains	721.2993	896.9842	1039.3996	1206.4993	1320.2175	1322.9013	1264.1720	1154.9453	1041.4289	873.9973	737.6093	677.4508 (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	47.3771	47.5345	47.6897	48.4327	48.5743	49.2444	49.2444	49.3706	48.9841	48.5743	48.2887	47.9937
alpha	4.1585	4.1690	4.1793	4.2288	4.2383	4.2830	4.2830	4.2914	4.2656	4.2383	4.2192	4.1996
util living area	0.9937	0.9842	0.9629	0.8989	0.7708	0.5860	0.4374	0.4941	0.7402	0.9376	0.9865	0.9951 (86)
MIT	19.3197	19.6012	19.9765	20.4504	20.7882	20.9511	20.9888	20.9817	20.8689	20.4049	19.7812	19.2838 (87)
Th 2	19.8321	19.8355	19.8389	19.8545	19.8575	19.8712	19.8712	19.8737	19.8659	19.8575	19.8515	19.8453 (88)
util rest of house	0.9918	0.9795	0.9517	0.8694	0.7106	0.4953	0.3290	0.3798	0.6541	0.9126	0.9817	0.9936 (89)
MIT 2	18.3238	18.6046	18.9740	19.4324	19.7229	19.8498	19.8684	19.8687	19.7981	19.4045	18.7969	18.2979 (90)
Living area fraction	18.4663	18.7471	19.1174	19.5779	19.8752	20.0073	20.0286	20.0278	19.9512	19.5475	18.9377	18.4388 (92)
MIT	18.4663	18.7471	19.1174	19.5779	19.8752	20.0073	20.0286	20.0278	19.9512	19.5475	18.9377	18.4388 (92)
Temperature adjustment	18.4663	18.7471	19.1174	19.5779	19.8752	20.0073	20.0286	20.0278	19.9512	19.5475	18.9377	18.4388 (93)
adjusted MIT	18.4663	18.7471	19.1174	19.5779	19.8752	20.0073	20.0286	20.0278	19.9512	19.5475	18.9377	18.4388 (93)

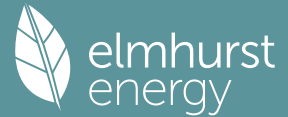
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9885	0.9735	0.9427	0.8610	0.7116	0.5068	0.3445	0.3960	0.6613	0.9040	0.9764	0.9910 (94)
Useful gains	713.0165	873.1917	979.8463	1038.7660	939.4668	670.4065	435.4550	457.3069	688.7021	790.0689	720.1781	671.3274 (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	1883.3521	1834.8301	1666.4374	1388.6540	1060.0810	691.6180	438.5405	462.8305	752.3763	1160.2236	1544.0661	1868.6823 (97)
Space heating kWh	870.7297	646.2211	510.8237	251.9194	89.7370	0.0000	0.0000	0.0000	0.0000	275.3950	593.1994	890.8320 (98a)
Space heating requirement - total per year (kWh/year)												4128.8573
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	870.7297	646.2211	510.8237	251.9194	89.7370	0.0000	0.0000	0.0000	0.0000	275.3950	593.1994	890.8320 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4128.8573
Space heating per m ²										(98c) / (4) =		40.7185 (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	1202.3085	946.4982	969.5957	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8872	0.9346	0.9089	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1066.6368	884.5915	881.2631	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1493.8872	1427.7612	1302.6638	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	307.6202	404.1182	313.5222	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	76.9051	101.0296	78.3805	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												256.3152 (107)
Energy for space heating												40.7185 (99)
Energy for space cooling												2.5278 (108)
Total												43.2463 (109)
Fabric Energy Efficiency (DFEE)												43.2 (109)

Full SAP Calculation Printout



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)
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 256.0350 (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	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) = 0.1562 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4062 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.4062 (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	0.5179	0.5078	0.4976	0.4469	0.4367	0.3859	0.3859	0.3758	0.4062	0.4367	0.4570	0.4773 (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	0.6341	0.6289	0.6238	0.5998	0.5954	0.5745	0.5745	0.5706	0.5825	0.5954	0.6044	0.6139 (25)

3. Heat losses and heat loss parameter

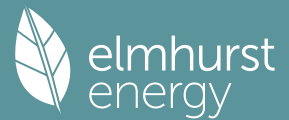
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			4.2000	1.0000	4.2000		(26)
TER Opening Type (Uw = 1.20)			21.1500	1.1450	24.2176		(27)
Heatloss Floor 1			50.7000	0.1300	6.5910		(28a)
External Wall 1	160.6000	25.3500	135.2500	0.1800	24.3450		(29a)
External Roof 1	50.7000		50.7000	0.1100	5.5770		(30)
Total net area of external elements Aum(A, m ²)			262.0000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 64.9306		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							223.6195 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.1500	0.0500	1.1075	
E3 Sill				20.1500	0.0500	1.0075	
E4 Jamb				48.5000	0.0500	2.4250	
E5 Ground floor (normal)				31.8000	0.1600	5.0880	
E6 Intermediate floor within a dwelling				31.8000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)				18.7900	0.0600	1.1274	
E12 Gable (insulation at ceiling level)				13.0100	0.0600	0.7806	
E16 Corner (normal)				25.2500	0.0900	2.2725	
E17 Corner (inverted - internal area greater than external area)				5.0500	-0.0900	-0.4545	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						13.3540 (36)	
Point Thermal bridges						(36a) = 0.0000	
Total fabric heat loss						(33) + (36) + (36a) = 78.2846 (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	53.5788	53.1387	52.7073	50.6813	50.3022	48.5375	48.5375	48.2107	49.2172	50.3022	51.0690	51.8708 (38)
Average = Sum(39)m / 12 =	131.8633	131.4233	130.9919	128.9658	128.5867	126.8221	126.8221	126.4953	127.5018	128.5867	129.3536	130.1553 (39)
												128.9640
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3004	1.2961	1.2918	1.2719	1.2681	1.2507	1.2507	1.2475	1.2574	1.2681	1.2757	1.2836 (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	2.7521 (42)
Hot water usage for mixer showers	

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Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for other uses	30.3819	29.9307	29.2953	28.1237	27.2465	26.2737	25.7483	26.3793	27.0663	28.1071	29.3028	30.2792 (42b)
Average daily hot water use (litres/day)	42.8144	41.2575	39.7006	38.1437	36.5868	35.0300	35.0300	36.5868	38.1437	39.7006	41.2575	42.8144 (42c)
												67.0910 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	73.1963	71.1882	68.9959	66.2675	63.8333	61.3037	60.7783	62.9661	65.2100	67.8077	70.5603	73.0936 (44)
Distribution loss (46)m = 0.15 x (45)m	115.9251	101.3710	106.0441	90.7168	85.9319	75.3800	73.5060	77.9652	80.4104	92.0145	100.5261	114.4469 (45)
Water 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 (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	98.5363	86.1654	90.1375	77.1093	73.0421	64.0730	62.4801	66.2704	68.3489	78.2123	85.4472	97.2799 (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	98.5363	86.1654	90.1375	77.1093	73.0421	64.0730	62.4801	66.2704	68.3489	78.2123	85.4472	97.2799 (64)
12Total per year (kWh/year)												947.1024 (64)
Electric shower(s)	56.3496	50.2079	54.8252	52.3190	53.3007	50.8437	52.5385	53.3007	52.3190	54.8252	53.7942	56.3496 (64a)
												640.9732 (64a)
Heat gains from water heating, kWh/month	38.7215	34.0933	36.2407	32.3571	31.5857	28.7292	28.7547	29.8928	30.1670	33.2594	34.8104	38.4074 (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	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057	137.6057 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.8418	144.8606	130.8418	135.2032	130.8418	135.2032	130.8418	130.8418	135.2032	130.8418	135.2032	130.8418 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	258.5714	261.2546	254.4931	240.0987	221.9283	204.8508	193.4419	190.7588	197.5203	211.9146	230.0850	247.1625 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606	36.7606 (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)	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845 (71)
Water heating gains (Table 5)	52.0450	50.7341	48.7106	44.9404	42.4539	39.9016	38.6487	40.1785	41.8986	44.7034	48.3477	51.6228 (72)
Total internal gains	505.7399	521.1310	498.3272	484.5240	459.5058	444.2374	427.2142	426.0608	438.9037	451.7416	477.9176	493.9089 (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				11.8000	10.6334		0.6300		0.7000		0.7700		38.3465 (74)
East				2.7000	19.6403		0.6300		0.7000		0.7700		16.2063 (76)
South				6.6500	46.7521		0.6300		0.7000		0.7700		95.0155 (78)
Solar gains	149.5682	260.5958	374.9550	500.1955	596.2169	608.6438	579.7638	504.9583	417.5058	292.6918	180.1384	127.3969	(83)
Total gains	655.3081	781.7268	873.2821	984.7195	1055.7227	1052.8812	1006.9780	931.0191	856.4096	744.4334	658.0560	621.3057	(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	47.7662	47.9262	48.0840	48.8394	48.9834	49.6650	49.6650	49.7933	49.4002	48.9834	48.6930	48.3931
alpha	4.1844	4.1951	4.2056	4.2560	4.2656	4.3110	4.3110	4.3196	4.2933	4.2656	4.2462	4.2262
util living area	0.9956	0.9903	0.9791	0.9429	0.8569	0.6941	0.5339	0.5915	0.8218	0.9618	0.9911	0.9965 (86)
MIT	19.2645	19.4961	19.8284	20.2883	20.6718	20.9085	20.9769	20.9647	20.8013	20.2998	19.7106	19.2388 (87)
Th 2	19.8405	19.8439	19.8472	19.8629	19.8659	19.8796	19.8796	19.8822	19.8743	19.8659	19.8599	19.8537 (88)
util rest of house	0.9942	0.9873	0.9722	0.9235	0.8079	0.5998	0.4076	0.4631	0.7453	0.9449	0.9878	0.9954 (89)
MIT 2	18.2752	18.5076	18.8384	19.2948	19.6438	19.8366	19.8735	19.8716	19.7637	19.3159	18.7341	18.2594 (90)
Living area fraction									fLA = Living area / (4) =			0.1430 (91)
MIT	18.4167	18.6490	18.9800	19.4369	19.7908	19.9899	20.0313	20.0279	19.9121	19.4566	18.8737	18.3995 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4167	18.6490	18.9800	19.4369	19.7908	19.9899	20.0313	20.0279	19.9121	19.4566	18.8737	18.3995 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	649.9046	768.3604	843.0063	900.3442	848.9114	642.1368	428.4446	447.6993	640.8068	697.3700	647.3295	617.1752 (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	1861.4706	1806.9343	1634.7740	1358.8992	1040.3655	683.5558	435.1614	458.9180	741.0477	1138.8407	1522.9716	1848.1370 (97)

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Space heating kWh	901.4051	697.9216	589.0752	330.1596	142.4419	0.0000	0.0000	0.0000	0.0000	328.4543	630.4623	915.8356 (98a)
Space heating requirement - total per year (kWh/year)												4535.7556
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	901.4051	697.9216	589.0752	330.1596	142.4419	0.0000	0.0000	0.0000	0.0000	328.4543	630.4623	915.8356 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4535.7556
Space heating per m2												(98c) / (4) = 44.7313 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1192.1276	938.4834	961.3643	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8068	0.8777	0.8427	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	961.7774	823.7116	810.0991	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1177.8061	1126.6912	1040.4903	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction												
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	155.5407	225.4169	171.4111	0.0000	0.0000	0.0000	0.0000 (104)
FC = cooled area / (4) =												1.0000 (105)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	38.8852	56.3542	42.8528	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												138.0922 (107)
Energy for space cooling												44.7313 (99)
Total												1.3619 (108)
Fabric Energy Efficiency (TFEE)												46.0932 (109)
												46.1 (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)
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 256.0350 (5)

2. Ventilation rate

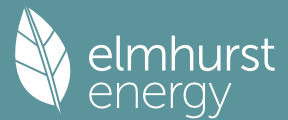
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 50.0000 / (5) = 0.1953 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4453 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.4453 (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	0.5677	0.5566	0.5455	0.4898	0.4787	0.4230	0.4230	0.4119	0.4453	0.4787	0.5009	0.5232 (22b)
Effective ac	0.6612	0.6549	0.6488	0.6200	0.6146	0.5895	0.5895	0.5848	0.5991	0.6146	0.6255	0.6369 (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
Door			4.2000	1.1000	4.6200		(26)
Window (Uw = 1.10)			30.5500	1.0536	32.1887		(27)
Heatloss Floor 1			50.7000	0.1300	6.5910	110.0000	5577.0000 (28a)
External Wall 1	160.6000	34.7500	125.8500	0.1800	22.6530	60.0000	7551.0000 (29a)
External Roof 1	50.7000		50.7000	0.1500	7.6050	9.0000	456.3000 (30)
Total net area of external elements Aum(A, m2)			262.0000				(31)

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Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	73.6577		(33)
Block	93.0600		75.0000	6979.5000 (32c)
Stud	82.4800		9.0000	742.3200 (32c)
Internal Floor 1	50.7000		18.0000	912.6000 (32d)
Internal Ceiling 1	50.7000		9.0000	456.3000 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	22675.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		223.6195 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	22.1500	0.0230	0.5094	
E2 Other lintels (including other steel lintels)	20.1500	0.0250	0.5038	
E3 Sill	48.5000	0.0200	0.9700	
E4 Jamb	31.8000	0.0510	1.6218	
E5 Ground floor (normal)	31.8000	0.0010	0.0318	
E6 Intermediate floor within a dwelling	18.7900	0.0530	0.9959	
E10 Eaves (insulation at ceiling level)	13.0100	0.0370	0.4814	
E12 Gable (insulation at ceiling level)	25.2500	0.0400	1.0100	
E16 Corner (normal)	5.0500	-0.0820	-0.4141	
E17 Corner (inverted - internal area greater than external area)				5.7099 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000 (36a) =
Point Thermal bridges				(33) + (36) + (36a) =
Total fabric heat loss				79.3676 (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	55.8628	55.3340	54.8157	52.3813	51.9258	49.8055	49.8055	49.4129	50.6222	51.9258	52.8472	53.8105	(38)
Heat transfer coeff	135.2304	134.7016	134.1834	131.7489	131.2935	129.1732	129.1732	128.7805	129.9899	131.2935	132.2149	133.1782	(39)
Average = Sum(39)m / 12 =												131.7468	
HLP	1.3336	1.3284	1.3233	1.2993	1.2948	1.2739	1.2739	1.2700	1.2820	1.2948	1.3039	1.3134	(40)
HLP (average)												1.2993	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7521 (42)
Hot water usage for mixer showers	70.3637	69.3063	67.7654	64.8172	62.6415	60.2152	58.8360	60.3653	62.0416	64.6467	67.6582	70.0941	(42a)
Hot water usage for baths	30.3819	29.9307	29.2953	28.1237	27.2465	26.2737	25.7483	26.3793	27.0663	28.1071	29.3028	30.2792	(42b)
Hot water usage for other uses	42.8144	41.2575	39.7006	38.1437	36.5868	35.0300	35.0300	36.5868	38.1437	39.7006	41.2575	42.8144	(42c)
Average daily hot water use (litres/day)												131.9640	(43)
Daily hot water use	143.5600	140.4945	136.7613	131.0846	126.4748	121.5188	119.6143	123.3314	127.2516	132.4544	138.2185	143.1877	(44)
Energy conte	227.3639	200.0622	210.1970	179.4483	170.2594	149.4216	144.6631	152.7100	156.9139	179.7394	196.9177	224.1973	(45)
Energy content (annual)										Total = Sum(45)m =		2191.8938	
Distribution loss (46)m = 0.15 x (45)m	34.1046	30.0093	31.5295	26.9172	25.5389	22.4132	21.6995	22.9065	23.5371	26.9609	29.5376	33.6296	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.1556	(55)
Total storage loss	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236	(56)
If cylinder contains dedicated solar storage	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236	(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	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833	(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	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833	(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	122.8673	109.2151	117.1593	105.4106	103.8800	95.4267	95.3693	98.0449	97.9179	107.0322	111.2191	121.8144	(65)

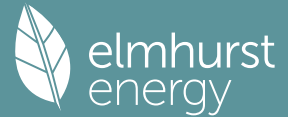
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.2013	26.8246	21.8152	16.5155	12.3455	10.4226	11.2620	14.6388	19.6481	24.9478	29.1178	31.0407	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	385.9274	389.9322	379.8404	358.3562	331.2363	305.7474	288.7193	284.7146	294.8063	316.2905	343.4104	368.8993	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	(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)	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	(71)
Water heating gains (Table 5)	165.1442	162.5225	157.4722	146.4036	139.6237	132.5371	128.1845	131.7807	135.9970	143.8604	154.4710	163.7290	(72)
Total internal gains	690.5801	688.5862	668.4348	630.5824	592.5126	558.0142	537.4729	540.4412	559.7586	594.4058	636.3063	672.9761	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
North	17.0500		10.6334		0.6300		0.7000		0.7700		55.4074	(74)
East	3.9000		19.6403		0.6300		0.7000		0.7700		23.4090	(76)
South	9.6000		46.7521		0.6300		0.7000		0.7700		137.1652	(78)

Solar gains	215.9817	376.3207	541.4946	722.4117	861.1340	879.1003	837.3800	729.3067	602.9615	422.6779	260.1280	183.9642	(83)
Total gains	906.5617	1064.9070	1209.9295	1352.9940	1453.6466	1437.1145	1374.8529	1269.7479	1162.7201	1017.0838	896.4343	856.9403	(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	46.5769	46.7598	46.9404	47.8077	47.9736	48.7610	48.7610	48.9097	48.4547	47.9736	47.6392	47.2947	
alpha	4.1051	4.1173	4.1294	4.1872	4.1982	4.2507	4.2507	4.2606	4.2303	4.1982	4.1759	4.1530	
util living area	0.9857	0.9720	0.9417	0.8671	0.7315	0.5506	0.4077	0.4567	0.6922	0.9055	0.9738	0.9885	(86)
Living	19.4814	19.7373	20.1011	20.5285	20.8233	20.9601	20.9911	20.9859	20.8965	20.5016	19.9202	19.4468	
Non living	18.0895	18.4139	18.8670	19.3872	19.7043	19.8395	19.8586	19.8595	19.7888	19.3741	18.6616	18.0565	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.2231	19.7373	20.1011	20.5285	20.8233	20.9601	20.9911	20.9859	20.8965	20.5016	19.9202	19.6641	(87)
Th 2	19.8146	19.8186	19.8226	19.8414	19.8449	19.8613	19.8613	19.8644	19.8550	19.8449	19.8378	19.8304	(88)
util rest of house	0.9816	0.9642	0.9255	0.8319	0.6684	0.4624	0.3050	0.3487	0.6039	0.8717	0.9651	0.9851	(89)
MIT 2	19.1268	18.4139	18.8670	19.3872	19.7043	19.8395	19.8586	19.8595	19.7888	19.3741	18.6616	18.3762	(90)
Living area fraction									fLA = Living area /	(4) =		0.1430	(91)
MIT	19.2836	18.6032	19.0435	19.5504	19.8643	19.9997	20.0205	20.0206	19.9472	19.5354	18.8416	18.5603	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2836	18.6032	19.0435	19.5504	19.8643	19.9997	20.0205	20.0206	19.9472	19.5354	18.8416	18.5603	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9793	0.9533	0.9118	0.8216	0.6696	0.4735	0.3196	0.3639	0.6117	0.8605	0.9547	0.9800	(94)
Useful gains	887.8066	1015.1319	1103.2714	1111.6564	973.3365	680.4994	439.4271	462.1081	711.2081	875.2412	855.8305	839.8047	(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	2026.2395	1845.8396	1683.1226	1403.1834	1071.9240	697.4981	441.8395	466.2612	760.0820	1173.1554	1552.4125	1912.4822	(97)
Space heating kWh	846.9940	558.2356	431.4093	209.8995	73.3490	0.0000	0.0000	0.0000	0.0000	221.6482	501.5391	798.0721	(98a)
Space heating requirement - total per year (kWh/year)												3641.1468	
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	846.9940	558.2356	431.4093	209.8995	73.3490	0.0000	0.0000	0.0000	0.0000	221.6482	501.5391	798.0721	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3641.1468	
Space heating per m2										(98c) / (4) =		35.9087	(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 %)													241.6401	(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	846.9940	558.2356	431.4093	209.8995	73.3490	0.0000	0.0000	0.0000	0.0000	221.6482	501.5391	798.0721	(98)	
Space heating efficiency (main heating system 1)	241.6401	241.6401	241.6401	241.6401	241.6401	0.0000	0.0000	0.0000	0.0000	241.6401	241.6401	241.6401	(210)	
Space heating fuel (main heating system)	350.5188	231.0194	178.5338	86.8645	30.3547	0.0000	0.0000	0.0000	0.0000	91.7266	207.5562	330.2730	(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	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833	(64)	
Efficiency of water heater	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	162.3784	(216)	
Fuel for water heating, kWh/month	176.4089	156.0738	165.8367	145.7264	141.2413	127.2346	125.4780	130.4336	131.8487	147.0795	156.4849	174.4587	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)	
Lighting	26.4350	21.2072	19.0947	13.9896	10.8060	8.8286	9.8576	12.8132	16.6431	21.8367	24.6645	27.1698	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	

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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												1506.8469	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												162.3784	
Water heating fuel used												1778.3052	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												213.3460	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3498.4981	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1506.8469	16.4900	248.4791	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1778.3052	16.4900	293.2425	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	213.3460	16.4900	35.1808	(250)
Additional standing charges			0.0000	(251)
Total energy cost			576.9023	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.4186	(257)
SAP value		77.0043	
SAP rating (Section 12)		77	(258)
SAP band		C	

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	1506.8469	0.1563	235.4921	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1778.3052	0.1409	250.5413	(264)
Space and water heating			486.0334	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	213.3460	0.1443	30.7924	(268)
Total CO2, kg/year			516.8258	(272)
CO2 emissions per m2			5.1000	(273)
EI value			95.2695	
EI rating			95	(274)
EI band			A	

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

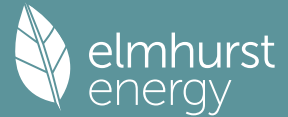
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)	
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.4000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	256.0350 (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	5 * 10 =	50.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 50.0000 / (5) = 0.1953 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.4453 (18)
Number of sides sheltered 0 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.4453 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	4.7000	4.6000	4.3000	4.3000	4.0000	4.0000	3.9000	4.0000	4.5000	4.4000	4.7000	(22)
Wind factor	1.2750	1.1750	1.1500	1.0750	1.0750	1.0000	1.0000	0.9750	1.0000	1.1250	1.1000	1.1750	(22a)
Adj infilt rate	0.5677	0.5232	0.5121	0.4787	0.4787	0.4453	0.4453	0.4342	0.4453	0.5009	0.4898	0.5232	(22b)
Effective ac	0.6612	0.6369	0.6311	0.6146	0.6146	0.5991	0.5991	0.5942	0.5991	0.6255	0.6200	0.6369	(25)

3. Heat losses and heat loss parameter

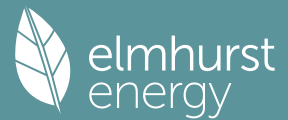
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Door			4.2000	1.1000	4.6200			(26)
Window (Uw = 1.10)			30.5500	1.0536	32.1887			(27)
Heatloss Floor 1			50.7000	0.1300	6.5910	110.0000	5577.0000	(28a)
External Wall 1	160.6000	34.7500	125.8500	0.1800	22.6530	60.0000	7551.0000	(29a)
External Roof 1	50.7000		50.7000	0.1500	7.6050	9.0000	456.3000	(30)
Total net area of external elements Aum(A, m2)			262.0000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	73.6577			(33)
Block			93.0600			75.0000	6979.5000	(32c)
Stud			82.4800			9.0000	742.3200	(32c)
Internal Floor 1			50.7000			18.0000	912.6000	(32d)
Internal Ceiling 1			50.7000			9.0000	456.3000	(32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22675.0200	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							223.6195	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)				22.1500	0.0230	0.5094		
E3 Sill				20.1500	0.0250	0.5038		
E4 Jamb				48.5000	0.0200	0.9700		
E5 Ground floor (normal)				31.8000	0.0510	1.6218		
E6 Intermediate floor within a dwelling				31.8000	0.0010	0.0318		
E10 Eaves (insulation at ceiling level)				18.7900	0.0530	0.9959		
E12 Gable (insulation at ceiling level)				13.0100	0.0370	0.4814		
E16 Corner (normal)				25.2500	0.0400	1.0100		
E17 Corner (inverted - internal area greater than external area)				5.0500	-0.0820	-0.4141		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.7099	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	79.3676	(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	55.8628	53.8105	53.3237	51.9258	51.9258	50.6222	50.6222	50.2087	50.6222	52.8472	52.3813	53.8105	(38)
Average = Sum(39)m / 12 =	135.2304	133.1782	132.6913	131.2935	131.2935	129.9899	129.9899	129.5763	129.9899	132.2149	131.7489	133.1782	(39)
												131.6979	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3336	1.3134	1.3086	1.2948	1.2948	1.2820	1.2820	1.2779	1.2820	1.3039	1.2993	1.3134	(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													2.7521 (42)
Hot water usage for mixer showers													
	70.3637	69.3063	67.7654	64.8172	62.6415	60.2152	58.8360	60.3653	62.0416	64.6467	67.6582	70.0941	(42a)
Hot water usage for baths													
	30.3819	29.9307	29.2953	28.1237	27.2465	26.2737	25.7483	26.3793	27.0663	28.1071	29.3028	30.2792	(42b)
Hot water usage for other uses													
	42.8144	41.2575	39.7006	38.1437	36.5868	35.0300	35.0300	36.5868	38.1437	39.7006	41.2575	42.8144	(42c)
Average daily hot water use (litres/day)													131.9640 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	143.5600	140.4945	136.7613	131.0846	126.4748	121.5188	119.6143	123.3314	127.2516	132.4544	138.2185	143.1877	(44)
Energy content (annual)	227.3639	200.0622	210.1970	179.4483	170.2594	149.4216	144.6631	152.7100	156.9139	179.7394	196.9177	224.1973	(45)
Distribution loss (46)m = 0.15 x (45)m													
	34.1046	30.0093	31.5295	26.9172	25.5389	22.4132	21.6995	22.9065	23.5371	26.9609	29.5376	33.6296	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													2.1400 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.1556 (55)
Total storage loss													
	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236	(56)
If cylinder contains dedicated solar storage													
	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236	(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													
	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833	(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													
	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833	(64)
Electric shower(s)													Total per year (kWh/year) = Sum(64)m = 2887.5838 (64)

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	122.8673	109.2151	117.1593	105.4106	103.8800	95.4267	95.3693	98.0449	97.9179	107.0322	111.2191	121.8144 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)												

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	30.2013	26.8246	21.8152	16.5155	12.3455	10.4226	11.2620	14.6388	19.6481	24.9478	29.1178	31.0407 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	385.9274	389.9322	379.8404	358.3562	331.2363	305.7474	288.7193	284.7146	294.8063	316.2905	343.4104	368.8993 (68)
Pumps, fans	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648 (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)	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845 (71)
Total internal gains	165.1442	162.5225	157.4722	146.4036	139.6237	132.5371	128.1845	131.7807	135.9970	143.8604	154.4710	163.7290 (72)
	690.5801	688.5862	668.4348	630.5824	592.5126	558.0142	537.4729	540.4412	559.7586	594.4058	636.3063	672.9761 (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					17.0500	13.8645		0.6300	0.7000	0.7700		72.2440 (74)	
East					3.9000	25.9136		0.6300	0.7000	0.7700		30.8862 (76)	
South					9.6000	58.2505		0.6300	0.7000	0.7700		170.9003 (78)	
Solar gains	274.0305	409.2522	589.6039	807.9081	925.1532	1024.0324	951.3730	842.7591	698.5283	487.1887	327.2526	222.7501 (83)	
Total gains	964.6106	1097.8385	1258.0388	1438.4904	1517.6658	1582.0466	1488.8459	1383.2003	1258.2869	1081.5945	963.5589	895.7263 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	46.5769	47.2947	47.4682	47.9736	47.9736	48.4547	48.4547	48.6093	48.4547	47.6392	47.8077	47.2947
util living area	4.1051	4.1530	4.1645	4.1982	4.1982	4.2303	4.2303	4.2406	4.2303	4.1759	4.1872	4.1530
	0.9777	0.9631	0.9218	0.8233	0.6625	0.4507	0.3212	0.3441	0.5859	0.8510	0.9543	0.9821 (86)
Living	19.7020	19.9049	20.2641	20.6497	20.8908	20.9832	20.9969	20.9960	20.9520	20.6688	20.1705	19.6767
Non living	18.3687	18.6319	19.0728	19.5232	19.7661	19.8474	19.8543	19.8574	19.8298	19.5537	18.9746	18.3485
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.3360	19.9049	20.2641	20.6497	20.8908	20.9832	20.9969	20.9960	20.9520	20.6688	20.1705	19.8618 (87)
Th 2	19.8146	19.8304	19.8341	19.8449	19.8449	19.8550	19.8550	19.8582	19.8550	19.8378	19.8414	19.8304 (88)
util rest of house	0.9711	0.9526	0.9002	0.7796	0.5907	0.3627	0.2228	0.2392	0.4877	0.7996	0.9386	0.9766 (89)
MIT 2	19.2382	18.6319	19.0728	19.5232	19.7661	19.8474	19.8543	19.8574	19.8298	19.5537	18.9746	18.6156 (90)
Living area fraction									fLA = Living area / (4) =			0.1430 (91)
MIT	19.3952	18.8140	19.2431	19.6843	19.9269	20.0098	20.0177	20.0202	19.9903	19.7131	19.1456	18.7938 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3952	18.8140	19.2431	19.6843	19.9269	20.0098	20.0177	20.0202	19.9903	19.7131	19.1456	18.7938 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9682	0.9406	0.8868	0.7727	0.5961	0.3749	0.2369	0.2542	0.4999	0.7932	0.9262	0.9699 (94)
Ext temp.	933.8920	1032.5765	1115.6698	1111.5811	904.6803	593.0653	352.6640	351.6740	629.0160	857.8770	892.4454	868.7961 (95)
Heat loss rate W	5.4000	5.7000	7.3000	9.6000	12.6000	15.4000	17.3000	17.3000	15.0000	11.8000	8.4000	5.5000 (96)
Space heating kWh	1892.5699	1746.4935	1584.7493	1323.9967	961.9789	599.2306	353.2776	352.4716	648.6880	1046.2342	1415.7257	1770.4402 (97)
Space heating requirement - total per year (kWh/year)	713.2564	479.7523	348.9951	152.9392	42.6302	0.0000	0.0000	0.0000	0.0000	140.1378	376.7618	670.8232 (98a)
Solar heating kWh												2925.2959
Solar heating 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 (98b)
Space heating kWh	713.2564	479.7523	348.9951	152.9392	42.6302	0.0000	0.0000	0.0000	0.0000	140.1378	376.7618	670.8232 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2925.2959
Space heating per m2										(98c) / (4) =		28.8491 (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 %)												241.5911 (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)	713.2564	479.7523	348.9951	152.9392	42.6302	0.0000	0.0000	0.0000	0.0000	140.1378	376.7618	670.8232 (98)
	241.5911	241.5911	241.5911	241.5911	241.5911	0.0000	0.0000	0.0000	0.0000	241.5911	241.5911	241.5911 (210)

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Space heating fuel (main heating system)	295.2328	198.5802	144.4569	63.3050	17.6456	0.0000	0.0000	0.0000	0.0000	58.0062	155.9502	277.6688	(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	286.4499	253.4302	269.2830	236.6283	229.3454	206.6016	203.7491	211.7960	214.0939	238.8254	254.0977	283.2833	(64)
Efficiency of water heater	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	(216)
Fuel for water heating, kWh/month	176.4156	156.0798	165.8430	145.7320	141.2467	127.2395	125.4827	130.4386	131.8538	147.0851	156.4908	174.4654	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	26.4350	21.2072	19.0947	13.9896	10.8060	8.8286	9.8576	12.8132	16.6431	21.8367	24.6645	27.1698	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1210.8457	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												162.3722	
Water heating fuel used												1778.3730	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												213.3460	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3202.5647	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1210.8457	26.0600	315.5464	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1778.3730	26.0600	463.4440	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	213.3460	26.0600	55.5980	(250)
Additional standing charges			0.0000	(251)
Total energy cost			834.5884	(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	1210.8457	0.1570	190.0769	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1778.3730	0.1409	250.5509	(264)
Space and water heating			440.6277	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	213.3460	0.1443	30.7924	(268)
Total CO2, kg/year			471.4202	(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	1210.8457	1.5811	1914.4978	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1778.3730	1.5210	2704.8183	(278)
Space and water heating			4619.3161	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	213.3460	1.5338	327.2372	(282)
Total Primary energy kWh/year			4946.5533	(286)

SAP 10 EPC IMPROVEMENTS

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19856 ashp

Current energy efficiency rating:
Current environmental impact rating:

C 77
A 95

N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:
N Solar water heating
U Solar photovoltaic panels

SAP change Cost change CO2 change
+ 2.3 -£ 113 -54 kg (11.5%)
+ 7.7 -£ 311 -255 kg (61.1%)

Recommended measures	Typical annual savings	Energy efficiency impact	Environmental impact
Solar water heating	£113	0.54 kg/m ²	C 79 A 96
Solar photovoltaic panels	£311	2.51 kg/m ²	B 87 A 98
Total Savings	£423	3.05 kg/m ²	

Potential energy efficiency rating: B 87
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 556 TEST (29 Nov 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current	Potential	Saving
Electricity	£835	£722	£113
Space heating	£316	£337	-£21
Water heating	£463	£330	£134
Lighting	£56	£56	£0
Generated (PV)	-£0	-£311	£311
Total cost of fuels	£835	£411	£424
Total cost of uses	£835	£412	£424
Delivered energy	32 kWh/m ²	8 kWh/m ²	24 kWh/m ²
Carbon dioxide emissions	0.5 tonnes	0.2 tonnes	0.3 tonnes
CO2 emissions per m ²	5 kg/m ²	2 kg/m ²	3 kg/m ²
Primary energy	49 kWh/m ²	24 kWh/m ²	25 kWh/m ²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 256.0350 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 50.0000 / (5) = 0.1953 (8)

Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
Yes
0.4453 (18)
0 (19)

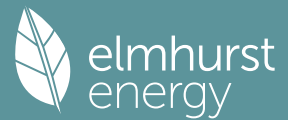
Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] = 1.0000 (20)
(21) = (18) x (20) = 0.4453 (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	0.5677	0.5566	0.5455	0.4898	0.4787	0.4230	0.4230	0.4119	0.4453	0.4787	0.5009	0.5232 (22b)
Effective ac	0.6612	0.6549	0.6488	0.6200	0.6146	0.5895	0.5895	0.5848	0.5991	0.6146	0.6255	0.6369 (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						
Door			4.2000	1.1000	4.6200			(26)					
Window (Uw = 1.10)			30.5500	1.0536	32.1887			(27)					
Heatloss Floor 1			50.7000	0.1300	6.5910	110.0000	5577.0000	(28a)					
External Wall 1	160.6000	34.7500	125.8500	0.1800	22.6530	60.0000	7551.0000	(29a)					
External Roof 1	50.7000		50.7000	0.1500	7.6050	9.0000	456.3000	(30)					
Total net area of external elements Aum(A, m2)			262.0000					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		73.6577			(33)					
Block			93.0600			75.0000	6979.5000	(32c)					
Stud			82.4800			9.0000	742.3200	(32c)					
Internal Floor 1			50.7000			18.0000	912.6000	(32d)					
Internal Ceiling 1			50.7000			9.0000	456.3000	(32e)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22675.0200	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							223.6195	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				22.1500	0.0230	0.5094							
E3 Sill				20.1500	0.0250	0.5038							
E4 Jamb				48.5000	0.0200	0.9700							
E5 Ground floor (normal)				31.8000	0.0510	1.6218							
E6 Intermediate floor within a dwelling				31.8000	0.0010	0.0318							
E10 Eaves (insulation at ceiling level)				18.7900	0.0530	0.9959							
E12 Gable (insulation at ceiling level)				13.0100	0.0370	0.4814							
E16 Corner (normal)				25.2500	0.0400	1.0100							
E17 Corner (inverted - internal area greater than external area)				5.0500	-0.0820	-0.4141							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.7099	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	79.3676	(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	55.8628	55.3340	54.8157	52.3813	51.9258	49.8055	49.8055	49.4129	50.6222	51.9258	52.8472	53.8105	(38)
Average = Sum(39)m / 12 =	135.2304	134.7016	134.1834	131.7489	131.2935	129.1732	129.1732	128.7805	129.9899	131.2935	132.2149	133.1782	(39)
												131.7468	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3336	1.3284	1.3233	1.2993	1.2948	1.2739	1.2739	1.2700	1.2820	1.2948	1.3039	1.3134	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.2993	
												31	
4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.7521 (42)
Hot water usage for mixer showers													
	70.3637	69.3063	67.7654	64.8172	62.6415	60.2152	58.8360	60.3653	62.0416	64.6467	67.6582	70.0941	(42a)
Hot water usage for baths													
	30.3819	29.9307	29.2953	28.1237	27.2465	26.2737	25.7483	26.3793	27.0663	28.1071	29.3028	30.2792	(42b)
Hot water usage for other uses													
	42.8144	41.2575	39.7006	38.1437	36.5868	35.0300	35.0300	36.5868	38.1437	39.7006	41.2575	42.8144	(42c)
Average daily hot water use (litres/day)													131.9640 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	143.5600	140.4945	136.7613	131.0846	126.4748	121.5188	119.6143	123.3314	127.2516	132.4544	138.2185	143.1877	(44)
Energy content (annual)	227.3639	200.0622	210.1970	179.4483	170.2594	149.4216	144.6631	152.7100	156.9139	179.7394	196.9177	224.1973	(45)
Distribution loss (46)m = 0.15 x (45)m													
	34.1046	30.0093	31.5295	26.9172	25.5389	22.4132	21.6995	22.9065	23.5371	26.9609	29.5376	33.6296	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													2.1400 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.1556 (55)
Total storage loss													
	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236	(56)
If cylinder contains dedicated solar storage													
	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	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													
	286.4499	253.4302	267.8873	229.8747	216.5511	193.9949	190.7222	199.6995	208.6910	237.4297	254.0977	283.2833	(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)
Aperture area of solar collector													3.0000 (H1)
Zero-loss collector efficiency													0.8000 (H2)
Collector linear heat loss coefficient													1.8000 (H3)
Collector 2nd order heat loss coefficient													0.0000 (H4)
Collector loop efficiency													0.9000 (H5)
Incidence angle modifier													1.0000 (H6)
Overshading factor													0.8000 (H8)
Overall heat loss coefficient of system													6.5000 (H10)
Heat loss coefficient of collector loop													3.9667 (H11)
Dedicated solar storage volume													75.0000 (H12)
Effective solar volume													75.0000 (H14)
Reference volume													225.0000 (H15)
Storage tank correction coefficient													1.3161 (H16)
Heat delivered to hot water													630.6711 (H24)
Heat delivered to space heating													0.0000 (H29)
Solar input													630.6711
Solar input	-0.0000	-16.1967	-58.7457	-81.1285	-106.4870	-98.2877	-97.6548	-85.0746	-58.3606	-28.7354	-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													
	286.4499	237.2335	209.1416	148.7462	110.0640	95.7071	93.0673	114.6250	150.3304	208.6943	254.0977	283.2833	(64)
												2191.4403	(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													
	122.8673	109.2151	116.0427	100.0077	93.6446	85.3413	84.9477	88.3677	93.5956	105.9156	111.2191	121.8144	(65)

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

6. Solar gains

Solar gains	215.9817	376.3207	541.4946	722.4117	861.1340	879.1003	837.3800	729.3067	602.9615	422.6779	260.1280	183.9642 (83)
Total gains	906.5617	1064.9070	1208.4287	1345.4900	1439.8893	1423.1070	1360.8454	1256.7410	1156.7169	1015.5830	896.4343	856.9403 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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8. Space heating requirement

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

[illegible]

10a. Fuel costs - using Table 12 prices

11a. SAP rating - Individual heating systems

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	1508.9128	0.1563	235.7805 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1349.5884	0.1453	196.0645 (264)
Space and water heating			431.8450 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	213.3460	0.1443	30.7924 (268)
Energy saving/generation technologies			
FV Unit electricity used in dwelling	-895.2093	0.1345	-120.4281
FV Unit electricity exported	-832.0301	0.1229	-102.2209
Total			-222.6490 (269)
Total CO2, kg/year			251.0854 (272)
CO2 emissions per m2			2.4800 (273)
EI value			97.7018
EI rating			98 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.7000 (1b)	x 2.3500 (2b)	= 119.1450 (1b) - (3b)
First floor	50.7000 (1c)	x 2.7000 (2c)	= 136.8900 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.4000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 256.0350 (5)

2. Ventilation rate

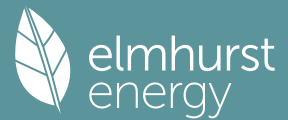
											m3 per hour			
Number of open chimneys												0 * 80 =	0.0000 (6a)	
Number of open flues												0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire												0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler												0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater												0 * 35 =	0.0000 (6e)	
Number of blocked chimneys												0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans												5 * 10 =	50.0000 (7a)	
Number of passive vents												0 * 10 =	0.0000 (7b)	
Number of flueless gas fires												0 * 40 =	0.0000 (7c)	
													Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =												50.0000 / (5) =	0.1953 (8)	
Pressure test												Yes		
Pressure Test Method												Blower Door		
Measured/design AP50												5.0000 (17)		
Infiltration rate												0.4453 (18)		
Number of sides sheltered												0 (19)		
													(20) = 1 - [0.075 x (19)] = 1.0000 (20)	
Shelter factor												(21) = (18) x (20) = 0.4453 (21)		
Infiltration rate adjusted to include shelter factor														
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind factor	5.1000	4.7000	4.6000	4.3000	4.3000	4.0000	4.0000	3.9000	4.0000	4.5000	4.4000	4.7000 (22)		
Adj infilt rate	1.2750	1.1750	1.1500	1.0750	1.0750	1.0000	1.0000	0.9750	1.0000	1.1250	1.1000	1.1750 (22a)		
	0.5677	0.5232	0.5121	0.4787	0.4787	0.4453	0.4453	0.4342	0.4453	0.5009	0.4898	0.5232 (22b)		
Effective ac	0.6612	0.6369	0.6311	0.6146	0.6146	0.5991	0.5991	0.5942	0.5991	0.6255	0.6200	0.6369 (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						
Door			4.2000	1.1000	4.6200			(26)					
Window (Uw = 1.10)			30.5500	1.0536	32.1887			(27)					
Heatloss Floor 1			50.7000	0.1300	6.5910	110.0000	5577.0000	(28a)					
External Wall 1	160.6000	34.7500	125.8500	0.1800	22.6530	60.0000	7551.0000	(29a)					
External Roof 1	50.7000		50.7000	0.1500	7.6050	9.0000	456.3000	(30)					
Total net area of external elements Aum(A, m2)			262.0000					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		73.6577			(33)					
Block			93.0600			75.0000	6979.5000	(32c)					
Stud			82.4800			9.0000	742.3200	(32c)					
Internal Floor 1			50.7000			18.0000	912.6000	(32d)					
Internal Ceiling 1			50.7000			9.0000	456.3000	(32e)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22675.0200	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							223.6195	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				22.1500	0.0230	0.5094							
E3 Sill				20.1500	0.0250	0.5038							
E4 Jamb				48.5000	0.0200	0.9700							
E5 Ground floor (normal)				31.8000	0.0510	1.6218							
E6 Intermediate floor within a dwelling				31.8000	0.0010	0.0318							
E10 Eaves (insulation at ceiling level)				18.7900	0.0530	0.9959							
E12 Gable (insulation at ceiling level)				13.0100	0.0370	0.4814							
E16 Corner (normal)				25.2500	0.0400	1.0100							
E17 Corner (inverted - internal area greater than external area)				5.0500	-0.0820	-0.4141							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.7099	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	79.3676	(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	55.8628	53.8105	53.3237	51.9258	51.9258	50.6222	50.6222	50.2087	50.6222	52.8472	52.3813	53.8105	(38)
Average = Sum(39)m / 12 =	135.2304	133.1782	132.6913	131.2935	131.2935	129.9899	129.9899	129.5763	129.9899	132.2149	131.7489	133.1782	(39)
												131.6979	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3336	1.3134	1.3086	1.2948	1.2948	1.2820	1.2820	1.2779	1.2820	1.3039	1.2993	1.3134	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

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Assumed occupancy												2.7521 (42)
Hot water usage for mixer showers												
70.3637	69.3063	67.7654	64.8172	62.6415	60.2152	58.8360	60.3653	62.0416	64.6467	67.6582	70.0941	(42a)
Hot water usage for baths												
30.3819	29.9307	29.2953	28.1237	27.2465	26.2737	25.7483	26.3793	27.0663	28.1071	29.3028	30.2792	(42b)
Hot water usage for other uses												
42.8144	41.2575	39.7006	38.1437	36.5868	35.0300	35.0300	36.5868	38.1437	39.7006	41.2575	42.8144	(42c)
Average daily hot water use (litres/day)												131.9640 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	143.5600	140.4945	136.7613	131.0846	126.4748	121.5188	119.6143	123.3314	127.2516	132.4544	138.2185	143.1877 (44)
Energy content	227.3639	200.0622	210.1970	179.4483	170.2594	149.4216	144.6631	152.7100	156.9139	179.7394	196.9177	224.1973 (45)
Energy content (annual)												Total = Sum(45)m = 2191.8938
Distribution loss (46)m = 0.15 x (45)m	34.1046	30.0093	31.5295	26.9172	25.5389	22.4132	21.6995	22.9065	23.5371	26.9609	29.5376	33.6296 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1556 (55)
Total storage loss	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236 (56)
If cylinder contains dedicated solar storage	35.8236	32.3568	35.8236	34.6680	35.8236	34.6680	35.8236	35.8236	34.6680	35.8236	34.6680	35.8236 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	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	286.4499	253.4302	267.8873	229.8747	216.5511	193.9949	190.7222	199.6995	208.6910	237.4297	254.0977	283.2833 (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)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												768.5084 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												768.5084
Solar input	-5.0282	-23.0711	-69.3678	-95.0529	-116.2451	-116.5730	-112.8794	-102.4941	-74.6607	-42.6857	-10.4505	-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	281.4218	230.3591	198.5194	134.8218	100.3059	77.4219	77.8428	97.2054	134.0304	194.7439	243.6472	283.2833 (64)
											Total per year (kWh/year) = Sum(64)m =	2053.6030 (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	122.8673	109.2151	116.0427	100.0077	93.6446	85.3413	84.9477	88.3677	93.5956	105.9156	111.2191	121.8144 (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	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268	165.1268 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.2013	26.8246	21.8152	16.5155	12.3455	10.4226	11.2620	14.6388	19.6481	24.9478	29.1178	31.0407 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	385.9274	389.9322	379.8404	358.3562	331.2363	305.7474	288.7193	284.7146	294.8063	316.2905	343.4104	368.8993 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648	54.2648 (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)	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845	-110.0845 (71)
Water heating gains (Table 5)	165.1442	162.5225	155.9714	138.8996	125.8664	118.5296	114.1771	118.7738	129.9938	142.3596	154.4710	163.7290 (72)
Total internal gains	690.5801	688.5862	666.9340	623.0784	578.7553	544.0067	523.4654	527.4342	553.7554	592.9050	636.3063	672.9761 (73)

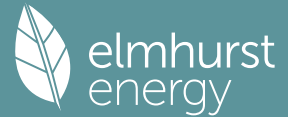
6. Solar gains

[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					17.0500	13.8645		0.6300	0.7000	0.7700		72.2440 (74)	
East					3.9000	25.9136		0.6300	0.7000	0.7700		30.8862 (76)	
South					9.6000	58.2505		0.6300	0.7000	0.7700		170.9003 (78)	
Solar gains	274.0305	409.2522	589.6039	807.9081	925.1532	1024.0324	951.3730	842.7591	698.5283	487.1887	327.2526	222.7501	(83)
Total gains	964.6106	1097.8385	1256.5380	1430.9864	1503.9085	1568.0391	1474.8384	1370.1933	1252.2837	1080.0937	963.5589	895.7263	(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	46.5769	47.2947	47.4682	47.9736	47.9736	48.4547	48.4547	48.6093	48.4547	47.6392	47.8077	47.2947
alpha	4.1051	4.1530	4.1645	4.1982	4.1982	4.2303	4.2303	4.2406	4.2303	4.1759	4.1872	4.1530
util living area	0.9777	0.9631	0.9221	0.8253	0.6669	0.4544	0.3242	0.3472	0.5882	0.8515	0.9543	0.9821 (86)
Living	19.7020	19.9049	20.2629	20.6460	20.8880	20.9826	20.9968	20.9959	20.9513	20.6680	20.1705	19.6767

Full SAP Calculation Printout



Non living	18.3687	18.6319	19.0714	19.5194	19.7639	19.8472	19.8543	19.8573	19.8294	19.5528	18.9746	18.3485
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.3360	19.9049	20.2629	20.6460	20.8880	20.9826	20.9968	20.9959	20.9513	20.6680	20.1705	19.8618 (87)
Th 2	19.8146	19.8304	19.8341	19.8449	19.8449	19.8550	19.8550	19.8582	19.8550	19.8378	19.8414	19.8304 (88)
util rest of house												
	0.9711	0.9526	0.9006	0.7818	0.5951	0.3659	0.2249	0.2415	0.4898	0.8002	0.9386	0.9766 (89)
MIT 2	19.2382	18.6319	19.0714	19.5194	19.7639	19.8472	19.8543	19.8573	19.8294	19.5528	18.9746	18.6156 (90)
Living area fraction									FLA = Living area / (4) =			0.1430 (91)
MIT	19.3952	18.8140	19.2418	19.6805	19.9247	20.0095	20.0177	20.0201	19.9898	19.7123	19.1456	18.7938 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3952	18.8140	19.2418	19.6805	19.9247	20.0095	20.0177	20.0201	19.9898	19.7123	19.1456	18.7938 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9682	0.9406	0.8871	0.7749	0.6003	0.3781	0.2391	0.2566	0.5020	0.7937	0.9262	0.9699	(94)
Useful gains	933.8920	1032.5765	1114.7329	1108.8082	902.8700	592.8259	352.6360	351.6379	628.6492	857.2640	892.4454	868.7961	(95)
Ext temp.	5.4000	5.7000	7.3000	9.6000	12.6000	15.4000	17.3000	17.3000	15.0000	11.8000	8.4000	5.5000	(96)
Heat loss rate W	1892.5699	1746.4935	1584.5714	1323.5009	961.6802	599.1927	353.2728	352.4654	648.6293	1046.1231	1415.7257	1770.4402	(97)
Space heating kWh	713.2564	479.7523	349.5599	154.5788	43.7548	0.0000	0.0000	0.0000	0.0000	140.5112	376.7618	670.8232	(98a)
Space heating requirement - total per year (kWh/year)												2928.9982	
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	713.2564	479.7523	349.5599	154.5788	43.7548	0.0000	0.0000	0.0000	0.0000	140.5112	376.7618	670.8232	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2928.9982	
Space heating per m2										(98c) / (4) =		28.8856	(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 %)													241.5911 (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	713.2564	479.7523	349.5599	154.5788	43.7548	0.0000	0.0000	0.0000	0.0000	140.5112	376.7618	670.8232	(98)
Space heating efficiency (main heating system 1)	241.5911	241.5911	241.5911	241.5911	241.5911	0.0000	0.0000	0.0000	0.0000	241.5911	241.5911	241.5911	(210)
Space heating fuel (main heating system)	295.2328	198.5802	144.6907	63.9836	18.1111	0.0000	0.0000	0.0000	0.0000	58.1607	155.9502	277.6688	(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	281.4218	230.3591	198.5194	134.8218	100.3059	77.4219	77.8428	97.2054	134.0304	194.7439	243.6472	283.2833	(64)
Efficiency of water heater (217)m	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	162.3722	(216)
Fuel for water heating, kWh/month	173.3189	141.8710	122.2619	83.0326	61.7753	47.6818	47.9410	59.8658	82.5451	119.9367	150.0547	174.4654	(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	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	26.4350	21.2072	19.0947	13.9896	10.8060	8.8286	9.8576	12.8132	16.6431	21.8367	24.6645	27.1698	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-48.8359	-63.2500	-93.2111	-105.4189	-107.4782	-101.9278	-99.4684	-95.3714	-86.0852	-73.8079	-53.3166	-40.0386	(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	-15.9819	-29.2794	-63.6104	-108.5737	-145.0798	-166.8417	-159.3784	-135.5539	-96.6787	-51.3301	-22.8897	-11.7363	(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												1212.3782	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												162.3722	
Water heating fuel used												1264.7502	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												213.3460	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1975.1438	(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												795.3306	(238)

Full SAP Calculation Printout



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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1212.3782	26.0600	315.9458 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1264.7502	26.0600	329.5939 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	26.0600	20.8480 (249)
Energy for lighting	213.3460	26.0600	55.5980 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-968.2099	26.0600	-252.3155
PV Unit electricity exported	-1006.9339	5.8100	-58.5029
Total			-310.8184 (252)
Total energy cost			411.1673 (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	1212.3782	0.1570	190.2921 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1264.7502	0.1462	184.9107 (264)
Space and water heating			375.2028 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	213.3460	0.1443	30.7924 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-968.2099	0.1350	-130.6749
PV Unit electricity exported	-1006.9339	0.1232	-124.0076
Total			-254.6824 (269)
Total CO2, kg/year			162.4098 (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	1212.3782	1.5810	1916.8273 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1264.7502	1.5408	1948.7808 (278)
Space and water heating			3865.6082 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	213.3460	1.5338	327.2372 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-968.2099	1.4988	-1451.1801
PV Unit electricity exported	-1006.9339	0.4519	-454.9895
Total			-1906.1696 (283)
Total Primary energy kWh/year			2407.6998 (286)

Predicted Energy Assessment

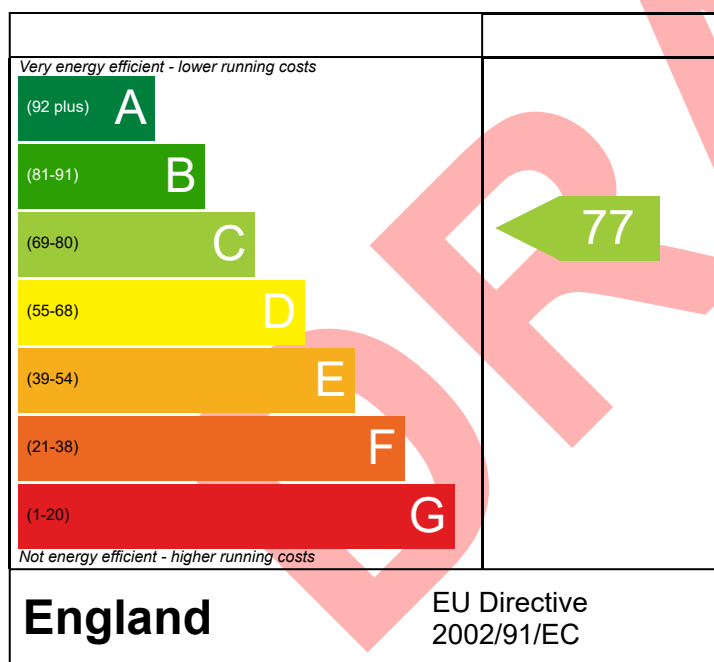


Dwelling type: House, Detached
Date of assessment: 04/12/2024
Produced by: Thomas Gibson
Total floor area: 101.4 m²
DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

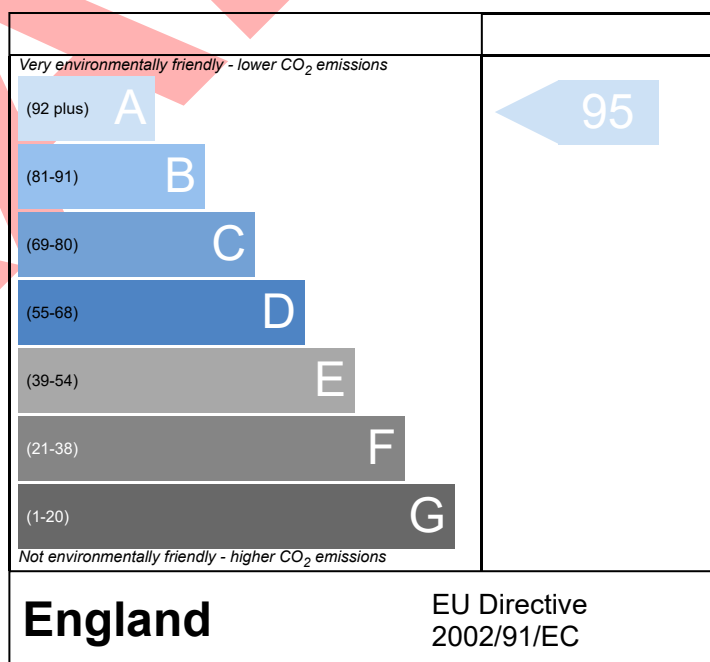
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Summary for Input Data

Property Reference	19856	Issued on Date	04/12/2024
Assessment Reference	19856 ashp	Prop Type Ref	19856
Property			

SAP Rating	77 C	DER	5.22	TER	12.24
Environmental	95 A	% DER < TER			57.35
CO ₂ Emissions (t/year)	0.47	DFEE	43.25	TFEE	46.09
Compliance Check	See BREL	% DFEE < TFEE			6.18
% DPER < TPER	14.76	DPER	54.61	TPER	64.07

Assessor Details	Mr. Thomas Gibson	Assessor ID	AV80-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Detached	
2.0 Number of Storeys	2	
3.0 Date Built	2024	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	223.62	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements	Ground floor: 1st Storey:	Heat Loss Perimeter 31.80 m 31.80 m	Internal Floor Area 50.70 m ² 50.70 m ²	Average Storey Height 2.35 m 2.70 m
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8.0 Living Area	14.50	m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res 0.00	Shelter None	Openings 34.75	Area Calculation Type Enter Gross Area
	External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	160.60	125.85				

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Block Stud	Dense block, plasterboard on dabs Plasterboard on timber frame	75.00 9.00	93.06 82.48

10.0 External Roofs	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code None	Shelter Factor 0.00	Calculation Type Enter Gross Area	Openings 0.00
	External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.15	9.00	50.70	50.70				

10.2 Internal Ceilings	Description	Storey Lowest occupied	Construction	Area (m ²)
	Internal Ceiling 1		Plasterboard ceiling, carpeted chipboard floor	50.70

11.0 Heat Loss Floors	Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
	Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.13	None	0.00	110.00	50.70

11.2 Internal Floors	Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
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Summary for Input Data

Internal Floor 1 Plasterboard ceiling, carpeted chipboard floor 9.00 50.70

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Solid Door				0.00			1.10
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.10

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Door	External Wall 1	South	2.10	
Door	Door	External Wall 1	North	2.10	
Front	Window	External Wall 1	South	9.60	
Rear	Window	External Wall 1	North	17.05	
Side	Window	External Wall 1	East	3.90	

14.0 Conservatory

None

15.0 Draught Proofing

100 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Non Gov Approved Schemes	22.15	0.02	0.02	No
E3 Sill	Non Gov Approved Schemes	20.15	0.03	0.03	No
E4 Jamb	Non Gov Approved Schemes	48.50	0.02	0.02	No
E5 Ground floor (normal)	Non Gov Approved Schemes	31.80	0.05	0.05	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	31.80	0.00	0.00	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	18.79	0.05	0.05	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	13.01	0.04	0.04	No
E16 Corner (normal)	Non Gov Approved Schemes	25.25	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Non Gov Approved Schemes	5.05	-0.08	-0.08	No

Y-value 0.02 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys 0

Number of open flues 0

Number of chimneys/flues attached to closed fire 0

Number of flues attached to solid fuel boiler 0

Number of flues attached to other heater 0

Number of blocked chimneys 0

Number of intermittent extract fans 5

Number of passive vents 0

Number of flueless gas fires 0

21.0 Fixed Cooling System

No

22.0 Pressure Testing

Designed AP₅₀ 5.00 m³/(h.m²) @ 50 Pa

Test Method Blower Door

22.0 Lighting

No Fixed Lighting No

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	4.00	400.00	25

24.0 Main Heating 1

Database Database

Percentage of Heat 100.00 %

Database Ref. No. 102640

Fuel Type Electricity

In Winter 241.64

Summary for Input Data

In Summer	162.38
Model Name	AE050JXYDEH
Manufacturer	Samsung Electronics Air Conditioner Europe B.V.
System Type	Heat Pump
Controls SAP Code	2207
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2	None
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26.0 Heat Networks	None
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27.0 Secondary Heating	None
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28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	2
Immersion Only Heating Hot Water	Yes

28.1 Showers					
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	

28.3 Waste Water Heat Recovery System	
---------------------------------------	--

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	2.14	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store	None
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34.0 Small-scale Hydro	None
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Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Recommendations	
Lower cost measures	None
Further measures to achieve even higher standards	

Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
£4,000 - £6,000	£113	C 79	A 96
£3,500 - £5,500	£311	B 87	A 98
		0	0

Thermal Bridging

Property Reference	19856	Issued on Date	04/12/2024
Assessment Reference	19856 ashp	Prop Type Ref	Detached House
Property			

SAP Rating	77 C	DER	5.22	TER	12.24
Environmental	95 A	% DER < TER			57.35
CO ₂ Emissions (t/year)	0.47	DFEE	43.25	TFEE	46.09
Compliance Check	See BREL	% DFEE < TFEE			6.18
% DPER < TPER	14.76	DPER	54.61	TPER	64.07

Assessor Details	Mr. Thomas Gibson	Assessor ID	AV80-0001
Client			

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Non Gov Approved Schemes	0.023	22.15	0.51	
External wall	E3 Sill	Non Gov Approved Schemes	0.025	20.15	0.50	
External wall	E4 Jamb	Non Gov Approved Schemes	0.020	48.50	0.97	
External wall	E5 Ground floor (normal)	Non Gov Approved Schemes	0.051	31.80	1.62	
External wall	E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	0.001	31.80	0.03	
External wall	E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	0.053	18.79	1.00	
External wall	E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.037	13.01	0.48	
External wall	E16 Corner (normal)	Non Gov Approved Schemes	0.040	25.25	1.01	
External wall	E17 Corner (inverted – internal area greater than external area)	Non Gov Approved Schemes	-0.082	5.05	-0.41	

Total: 216.50 W/mK:
Y-Value: 0.02 W/m²K:

Energy Report



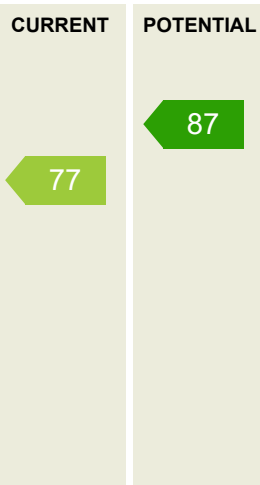
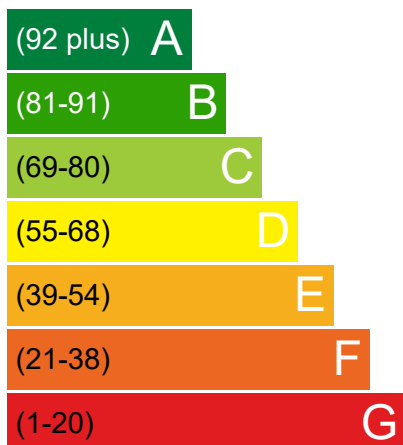
Dwelling Address	
Reference	19856-19856 ashp
Assessment Date	04/12/2024
Submission Date	
Property Type	House, Detached
Total Floor Area	101

This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

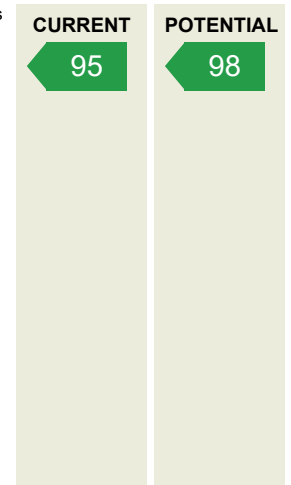
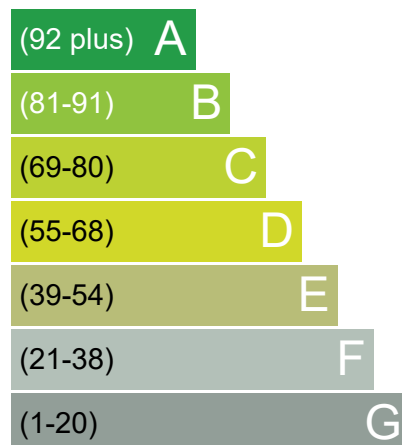
Energy Efficiency Rating

Most energy efficient - lower running costs

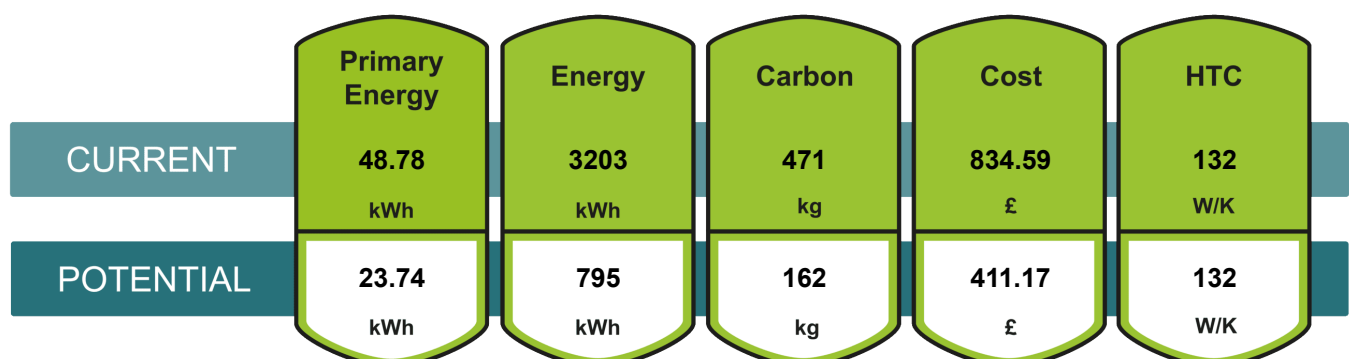


Carbon Dioxide (CO2) Emissions Rating

Very environmentally friendly - lower CO2 emissions



Additional ratings for your home



Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m ² K	Very Good
Roof	Average thermal transmittance 0.15 W/m ² K	Very Good
Floor	Average thermal transmittance 0.13 W/m ² K	Very Good
Windows	High performance glazing	Very Good
Main heating	Air source heat pump, radiators, electric	Good
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Poor
Lighting	Excellent lighting efficiency	Very Good
Air tightness	Air permeability [AP50] = 5.0 m ³ /h.m ² (assumed)	Good

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling. To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed. Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£113	C 79	£4,000 - £6,000	£113	A 96
Photovoltaic	£423	B 87	£3,500 - £5,500	£311	A 98

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total energy cost if all recommended measures named above were installed.

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting 	£56	£56	
Heating 	£316	£337	
Hot Water 	£463	£330	
New Technologies e.g. Impact of PV	£0	-(£311)	
TOTAL	£835	£411	

Estimated energy use and potential savings



Space Heating

1211

kWh per year



Water Heating

1778

kWh per year

About this document

Created by:
Company/Trading name:
Phone number:
Email address:

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g. heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO ₂)	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.