

Full SAP Calculation Printout



Plot Reference	02			Issued on Date	05/08/2026
Assessment Reference	02 ashp + PV	Plot Type Ref			
Plot Address	Flat 2, 2-4 Church St, Caversham, Reading, RG4 8AT			SAP Version	10.2
SAP Rating	88 B	DER	3.15	TER	16.02
Environmental	98 A	% DER < TER			80.34
CO ₂ Emissions (t/year)	0.11	DFEE	38.79	TFEE	43.61
Compliance Check	See BREL	% DFEE < TFEE			11.05
% DPER < TPER	49.77	DPER	42.46	TPER	84.52
Assessor Details	Mrs. Nicola Battista			Assessor ID	L706-0001
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)
Main dwelling	43.3700 (1b)	2.3900 (2b)	103.6543 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.3700		103.6543 (4)
Dwelling volume			103.6543 (5)

2. Ventilation rate

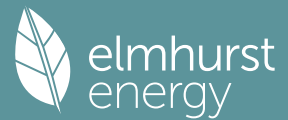
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1929 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4429 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3101 (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	0.3953	0.3876	0.3798	0.3411	0.3333	0.2946	0.2946	0.2868	0.3101	0.3333	0.3488	0.3643 (22b)
Effective ac	0.5781	0.5751	0.5721	0.5582	0.5556	0.5434	0.5434	0.5411	0.5481	0.5556	0.5608	0.5664 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Opening Type 1			1.8900	1.4000	2.6460		(26)
Opening Type 2			12.4700	1.1450	14.2786		(27)
Heatloss Floor 1			43.3700	0.1000	4.3370	75.0000	3252.7500 (28a)
External Wall 1	49.8100	12.4700	37.3400	0.1800	6.7212	60.0000	2240.4000 (29a)
External Wall 2	13.0700	1.8900	11.1800	0.1700	1.9006	190.0000	2124.2000 (29a)
Total net area of external elements Aum(A, m ²)			106.2500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.8834		(33)
Main dwelling							
Party Ceiling 1			43.3700			100.0000	4337.0000 (32b)
Internal Wall 1			51.6200			9.0000	464.5800 (32c)
Internal Wall 2			22.4200			100.0000	2242.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 14660.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							338.0431 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E16 Corner (normal)				9.5600	0.0400		0.3824
E2 Other lintels (including other steel lintels)				9.0400	0.0500		0.4520
E3 Sill				8.1400	0.0240		0.1954
E4 Jamb				23.3000	0.0190		0.4427

Full SAP Calculation Printout



E5 Ground floor (normal) 26.3100 0.0310 0.8156
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.2881 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 32.1715 (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 19.7759 19.6721 19.5704 19.0925 19.0031 18.5869 18.5869 18.5098 18.7472 19.0031 19.1840 19.3731 (38)
 51.9474 51.8436 51.7419 51.2640 51.1746 50.7584 50.7584 50.6813 50.9187 51.1746 51.3555 51.5446 (39)
 Average = Sum(39)m / 12 = 51.2636

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 1.1978 1.1954 1.1930 1.1820 1.1800 1.1704 1.1704 1.1686 1.1741 1.1800 1.1841 1.1885 (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 1.4985 (42)
 Hot water usage for mixer showers 49.3445 48.6029 47.5223 45.4548 43.9290 42.2275 41.2604 42.3328 43.5083 45.3353 47.4472 49.1554 (42a)
 Hot water usage for baths 21.3430 21.0260 20.5796 19.7566 19.1403 18.4570 18.0879 18.5311 19.0138 19.7449 20.5849 21.2708 (42b)
 Hot water usage for other uses 29.9762 28.8862 27.7961 26.7061 25.6160 24.5260 24.5260 25.6160 26.7061 27.7961 28.8862 29.9762 (42c)
 Average daily hot water use (litres/day) 92.5333 (43)

Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 100.6636 98.5151 95.8981 91.9175 88.6854 85.2105 83.8743 86.4800 89.2282 92.8763 96.9182 100.4024 (44)
 Energy conte 159.4266 140.2841 147.3917 125.8305 119.3876 104.7763 101.4387 107.0803 110.0273 126.0323 138.0778 157.2059 (45)
 Energy content (annual) Total = Sum(45)m = 1536.9590
 Distribution loss (46)m = 0.15 x (45)m
 23.9140 21.0426 22.1088 18.8746 17.9081 15.7164 15.2158 16.0620 16.5041 18.9048 20.7117 23.5809 (46)

Water storage loss (or HIU loss): 150.0000 (47)
 Store volume 1.8600 (48)
 a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)
 Temperature factor from Table 2b 1.0044 (55)
 Enter (49) or (54) in (55)
 Total storage loss

31.1364 28.1232 31.1364 30.1320 31.1364 30.1320 31.1364 31.1364 30.1320 31.1364 30.1320 31.1364 (56)
 If cylinder contains dedicated solar storage
 31.1364 28.1232 31.1364 30.1320 31.1364 30.1320 31.1364 31.1364 30.1320 31.1364 30.1320 31.1364 (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
 213.8254 189.4185 201.7905 178.4745 173.7864 157.4203 155.8375 161.4791 162.6713 180.4311 190.7218 211.6047 (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
 213.8254 189.4185 201.7905 178.4745 173.7864 157.4203 155.8375 161.4791 162.6713 180.4311 190.7218 211.6047 (64)
 Total per year (kWh/year) = Sum(64)m = 2177.4610 (64)
 2177 (64)

12Total per year (kWh/year)
 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 96.5284 85.9520 92.5268 83.9538 83.2154 76.9533 77.2474 79.1232 78.6993 85.4248 88.0261 95.7900 (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 74.9253 74.9253 74.9253 74.9253 74.9253 74.9253 74.9253 74.9253 74.9253 74.9253 74.9253 74.9253 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 65.6167 72.6471 65.6167 67.8039 65.6167 67.8039 65.6167 65.6167 67.8039 65.6167 67.8039 65.6167 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 130.0924 131.4424 128.0405 120.7984 111.6566 103.0645 97.3245 95.9745 99.3764 106.6185 115.7603 124.3524 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 30.4925 30.4925 30.4925 30.4925 30.4925 30.4925 30.4925 30.4925 30.4925 30.4925 30.4925 30.4925 (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) -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 -59.9403 (71)
 Water heating gains (Table 5) 129.7424 127.9047 124.3640 116.6025 111.8487 106.8796 103.8271 106.3484 109.3045 114.8183 122.2584 128.7500 (72)
 Total internal gains 370.9292 377.4718 363.4988 350.6825 334.5996 323.2256 312.2459 313.4173 321.9624 332.5310 351.3003 364.1967 (73)

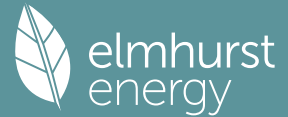
6. Solar gains

[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 6.9100 10.6334 0.6300 0.7000 0.7700 22.4554 (74)
 East 1.4300 19.6403 0.6300 0.7000 0.7700 8.5833 (76)
 West 4.1300 19.6403 0.6300 0.7000 0.7700 24.7896 (80)
 Solar gains 55.8283 108.1980 180.4348 273.9322 349.9517 365.6302 344.9847 285.9896 212.7176 128.5485 69.3138 46.1642 (83)
 Total gains 426.7575 485.6698 543.9336 624.6147 684.5512 688.8559 657.2306 599.4068 534.6800 461.0795 420.6141 410.3609 (84)

7. Mean internal temperature (heating season)

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

Full SAP Calculation Printout



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	78.3962	78.5531	78.7076	79.4413	79.5801	80.2326	80.2326	80.3546	79.9800	79.5801	79.2998	79.0089	
alpha	6.2264	6.2369	6.2472	6.2961	6.3053	6.3488	6.3488	6.3570	6.3320	6.3053	6.2867	6.2673	
util living area	0.9938	0.9854	0.9591	0.8599	0.6722	0.4695	0.3396	0.3884	0.6406	0.9167	0.9849	0.9951	(86)
Living	20.1485	20.3160	20.5608	20.8399	20.9696	20.9972	20.9997	20.9993	20.9830	20.7891	20.4236	20.1201	
Non living	18.9645	19.1764	19.4778	19.7972	19.9167	19.9427	19.9437	19.9451	19.9327	19.7558	19.3209	18.9342	
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	20.5644	20.3160	20.5608	20.8399	20.9696	20.9972	20.9997	20.9993	20.9830	20.7891	20.4236	20.2432	(87)
Th 2	19.9218	19.9237	19.9256	19.9344	19.9361	19.9438	19.9438	19.9452	19.9408	19.9361	19.9327	19.9292	(88)
util rest of house	0.9912	0.9795	0.9433	0.8167	0.6043	0.3931	0.2582	0.2997	0.5501	0.8780	0.9777	0.9930	(89)
MIT 2	19.5401	19.1764	19.4778	19.7972	19.9167	19.9427	19.9437	19.9451	19.9327	19.7558	19.3209	19.1135	(90)
Living area fraction													
MIT	20.0633	19.7584	20.0309	20.3298	20.4545	20.4812	20.4830	20.4835	20.4691	20.2836	19.8841	19.6905	(91)
Temperature adjustment													
adjusted MIT	20.0633	19.7584	20.0309	20.3298	20.4545	20.4812	20.4830	20.4835	20.4691	20.2836	19.8841	19.6905	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9916	0.9784	0.9451	0.8339	0.6381	0.4321	0.2998	0.3450	0.5962	0.8922	0.9772	0.9924	(94)
Useful gains	423.1926	475.1922	514.0690	520.8463	436.8143	297.6840	197.0308	206.8001	318.7840	411.3632	411.0422	407.2595	(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	818.8610	770.3145	700.1166	585.9351	448.0066	298.5227	197.0968	206.9572	324.3073	495.5523	656.5319	798.4495	(97)
Space heating kWh	294.3773	198.3222	138.4194	46.8639	8.3271	0.0000	0.0000	0.0000	0.0000	62.6367	176.7526	291.0454	(98a)
Space heating requirement - total per year (kWh/year)												1216.7446	
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	294.3773	198.3222	138.4194	46.8639	8.3271	0.0000	0.0000	0.0000	0.0000	62.6367	176.7526	291.0454	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1216.7446	
Space heating per m2										(98c) / (4) =		28.0550	(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 %)													213.5892 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	294.3773	198.3222	138.4194	46.8639	8.3271	0.0000	0.0000	0.0000	0.0000	62.6367	176.7526	291.0454	(98)
Space heating efficiency (main heating system 1)	213.5892	213.5892	213.5892	213.5892	213.5892	0.0000	0.0000	0.0000	0.0000	213.5892	213.5892	213.5892	(210)
Space heating fuel (main heating system)	137.8241	92.8522	64.8064	21.9412	3.8987	0.0000	0.0000	0.0000	0.0000	29.3258	82.7536	136.2641	(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	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(64)
Efficiency of water heater	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	(216)
Fuel for water heating, kWh/month	120.4617	106.7117	113.6817	100.5462	97.9052	88.6851	87.7933	90.9716	91.6433	101.6485	107.4460	119.2107	(217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
(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	12.0547	9.6708	8.7074	6.3794	4.9277	4.0259	4.4952	5.8430	7.5895	9.9578	11.2473	12.3898	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-23.9148	-35.5139	-53.2024	-60.8852	-66.8273	-62.9630	-62.1644	-57.7300	-49.6675	-40.5553	-26.6687	-20.4333	(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	-7.3892	-16.7236	-35.7640	-58.3473	-80.4744	-81.8581	-80.7428	-67.1287	-48.1220	-26.2233	-10.4625	-5.7629	(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												569.6659	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												177.5049	
Water heating fuel used												1226.7050	(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)												97.2886	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1079.5246	(233)
Wind generation												0.0000	(234)

Full SAP Calculation Printout



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	814.1349 (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	569.6659	0.1573	89.5844 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1226.7050	0.1407	172.6405 (264)
Space and water heating			262.2249 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	97.2886	0.1443	14.0417 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-560.5258	0.1340	-75.1022
PV Unit electricity exported	-518.9988	0.1240	-64.3568
Total			-139.4590 (269)
Total CO2, kg/year			136.8077 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.1500 (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	569.6659	1.5821	901.2950 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1226.7050	1.5204	1865.0570 (278)
Space and water heating			2766.3520 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	97.2886	1.5338	149.2244 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-560.5258	1.4952	-838.0753
PV Unit electricity exported	-518.9988	0.4551	-236.1981
Total			-1074.2734 (283)
Total Primary energy kWh/year			1841.3031 (286)
Dwelling Primary energy Rate (DPER)			42.4600 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	43.3700	2.3900	103.6543
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.3700		103.6543 (1b) - (3b)
Dwelling volume			103.6543 (4)
			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 103.6543 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1929 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4429 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3101 (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	0.3953	0.3876	0.3798	0.3411	0.3333	0.2946	0.2946	0.2868	0.3101	0.3333	0.3488	0.3643 (22b)
Effective ac	0.5781	0.5751	0.5721	0.5582	0.5556	0.5434	0.5434	0.5411	0.5481	0.5556	0.5608	0.5664 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8900	1.0000	1.8900			(26)
TER Opening Type			8.9700	1.1450	10.2710			(27)
Heatloss Floor 1			43.3700	0.1300	5.6381			(28a)
External Wall 1	49.8100	8.9700	40.8400	0.1800	7.3512			(29a)
External Wall 2	13.0700	1.8900	11.1800	0.1800	2.0124			(29a)
Total net area of external elements Aum(A, m2)			106.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.1627			(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							338.0431	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E16 Corner (normal)				9.5600	0.0900	0.8604		
E2 Other lintels (including other steel lintels)				9.0400	0.0500	0.4520		
E3 Sill				8.1400	0.0500	0.4070		
E4 Jamb				23.3000	0.0500	1.1650		
E5 Ground floor (normal)				26.3100	0.1600	4.2096		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.0940	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	34.2567	(37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.7759	19.6721	19.5704	19.0925	19.0031	18.5869	18.5869	18.5098	18.7472	19.0031	19.1840	19.3731	(38)
Heat transfer coeff	54.0326	53.9288	53.8271	53.3492	53.2598	52.8436	52.8436	52.7665	53.0039	53.2598	53.4407	53.6298	(39)
Average = Sum(39)m / 12 =												53.3488	
HLP	1.2459	1.2435	1.2411	1.2301	1.2280	1.2184	1.2184	1.2167	1.2221	1.2280	1.2322	1.2366	(40)
HLP (average)												1.2301	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4985	(42)
Hot water usage for mixer showers														
49.3445	48.6029	47.5223	45.4548	43.9290	42.2275	41.2604	42.3328	43.5083	45.3353	47.4472	49.1554	49.1554	(42a)	
Hot water usage for baths														
21.3430	21.0260	20.5796	19.7566	19.1403	18.4570	18.0879	18.5311	19.0138	19.7449	20.5849	21.2708	21.2708	(42b)	
Hot water usage for other uses														
29.9762	28.8862	27.7961	26.7061	25.6160	24.5260	24.5260	25.6160	26.7061	27.7961	28.8862	29.9762	29.9762	(42c)	
Average daily hot water use (litres/day)												92.5333	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	100.6636	98.5151	95.8981	91.9175	88.6854	85.2105	83.8743	86.4800	89.2282	92.8763	96.9182	100.4024	(44)	
Energy content (annual)	159.4266	140.2841	147.3917	125.8305	119.3876	104.7763	101.4387	107.0803	110.0273	126.0323	138.0778	157.2059	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1536.9590		
23.9140	21.0426	22.1088	18.8746	17.9081	15.7164	15.2158	16.0620	16.5041	18.9048	20.7117	23.5809	(46)		
Water storage loss (or HIU 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														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(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														
206.0215	182.3698	193.9866	170.9223	165.9825	149.8681	148.0336	153.6752	155.1191	172.6272	183.1697	203.8008	(62)		
WWHRS	-22.5582	-19.9507	-20.8912	-17.2987	-16.1218	-13.7955	-12.9311	-13.7510	-14.2734	-16.8268	-19.0627	-22.1405	(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	183.4632	162.4192	173.0954	153.6236	149.8607	136.0726	135.1024	139.9242	140.8457	155.8004	164.1070	181.6603	(64)	
12Total per year (kWh/year)												1875.9748	(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	90.2853	80.3130	86.2837	77.9121	76.9723	70.9116	71.0043	72.8801	72.6575	79.1817	81.9843	89.5469	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	65.8727	72.9305	65.8727	68.0685	65.8727	68.0685	65.8727	65.8727	68.0685	65.8727	68.0685	65.8727	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	130.0924	131.4424	128.0405	120.7984	111.6566	103.0645	97.3245	95.9745	99.3764	106.6185	115.7603	124.3524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	(71)
Water heating gains (Table 5)													
	121.3512	119.5135	115.9727	108.2112	103.4574	98.4883	95.4359	97.9571	100.9132	106.4270	113.8671	120.3587	(72)
Total internal gains													
	365.7939	372.3640	358.3636	345.5558	329.4643	315.0989	304.1107	305.2820	313.8357	327.3958	346.1736	359.0615	(73)

6. Solar gains

Full SAP Calculation Printout



[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				4.9700	10.6334	0.6300		0.7000	0.7700			16.1510 (74)
East				1.0300	19.6403	0.6300		0.7000	0.7700			6.1824 (76)
West				2.9700	19.6403	0.6300		0.7000	0.7700			17.8269 (80)
Solar gains	40.1603	77.8327	129.7963	197.0528	251.7359	263.0134	248.1625	205.7257	153.0187	92.4719	49.8611	33.2084 (83)
Total gains	405.9542	450.1967	488.1598	542.6086	581.2002	578.1124	552.2732	511.0078	466.8545	419.8677	396.0347	392.2698 (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	75.3708	75.5158	75.6586	76.3363	76.4644	77.0667	77.0667	77.1792	76.8336	76.4644	76.2056	75.9369
alpha	6.0247	6.0344	6.0439	6.0891	6.0976	6.1378	6.1378	6.1453	6.1222	6.0976	6.0804	6.0625
util living area	0.9955	0.9908	0.9772	0.9218	0.7822	0.5758	0.4198	0.4724	0.7372	0.9480	0.9897	0.9963 (86)
MIT	20.0497	20.1944	20.4208	20.7221	20.9222	20.9898	20.9987	20.9975	20.9587	20.7020	20.3295	20.0257 (87)
Th 2	19.8835	19.8854	19.8873	19.8960	19.8976	19.9053	19.9053	19.9067	19.9023	19.8976	19.8943	19.8909 (88)
util rest of house	0.9936	0.9868	0.9672	0.8901	0.7136	0.4820	0.3161	0.3617	0.6404	0.9194	0.9845	0.9948 (89)
MIT 2	18.8098	18.9945	19.2788	19.6418	19.8440	19.9011	19.9050	19.9061	19.8812	19.6298	19.1737	18.7849 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.4431	19.6073	19.8621	20.1936	20.3947	20.4571	20.4636	20.4635	20.4315	20.1774	19.7640	19.4186 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.4431	19.6073	19.8621	20.1936	20.3947	20.4571	20.4636	20.4635	20.4315	20.1774	19.7640	19.4186 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9926	0.9855	0.9670	0.8997	0.7461	0.5299	0.3692	0.4184	0.6892	0.9279	0.9837	0.9938 (94)
Useful gains	402.9338	443.6913	472.0355	488.1923	433.6622	306.3667	203.8800	213.8171	321.7758	389.6019	389.5705	389.8572 (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	818.2203	793.1480	719.2404	602.5023	463.0766	309.5102	204.1667	214.4169	335.5966	510.0898	676.7724	816.1700 (97)
Space heating kWh	308.9732	234.8349	183.9205	82.3033	21.8843	0.0000	0.0000	0.0000	0.0000	89.6430	206.7854	317.1767 (98a)
Space heating requirement - total per year (kWh/year)												1445.5213
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	308.9732	234.8349	183.9205	82.3033	21.8843	0.0000	0.0000	0.0000	0.0000	89.6430	206.7854	317.1767 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1445.5213
Space heating per m2												(98c) / (4) = 33.3300 (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	308.9732	234.8349	183.9205	82.3033	21.8843	0.0000	0.0000	0.0000	0.0000	89.6430	206.7854	317.1767 (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)	334.7489	254.4257	199.2638	89.1693	23.7100	0.0000	0.0000	0.0000	0.0000	97.1213	224.0362	343.6367 (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	183.4632	162.4192	173.0954	153.6236	149.8607	136.0726	135.1024	139.9242	140.8457	155.8004	164.1070	181.6603 (64)
Efficiency of water heater (217)m	85.2192	84.8858	84.1961	82.7249	80.8441	79.8000	79.8000	79.8000	79.8000	82.8675	84.5793	79.8000 (216)
Fuel for water heating, kWh/month	215.2839	191.3384	205.5862	185.7042	185.3701	170.5170	169.3013	175.3436	176.4984	188.0116	194.0273	212.9746 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	13.6871	10.9803	9.8865	7.2433	5.5949	4.5711	5.1039	6.6342	8.6172	11.3062	12.7703	14.0675 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-20.8125	-29.6181	-42.9974	-48.8868	-53.2382	-49.9500	-49.3953	-46.4043	-41.1597	-34.1717	-23.0022	-17.9665 (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	-10.9386	-23.0991	-46.0497	-69.3404	-91.8202	-92.2457	-91.0994	-77.0220	-56.3488	-33.0231	-14.6073	-8.6384 (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)

Full SAP Calculation Printout



Annual totals kWh/year		
Space heating fuel - main system 1	1566.1119	(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	2269.9565	(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)	110.4624	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1071.8355	(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	2960.6953	(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	1566.1119	0.2100	328.8835 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2269.9565	0.2100	476.6909 (264)
Space and water heating			805.5744 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	110.4624	0.1443	15.9431 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-457.6026	0.1343	-61.4730
PV Unit electricity exported	-614.2328	0.1258	-77.2936
Total			-138.7666 (269)
Total CO2, kg/year			694.6801 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.0200 (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	1566.1119	1.1300	1769.7064 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2269.9565	1.1300	2565.0509 (278)
Space and water heating			4334.7573 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	110.4624	1.5338	169.4309 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-457.6026	1.4965	-684.7900
PV Unit electricity exported	-614.2328	0.4619	-283.7200
Total			-968.5100 (283)
Total Primary energy kWh/year			3665.7790 (286)
Target Primary Energy Rate (TPER)			84.5200 (287)

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

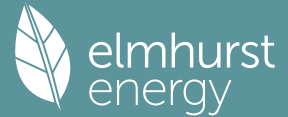
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	43.3700	2.3900	103.6543
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.3700		
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	20.0000 / (5) = 0.1929 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4429 (18)
Number of sides sheltered	4 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3101 (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	0.3953	0.3876	0.3798	0.3411	0.3333	0.2946	0.2946	0.2868	0.3101	0.3333	0.3488	0.3643	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5781	0.5751	0.5721	0.5582	0.5556	0.5434	0.5434	0.5411	0.5481	0.5556	0.5608	0.5664	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Opening Type 1			1.8900	1.4000	2.6460			(26)
Opening Type 2			12.4700	1.1450	14.2786			(27)
Heatloss Floor 1			43.3700	0.1000	4.3370	75.0000	3252.7500	(28a)
External Wall 1	49.8100	12.4700	37.3400	0.1800	6.7212	60.0000	2240.4000	(29a)
External Wall 2	13.0700	1.8900	11.1800	0.1700	1.9006	190.0000	2124.2000	(29a)
Total net area of external elements Aum(A, m2)			106.2500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.8834			(33)
Main dwelling								
Party Ceiling 1			43.3700			100.0000	4337.0000	(32b)
Internal Wall 1			51.6200			9.0000	464.5800	(32c)
Internal Wall 2			22.4200			100.0000	2242.0000	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 14660.9300 (34)
List of Thermal Bridges 338.0431 (35)

K1 Element	Length	Psi-value	Total	
E16 Corner (normal)	9.5600	0.0400	0.3824	
E2 Other lintels (including other steel lintels)	9.0400	0.0500	0.4520	
E3 Sill	8.1400	0.0240	0.1954	
E4 Jamb	23.3000	0.0190	0.4427	
E5 Ground floor (normal)	26.3100	0.0310	0.8156	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 32.1715 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	19.7759	19.6721	19.5704	19.0925	19.0031	18.5869	18.5869	18.5098	18.7472	19.0031	19.1840	19.3731	(38)
Heat transfer coeff	51.9474	51.8436	51.7419	51.2640	51.1746	50.7584	50.7584	50.6813	50.9187	51.1746	51.3555	51.5446	(39)
Average = Sum(39)m / 12 =													51.2636

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1978	1.1954	1.1930	1.1820	1.1800	1.1704	1.1704	1.1686	1.1741	1.1800	1.1841	1.1885	(40)
HLP (average)													1.1820
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4985 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths	21.3430	21.0260	20.5796	19.7566	19.1403	18.4570	18.0879	18.5311	19.0138	19.7449	20.5849	21.2708	(42b)
Hot water usage for other uses	29.9762	28.8862	27.7961	26.7061	25.6160	24.5260	24.5260	25.6160	26.7061	27.7961	28.8862	29.9762	(42c)
Average daily hot water use (litres/day)													47.0394 (43)
Daily hot water use	51.3192	49.9121	48.3757	46.4627	44.7564	42.9830	42.6139	44.1472	45.7198	47.5411	49.4711	51.2470	(44)
Energy conte	81.2770	71.0742	74.3517	63.6051	60.2507	52.8526	51.5378	54.6634	56.3771	64.5128	70.4806	80.2404	(45)
Energy content (annual)													Total = Sum(45)m = 781.2235
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	69.0855	60.4131	63.1990	54.0643	51.2131	44.9247	43.8071	46.4639	47.9205	54.8359	59.9085	68.2044	(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	69.0855	60.4131	63.1990	54.0643	51.2131	44.9247	43.8071	46.4639	47.9205	54.8359	59.9085	68.2044	(64)
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 664.0400 (64)
Electric shower(s)	39.5167	35.2097	38.4476	36.6901	37.3786	35.6555	36.8441	37.3786	36.6901	38.4476	37.7247	39.5167	(64a)
Heat gains from water heating, kWh/month	27.1505	23.9057	25.4116	22.6886	22.1479	20.1451	20.1628	20.9606	21.1527	23.3209	24.4083	26.9303	(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	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	(66)

Full SAP Calculation Printout



Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.6167	72.6471	65.6167	67.8039	65.6167	67.8039	65.6167	65.6167	67.8039	65.6167	67.8039	65.6167 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	130.0924	131.4424	128.0405	120.7984	111.6566	103.0645	97.3245	95.9745	99.3764	106.6185	115.7603	124.3524 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925 (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)	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403 (71)
Water heating gains (Table 5)	36.4927	35.5740	34.1554	31.5120	29.7687	27.9793	27.1005	28.1729	29.3787	31.3453	33.9004	36.1966 (72)
Total internal gains	277.6794	285.1410	273.2903	265.5919	252.5196	244.3253	235.5193	235.2417	242.0366	249.0580	262.9423	271.6433 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
North					6.9100	10.6334		0.6300	0.7000	0.7700		22.4554 (74)
East					1.4300	19.6403		0.6300	0.7000	0.7700		8.5833 (76)
West					4.1300	19.6403		0.6300	0.7000	0.7700		24.7896 (80)
Solar gains	55.8283	108.1980	180.4348	273.9322	349.9517	365.6302	344.9847	285.9896	212.7176	128.5485	69.3138	46.1642 (83)
Total gains	333.5077	393.3390	453.7250	539.5241	602.4712	609.9555	580.5040	521.2313	454.7542	377.6065	332.2560	317.8075 (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	78.3962	78.5531	78.7076	79.4413	79.5801	80.2326	80.2326	80.3546	79.9800	79.5801	79.2998	79.0089
alpha	6.2264	6.2369	6.2472	6.2961	6.3053	6.3488	6.3488	6.3570	6.3320	6.3053	6.2867	6.2673
util living area	0.9984	0.9951	0.9825	0.9153	0.7443	0.5280	0.3842	0.4458	0.7322	0.9637	0.9956	0.9988 (86)
MIT	19.9735	20.1485	20.4149	20.7566	20.9470	20.9946	20.9994	20.9985	20.9646	20.6759	20.2630	19.9453 (87)
Th 2	19.9218	19.9237	19.9256	19.9344	19.9361	19.9438	19.9438	19.9452	19.9408	19.9361	19.9327	19.9292 (88)
util rest of house	0.9977	0.9930	0.9746	0.8825	0.6757	0.4432	0.2923	0.3445	0.6379	0.9421	0.9933	0.9983 (89)
MIT 2	19.0024	19.1778	19.4404	19.7621	19.9084	19.9421	19.9437	19.9450	19.9267	19.7011	19.2997	18.9803 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.4983	19.6735	19.9381	20.2700	20.4389	20.4796	20.4829	20.4830	20.4568	20.1990	19.7917	19.4731 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.4983	19.6735	19.9381	20.2700	20.4389	20.4796	20.4829	20.4830	20.4568	20.1990	19.7917	19.4731 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9973	0.9923	0.9747	0.8939	0.7093	0.4866	0.3393	0.3963	0.6858	0.9484	0.9929	0.9980 (94)
Ext temp.	332.6055	390.3171	442.2517	482.2923	427.3549	296.8021	196.9509	206.5815	311.8672	358.1255	329.8824	317.1629 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	789.5145	765.9140	695.3132	582.8714	447.2074	298.4403	197.0877	206.9332	323.6797	491.2239	651.7871	787.2472 (97)
Space heating requirement - total per year (kWh/year)	339.9403	252.4011	188.2778	72.4169	14.7703	0.0000	0.0000	0.0000	0.0000	99.0252	231.7714	349.7426 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	339.9403	252.4011	188.2778	72.4169	14.7703	0.0000	0.0000	0.0000	0.0000	99.0252	231.7714	349.7426 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1548.3456											
Space heating per m2	(98c) / (4) = 35.7008 (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	477.1291	375.6123	385.1782	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9683	0.9875	0.9757	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	462.0097	370.9225	375.8244	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	690.3678	657.2531	589.2153	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	164.4178	213.0300	158.7628	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
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	41.1045	53.2575	39.6907	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	134.0527 (107)											
Energy for space heating	35.7008 (99)											
Energy for space cooling	3.0909 (108)											
Total	38.7918 (109)											
Fabric Energy Efficiency (DFEE)	38.8 (109)											

Full SAP Calculation Printout



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	43.3700 (1b)	2.3900 (2b)	103.6543 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.3700		103.6543 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	103.6543 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1929 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4429	(18)
Number of sides sheltered	4	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3101 (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)
	0.3953	0.3876	0.3798	0.3411	0.3333	0.2946	0.2946	0.2868	0.3101	0.3333	0.3488	0.3643 (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	0.5781	0.5751	0.5721	0.5582	0.5556	0.5434	0.5434	0.5411	0.5481	0.5556	0.5608	0.5664 (25)

3. Heat losses and heat loss parameter

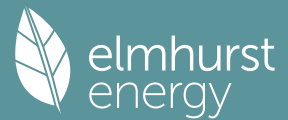
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type			8.9700	1.1450	10.2710		(27)
Heatloss Floor 1			43.3700	0.1300	5.6381		(28a)
External Wall 1	49.8100	8.9700	40.8400	0.1800	7.3512		(29a)
External Wall 2	13.0700	1.8900	11.1800	0.1800	2.0124		(29a)
Total net area of external elements Aum(A, m ²)			106.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.1627		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							338.0431 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E16 Corner (normal)				9.5600	0.0900	0.8604	
E2 Other lintels (including other steel lintels)				9.0400	0.0500	0.4520	
E3 Sill				8.1400	0.0500	0.4070	
E4 Jamb				23.3000	0.0500	1.1650	
E5 Ground floor (normal)				26.3100	0.1600	4.2096	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.0940 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	34.2567 (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	19.7759	19.6721	19.5704	19.0925	19.0031	18.5869	18.5869	18.5098	18.7472	19.0031	19.1840	19.3731 (38)
Average = Sum(39)m / 12 =	54.0326	53.9288	53.8271	53.3492	53.2598	52.8436	52.8436	52.7665	53.0039	53.2598	53.4407	53.6298 (39)
												53.3488
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2459	1.2435	1.2411	1.2301	1.2280	1.2184	1.2184	1.2167	1.2221	1.2280	1.2322	1.2366 (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												1.4985 (42)
Hot water usage for mixer showers												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	21.3430	21.0260	20.5796	19.7566	19.1403	18.4570	18.0879	18.5311	19.0138	19.7449	20.5849	21.2708 (42b)
Hot water usage for other uses	29.9762	28.8862	27.7961	26.7061	25.6160	24.5260	24.5260	25.6160	26.7061	27.7961	28.8862	29.9762 (42c)
Average daily hot water use (litres/day)												47.0394 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	51.3192	49.9121	48.3757	46.4627	44.7564	42.9830	42.6139	44.1472	45.7198	47.5411	49.4711	51.2470 (44)

Full SAP Calculation Printout



Energy content (annual)	81.2770	71.0742	74.3517	63.6051	60.2507	52.8526	51.5378	54.6634	56.3771	64.5128	70.4806	80.2404 (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	781.2235
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	69.0855	60.4131	63.1990	54.0643	51.2131	44.9247	43.8071	46.4639	47.9205	54.8359	59.9085	68.2044 (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	69.0855	60.4131	63.1990	54.0643	51.2131	44.9247	43.8071	46.4639	47.9205	54.8359	59.9085	68.2044 (64)
12Total per year (kWh/year)												664.0400 (64)
Electric shower(s)	39.5167	35.2097	38.4476	36.6901	37.3786	35.6555	36.8441	37.3786	36.6901	38.4476	37.7247	39.5167 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												449.5000 (64a)
Heat gains from water heating, kWh/month	27.1505	23.9057	25.4116	22.6886	22.1479	20.1451	20.1628	20.9606	21.1527	23.3209	24.4083	26.9303 (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	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253	74.9253 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.8727	72.9305	65.8727	68.0685	65.8727	68.0685	65.8727	65.8727	68.0685	65.8727	68.0685	65.8727 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	130.0924	131.4424	128.0405	120.7984	111.6566	103.0645	97.3245	95.9745	99.3764	106.6185	115.7603	124.3524 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925	30.4925 (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)	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403 (71)
Water heating gains (Table 5)	36.4927	35.5740	34.1554	31.5120	29.7687	27.9793	27.1005	28.1729	29.3787	31.3453	33.9004	36.1966 (72)
Total internal gains	277.9354	285.4245	273.5463	265.8565	252.7756	244.5899	235.7754	235.4978	242.3012	249.3141	263.2069	271.8993 (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	4.9700	10.6334	0.6300	0.7000	0.7700	16.1510 (74)
East	1.0300	19.6403	0.6300	0.7000	0.7700	6.1824 (76)
West	2.9700	19.6403	0.6300	0.7000	0.7700	17.8269 (80)

Solar gains	40.1603	77.8327	129.7963	197.0528	251.7359	263.0134	248.1625	205.7257	153.0187	92.4719	49.8611	33.2084 (83)
Total gains	318.0957	363.2571	403.3426	462.9093	504.5115	507.6033	483.9379	441.2235	395.3199	341.7859	313.0680	305.1077 (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	75.3708	75.5158	75.6586	76.3363	76.4644	77.0667	77.0667	77.1792	76.8336	76.4644	76.2056	75.9369
alpha	6.0247	6.0344	6.0439	6.0891	6.0976	6.1378	6.1378	6.1453	6.1222	6.0976	6.0804	6.0625
util living area	0.9988	0.9970	0.9910	0.9587	0.8511	0.6468	0.4777	0.5437	0.8240	0.9792	0.9970	0.9991 (86)
MIT	19.8849	20.0344	20.2732	20.6144	20.8739	20.9811	20.9974	20.9946	20.9235	20.5808	20.1769	19.8614 (87)
Th 2	19.8835	19.8854	19.8873	19.8960	19.8976	19.9053	19.9053	19.9067	19.9023	19.8976	19.8943	19.8909 (88)
util rest of house	0.9982	0.9956	0.9866	0.9387	0.7902	0.5457	0.3605	0.4182	0.7334	0.9652	0.9953	0.9986 (89)
MIT 2	18.8831	19.0335	19.2714	19.6053	19.8251	19.8989	19.9049	19.9057	19.8686	19.5816	19.1831	18.8656 (90)
Living area fraction									fLA = Living area / (4) =			0.5107 (91)
MIT	19.3947	19.5446	19.7830	20.1207	20.3608	20.4516	20.4629	20.4618	20.4074	20.0919	19.6907	19.3742 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3947	19.5446	19.7830	20.1207	20.3608	20.4516	20.4629	20.4618	20.4074	20.0919	19.6907	19.3742 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	317.4277	361.4409	397.7173	436.7483	412.6244	303.2784	203.5358	213.0175	307.7855	330.9351	311.4637	304.6090 (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	815.6085	789.7686	714.9875	598.6133	461.2703	309.2194	204.1272	214.3289	334.3152	505.5359	672.8546	813.7895 (97)
Space heating kWh	370.6465	287.8363	236.0490	116.5428	36.1926	0.0000	0.0000	0.0000	0.0000	129.9030	260.2015	378.8303 (98a)
Space heating requirement - total per year (kWh/year)												1816.2020
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	370.6465	287.8363	236.0490	116.5428	36.1926	0.0000	0.0000	0.0000	0.0000	129.9030	260.2015	378.8303 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1816.2020
Space heating per m2										(98c) / (4) =		41.8769 (99)

Full SAP Calculation Printout



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	496.7299	391.0427	401.0257	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9119	0.9591	0.9333	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	452.9814	375.0451	374.2756	0.0000	0.0000	0.0000	0.0000	(102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	570.4485	544.1085	495.4319	0.0000	0.0000	0.0000	0.0000	(103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	84.5763	125.7832	90.1403	0.0000	0.0000	0.0000	0.0000	(104)
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	(105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	21.1441	31.4458	22.5351	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement													(107)
Energy for space heating													(107)
Energy for space cooling													(107)
Total													(107)
Fabric Energy Efficiency (TFEE)													(107)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	43.3700	2.3900	103.6543
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.3700		
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

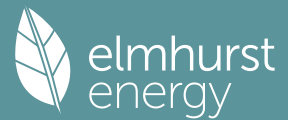
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1929 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4429	(18)
Number of sides sheltered		4	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3101 (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	0.3953	0.3876	0.3798	0.3411	0.3333	0.2946	0.2946	0.2868	0.3101	0.3333	0.3488	0.3643	(22b)
Effective ac	0.5781	0.5751	0.5721	0.5582	0.5556	0.5434	0.5434	0.5411	0.5481	0.5556	0.5608	0.5664	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Opening Type 1			1.8900	1.4000	2.6460		(26)
Opening Type 2			12.4700	1.1450	14.2786		(27)
Heatloss Floor 1			43.3700	0.1000	4.3370	75.0000	3252.7500 (28a)
External Wall 1	49.8100	12.4700	37.3400	0.1800	6.7212	60.0000	2240.4000 (29a)
External Wall 2	13.0700	1.8900	11.1800	0.1700	1.9006	190.0000	2124.2000 (29a)
Total net area of external elements Aum(A, m ²)			106.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.8834		(33)
Main dwelling							
Party Ceiling 1			43.3700			100.0000	4337.0000 (32b)
Internal Wall 1			51.6200			9.0000	464.5800 (32c)
Internal Wall 2			22.4200			100.0000	2242.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14660.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							338.0431 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
El6 Corner (normal)				9.5600	0.0400	0.3824	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	9.0400	0.0500	0.4520									
E3 Sill	8.1400	0.0240	0.1954									
E4 Jamb	23.3000	0.0190	0.4427									
E5 Ground floor (normal)	26.3100	0.0310	0.8156									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				2.2881 (36)								
Point Thermal bridges			(36a) =	0.0000								
Total fabric heat loss		(33) + (36) + (36a) =		32.1715 (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	19.7759	19.6721	19.5704	19.0925	19.0031	18.5869	18.5869	18.5098	18.7472	19.0031	19.1840	19.3731 (38)
Average = Sum(39)m / 12 =	51.9474	51.8436	51.7419	51.2640	51.1746	50.7584	50.7584	50.6813	50.9187	51.1746	51.3555	51.5446 (39)
												51.2636
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1978	1.1954	1.1930	1.1820	1.1800	1.1704	1.1704	1.1686	1.1741	1.1800	1.1841	1.1885 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

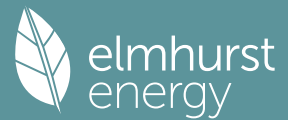
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.4985 (42)
Hot water usage for mixer showers												49.1554 (42a)
Hot water usage for baths												21.2708 (42b)
Hot water usage for other uses												29.9762 (42c)
Average daily hot water use (litres/day)												92.5333 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	100.6636	98.5151	95.8981	91.9175	88.6854	85.2105	83.8743	86.4800	89.2282	92.8763	96.9182	100.4024 (44)
Energy content (annual)	159.4266	140.2841	147.3917	125.8305	119.3876	104.7763	101.4387	107.0803	110.0273	126.0323	138.0778	157.2059 (45)
Distribution loss (46)m = 0.15 x (45)m												1536.9590
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0044 (55)
Total storage loss												
If cylinder contains dedicated solar storage												
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 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047 (62)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047 (64)
Electric shower(s)												
Heat gains from water heating, kWh/month	96.5284	85.9520	92.5268	83.9538	83.2154	76.9533	77.2474	79.1232	78.6993	85.4248	88.0261	95.7900 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
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)												
Water heating gains (Table 5)												
Total internal gains	413.1421	411.7794	400.8769	379.8897	359.5897	340.9198	329.6829	331.7292	342.0470	360.7865	383.7728	403.9653 (73)

6. Solar gains												
[Jan]												
North			6.9100	10.6334	0.6300	0.7000	0.7700	0.7700	0.7700	0.7700	0.7700	22.4554 (74)
East			1.4300	19.6403	0.6300	0.7000	0.7700	0.7700	0.7700	0.7700	0.7700	8.5833 (76)
West			4.1300	19.6403	0.6300	0.7000	0.7700	0.7700	0.7700	0.7700	0.7700	24.7896 (80)
Solar gains	55.8283	108.1980	180.4348	273.9322	349.9517	365.6302	344.9847	285.9896	212.7176	128.5485	69.3138	46.1642 (83)
Total gains	468.9705	519.9774	581.3117	653.8218	709.5414	706.5500	674.6676	617.7187	554.7646	489.3350	453.0866	450.1295 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



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	78.3962	78.5531	78.7076	79.4413	79.5801	80.2326	80.2326	80.3546	79.9800	79.5801	79.2998	79.0089	
alpha	6.2264	6.2369	6.2472	6.2961	6.3053	6.3488	6.3488	6.3570	6.3320	6.3053	6.2867	6.2673	
util living area	0.9899	0.9796	0.9457	0.8392	0.6519	0.4580	0.3308	0.3769	0.6200	0.8966	0.9782	0.9920 (86)	
Living	20.2256	20.3751	20.6147	20.8622	20.9743	20.9976	20.9997	20.9994	20.9857	20.8200	20.4793	20.1935	
Non living	19.0613	19.2493	19.5401	19.8184	19.9199	19.9428	19.9437	19.9451	19.9342	19.7864	19.3888	19.0269	
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	20.6038	20.3751	20.6147	20.8622	20.9743	20.9976	20.9997	20.9994	20.9857	20.8200	20.4793	20.3063 (87)	
Th 2	19.9218	19.9237	19.9256	19.9344	19.9361	19.9438	19.9438	19.9452	19.9408	19.9361	19.9327	19.9292 (88)	
util rest of house	0.9858	0.9717	0.9260	0.7933	0.5848	0.3834	0.2515	0.2908	0.5312	0.8526	0.9683	0.9887 (89)	
MIT 2	19.5788	19.2493	19.5401	19.8184	19.9199	19.9428	19.9437	19.9451	19.9342	19.7864	19.3888	19.1895 (90)	
Living area fraction									fLA = Living area / (4) =				0.5107 (91)
MIT	20.1023	19.8243	20.0889	20.3515	20.4584	20.4815	20.4831	20.4836	20.4712	20.3143	19.9458	19.7599 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.1023	19.8243	20.0889	20.3515	20.4584	20.4815	20.4831	20.4836	20.4712	20.3143	19.9458	19.7599 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9866	0.9709	0.9294	0.8124	0.6184	0.4215	0.2921	0.3348	0.5765	0.8698	0.9684	0.9881 (94)
Useful gains	462.7030	504.8250	540.2945	531.1521	438.7619	297.8083	197.0416	206.8288	319.8168	425.6403	438.7881	444.7593 (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	820.8879	773.7283	703.1156	587.0497	448.2071	298.5359	197.0981	206.9606	324.4146	497.1254	659.6999	802.0268 (97)
Space heating kWh	266.4895	180.7030	121.1389	40.2463	7.0272	0.0000	0.0000	0.0000	0.0000	53.1849	159.0565	265.8071 (98a)
Space heating requirement - total per year (kWh/year)												1093.6534
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	266.4895	180.7030	121.1389	40.2463	7.0272	0.0000	0.0000	0.0000	0.0000	53.1849	159.0565	265.8071 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1093.6534
Space heating per m2										(98c) / (4) =		25.2168 (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 %)													213.5892 (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	266.4895	180.7030	121.1389	40.2463	7.0272	0.0000	0.0000	0.0000	0.0000	53.1849	159.0565	265.8071 (98)	
Space heating efficiency (main heating system 1)	213.5892	213.5892	213.5892	213.5892	213.5892	0.0000	0.0000	0.0000	0.0000	213.5892	213.5892	213.5892 (210)	
Space heating fuel (main heating system)	124.7674	84.6031	56.7158	18.8429	3.2900	0.0000	0.0000	0.0000	0.0000	24.9006	74.4684	124.4478 (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	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047 (64)	
Efficiency of water heater	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049 (216)	
Fuel for water heating, kWh/month	120.4617	106.7117	113.6817	100.5462	97.9052	88.6851	87.7933	90.9716	91.6433	101.6485	107.4460	119.2107 (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	12.0547	9.6708	8.7074	6.3794	4.9277	4.0259	4.4952	5.8430	7.5895	9.9578	11.2473	12.3898 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-23.8128	-35.3485	-52.8694	-60.6467	-66.7605	-62.9630	-62.1644	-57.7300	-49.6675	-40.3871	-26.5571	-20.3591 (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	-7.4913	-16.8889	-36.0971	-58.5858	-80.5413	-81.8581	-80.7428	-67.1287	-48.1220	-26.3916	-10.5740	-5.8371 (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													512.0360 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													177.5049
Water heating fuel used													1226.7050 (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)													97.2886 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													

Full SAP Calculation Printout



PV generation	-1079.5246 (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	756.5050 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	512.0360	16.4900	84.4347 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1226.7050	16.4900	202.2837 (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	97.2886	16.4900	16.0429 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-559.2661	16.4900	-92.2230
PV Unit electricity exported	-520.2585	5.5900	-29.0824
Total			-121.3054 (252)
Total energy cost			181.4558 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7392 (257)
SAP value		88.0174
SAP rating (Section 12)		88 (258)
SAP band		B

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	512.0360	0.1574	80.5961 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1226.7050	0.1407	172.6405 (264)
Space and water heating			253.2366 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	97.2886	0.1443	14.0417 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-559.2661	0.1339	-74.9134
PV Unit electricity exported	-520.2585	0.1241	-64.5682
Total			-139.4817 (269)
Total CO2, kg/year			127.7967 (272)
CO2 emissions per m2			2.9500 (273)
EI value			98.0622
EI rating			98 (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

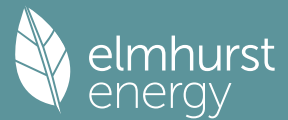
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	43.3700	2.3900	103.6543
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.3700		103.6543 (1b) - (3b)
Dwelling volume			103.6543 (4)
			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 103.6543 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1929 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)

Full SAP Calculation Printout



Infiltration rate												0.4429 (18)
Number of sides sheltered												4 (19)
Shelter factor												(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.3101 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.6000	4.4000	4.4000	4.1000	4.1000	3.7000	3.7000	3.5000	3.8000	4.2000	4.0000	4.3000	(22)
Adj infilt rate	1.1500	1.1000	1.1000	1.0250	1.0250	0.9250	0.9250	0.8750	0.9500	1.0500	1.0000	1.0750	(22a)
Effective ac	0.3566	0.3411	0.3411	0.3178	0.3178	0.2868	0.2868	0.2713	0.2946	0.3256	0.3101	0.3333	(22b)
	0.5636	0.5582	0.5582	0.5505	0.5505	0.5411	0.5411	0.5368	0.5434	0.5530	0.5481	0.5556	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Opening Type 1			1.8900	1.4000	2.6460			(26)
Opening Type 2			12.4700	1.1450	14.2786			(27)
Heatloss Floor 1			43.3700	0.1000	4.3370	75.0000	3252.7500	(28a)
External Wall 1	49.8100	12.4700	37.3400	0.1800	6.7212	60.0000	2240.4000	(29a)
External Wall 2	13.0700	1.8900	11.1800	0.1700	1.9006	190.0000	2124.2000	(29a)
Total net area of external elements Aum(A, m2)			106.2500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.8834			(33)
Main dwelling								
Party Ceiling 1			43.3700			100.0000	4337.0000	(32b)
Internal Wall 1			51.6200			9.0000	464.5800	(32c)
Internal Wall 2			22.4200			100.0000	2242.0000	(32c)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								(28)...(30) + (32) + (32a)...(32e) = 14660.9300 (34)
List of Thermal Bridges								338.0431 (35)
K1 Element				Length	Psi-value		Total	
E16 Corner (normal)				9.5600	0.0400		0.3824	
E2 Other lintels (including other steel lintels)				9.0400	0.0500		0.4520	
E3 Sill				8.1400	0.0240		0.1954	
E4 Jamb				23.3000	0.0190		0.4427	
E5 Ground floor (normal)				26.3100	0.0310		0.8156	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								2.2881 (36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	32.1715 (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	19.2775	19.0925	19.0925	18.8305	18.8305	18.5098	18.5098	18.3619	18.5869	18.9158	18.7472	19.0031	(38)
Average = Sum(39)m / 12 =	51.4490	51.2640	51.2640	51.0020	51.0020	50.6813	50.6813	50.5334	50.7584	51.0873	50.9187	51.1746	(39)
												50.9847	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1863	1.1820	1.1820	1.1760	1.1760	1.1686	1.1686	1.1652	1.1704	1.1779	1.1741	1.1800	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.1756	

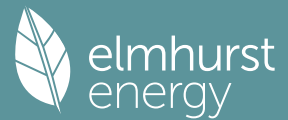
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4985 (42)
Hot water usage for mixer showers													
	49.3445	48.6029	47.5223	45.4548	43.9290	42.2275	41.2604	42.3328	43.5083	45.3353	47.4472	49.1554	(42a)
Hot water usage for baths													
	21.3430	21.0260	20.5796	19.7566	19.1403	18.4570	18.0879	18.5311	19.0138	19.7449	20.5849	21.2708	(42b)
Hot water usage for other uses													
	29.9762	28.8862	27.7961	26.7061	25.6160	24.5260	24.5260	25.6160	26.7061	27.7961	28.8862	29.9762	(42c)
Average daily hot water use (litres/day)													92.5333 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	100.6636	98.5151	95.8981	91.9175	88.6854	85.2105	83.8743	86.4800	89.2282	92.8763	96.9182	100.4024	(44)
Energy conte	159.4266	140.2841	147.3917	125.8305	119.3876	104.7763	101.4387	107.0803	110.0273	126.0323	138.0778	157.2059	(45)
Energy content (annual)													Total = Sum(45)m = 1536.9590
Distribution loss (46)m = 0.15 x (45)m													
	23.9140	21.0426	22.1088	18.8746	17.9081	15.7164	15.2158	16.0620	16.5041	18.9048	20.7117	23.5809	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8600 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0044 (55)
Total storage loss													
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)
If cylinder contains dedicated solar storage													
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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													
	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(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													
	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(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													
	96.5284	85.9520	92.5268	83.9538	83.2154	76.9533	77.2474	79.1232	78.6993	85.4248	88.0261	95.7900	(65)

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

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.7722	12.2323	9.9480	7.5313	5.6297	4.7529	5.1356	6.6755	8.9598	11.3765	13.2781	14.1550	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.1678	196.1827	191.1053	180.2962	166.6516	153.8276	145.2604	143.2456	148.3230	159.1321	172.7766	185.6006	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	(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)	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	(71)
Water heating gains (Table 5)	129.7424	127.9047	124.3640	116.6025	111.8487	106.8796	103.8271	106.3484	109.3045	114.8183	122.2584	128.7500	(72)
Total internal gains	413.1421	411.7794	400.8769	379.8897	359.5897	340.9198	329.6829	331.7292	342.0470	360.7865	383.7728	403.9653	(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					6.9100	12.7650	0.6300	0.7000			0.7700			26.9570 (74)
East					1.4300	23.8018	0.6300	0.7000			0.7700			10.4020 (76)
West					4.1300	23.8018	0.6300	0.7000			0.7700			30.0422 (80)
Solar gains	67.4012	114.5413	188.3978	293.5301	363.1345	401.1406	374.8047	318.7040	237.4402	144.3537	80.4604	55.9952	(83)	
Total gains	480.5433	526.3207	589.2747	673.4198	722.7242	742.0603	704.4876	650.4331	579.4871	505.1402	464.2333	459.9605	(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	79.1557	79.4413	79.4413	79.8495	79.8495	80.3546	80.3546	80.5900	80.2326	79.7162	79.9800	79.5801	
alpha	6.2770	6.2961	6.2961	6.3233	6.3233	6.3570	6.3570	6.3727	6.3488	6.3144	6.3320	6.3053	
util living area	0.9868	0.9750	0.9322	0.7972	0.5965	0.3819	0.2661	0.2951	0.5543	0.8638	0.9703	0.9893	(86)
Living	20.2991	20.4386	20.6759	20.9044	20.9855	20.9992	20.9999	20.9999	20.9929	20.8663	20.5533	20.2702	
Non living	19.1610	19.3364	19.6187	19.8633	19.9310	19.9450	19.9452	19.9480	19.9409	19.8336	19.4855	19.1291	
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	20.6414	20.4386	20.6759	20.9044	20.9855	20.9992	20.9999	20.9999	20.9929	20.8663	20.5533	20.3723	(87)
Th 2	19.9310	19.9344	19.9344	19.9393	19.9393	19.9452	19.9452	19.9480	19.9438	19.9377	19.9408	19.9361	(88)
util rest of house	0.9815	0.9654	0.9083	0.7450	0.5274	0.3103	0.1903	0.2135	0.4661	0.8104	0.9569	0.9850	(89)
MIT 2	19.6240	19.3364	19.6187	19.8633	19.9310	19.9450	19.9452	19.9480	19.9409	19.8336	19.4855	19.2745	(90)
Living area fraction									fLA = Living area / (4) =			0.5107	(91)
MIT	20.1436	19.8993	20.1586	20.3950	20.4695	20.4834	20.4839	20.4852	20.4782	20.3610	20.0308	19.8352	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1436	19.8993	20.1586	20.3950	20.4695	20.4834	20.4839	20.4852	20.4782	20.3610	20.0308	19.8352	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	472.2445	507.8859	538.5419	517.5079	406.4426	257.4326	161.3529	165.9916	296.2117	421.0088	444.8601	452.8134	(94)
Ext temp.	4.7000	5.3000	7.0000	9.5000	12.4000	15.4000	17.3000	17.2000	14.6000	11.1000	7.6000	4.7000	(96)
Heat loss rate W	794.5599	748.4212	674.5648	555.6663	411.5624	257.6346	161.3635	166.0122	298.3675	473.1203	632.9626	774.5366	(97)
Space heating kWh	239.8027	161.6397	101.2010	27.4741	3.8092	0.0000	0.0000	0.0000	0.0000	38.7710	135.4338	239.3620	(98a)
Space heating requirement - total per year (kWh/year)												947.4935	
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	239.8027	161.6397	101.2010	27.4741	3.8092	0.0000	0.0000	0.0000	0.0000	38.7710	135.4338	239.3620	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												947.4935	
Space heating per m2										(98c) / (4) =		21.8467	(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 %)													213.4627 (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)	239.8027	161.6397	101.2010	27.4741	3.8092	0.0000	0.0000	0.0000	0.0000	38.7710	135.4338	239.3620	(98)
Space heating fuel (main heating system)	213.4627	213.4627	213.4627	213.4627	213.4627	0.0000	0.0000	0.0000	0.0000	213.4627	213.4627	213.4627	(210)
Space heating efficiency (main heating system 2)	112.3394	75.7227	47.4092	12.8707	1.7845	0.0000	0.0000	0.0000	0.0000	18.1629	63.4461	112.1330	(211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating 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

Full SAP Calculation Printout



Water heating requirement	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(64)
Efficiency of water heater	(217)m	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	(216)
Fuel for water heating, kWh/month	120.4420	106.6943	113.6631	100.5298	97.8891	88.6705	87.7790	90.9567	91.6283	101.6319	107.4284	119.1911	(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	(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	12.0547	9.6708	8.7074	6.3794	4.9277	4.0259	4.4952	5.8430	7.5895	9.9578	11.2473	12.3898	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	(233a)m	-27.5738	-36.3975	-53.5316	-62.2992	-67.5288	-65.9000	-64.6885	-61.0419	-52.7721	-43.2151	-29.5447	(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	(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	(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	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	(233b)m	-9.8009	-18.1531	-37.9085	-63.5089	-83.2892	-91.0890	-88.6204	-76.0689	-54.6543	-30.6819	-13.0471	(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	(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	(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	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												443.8685	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												177.5339	
Water heating fuel used												1226.5042	(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)												97.2886	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1162.7634	(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												604.8978	(238)

10a. Fuel costs - using BEDF prices (597)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	443.8685	27.6700	122.8184	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1226.5042	27.6700	339.3737	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	97.2886	27.6700	26.9197	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-588.2346	27.6700	-162.7645	
PV Unit electricity exported	-574.5288	5.8100	-33.3801	
Total			-196.1446	(252)
Total energy cost			292.9672	(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	443.8685	0.1579	70.0848	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1226.5042	0.1407	172.6122	(264)
Space and water heating			242.6970	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	97.2886	0.1443	14.0417	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-588.2346	0.1341	-78.9027	
PV Unit electricity exported	-574.5288	0.1241	-71.3174	
Total			-150.2201	(269)
Total CO2, kg/year			106.5187	(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	443.8685	1.5845	703.3047	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1226.5042	1.5204	1864.7517	(278)
Space and water heating			2568.0564	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	97.2886	1.5338	149.2244	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-588.2346	1.4957	-879.8242	
PV Unit electricity exported	-574.5288	0.4555	-261.7071	
Total			-1141.5313	(283)
Total Primary energy kWh/year			1575.7495	(286)

Full SAP Calculation Printout



SAP 10 EPC IMPROVEMENTS

02 ashp + PV

Current energy efficiency rating: B 88
Current environmental impact rating: A 98

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

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

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

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 597 TEST (31 Jul 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current	Potential	Saving
Electricity	£489	£489	£0
Space heating	£123	£123	£0
Water heating	£339	£339	£0
Lighting	£27	£27	£0
Generated (PV)	-£196	-£196	£0
Total cost of fuels	£293	£293	£0
Total cost of uses	£293	£293	£0
Delivered energy	14 kWh/m²	14 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	2 kg/m²	2 kg/m²	0 kg/m²
Primary energy	36 kWh/m²	36 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling	43.3700 (1b)	x 2.3900 (2b)	= 103.6543 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 103.6543 (5)

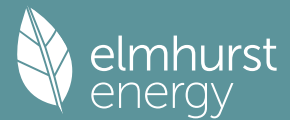
2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

	Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1929 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4429 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3101 (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	0.3953	0.3876	0.3798	0.3411	0.3333	0.2946	0.2946	0.2868	0.3101	0.3333	0.3488	0.3643 (22b)
Effective ac	0.5781	0.5751	0.5721	0.5582	0.5556	0.5434	0.5434	0.5411	0.5481	0.5556	0.5608	0.5664 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
Opening Type 1			1.8900	1.4000	2.6460			(26)					
Opening Type 2			12.4700	1.1450	14.2786			(27)					
Heatloss Floor 1			43.3700	0.1000	4.3370	75.0000	3252.7500	(28a)					
External Wall 1	49.8100	12.4700	37.3400	0.1800	6.7212	60.0000	2240.4000	(29a)					
External Wall 2	13.0700	1.8900	11.1800	0.1700	1.9006	190.0000	2124.2000	(29a)					
Total net area of external elements Aum(A, m2)			106.2500					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.8834			(33)					
Main dwelling													
Party Ceiling 1			43.3700			100.0000	4337.0000	(32b)					
Internal Wall 1			51.6200			9.0000	464.5800	(32c)					
Internal Wall 2			22.4200			100.0000	2242.0000	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14660.9300	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							338.0431	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E16 Corner (normal)				9.5600	0.0400		0.3824						
E2 Other lintels (including other steel lintels)				9.0400	0.0500		0.4520						
E3 Sill				8.1400	0.0240		0.1954						
E4 Jamb				23.3000	0.0190		0.4427						
E5 Ground floor (normal)				26.3100	0.0310		0.8156						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.2881	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	32.1715	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 19.7759	Feb 19.6721	Mar 19.5704	Apr 19.0925	May 19.0031	Jun 18.5869	Jul 18.5869	Aug 18.5098	Sep 18.7472	Oct 19.0031	Nov 19.1840	Dec 19.3731	(38)
Heat transfer coeff	51.9474	51.8436	51.7419	51.2640	51.1746	50.7584	50.7584	50.6813	50.9187	51.1746	51.3555	51.5446	(39)
Average = Sum(39)m / 12 =												51.2636	
HLP	Jan 1.1978	Feb 1.1954	Mar 1.1930	Apr 1.1820	May 1.1800	Jun 1.1704	Jul 1.1704	Aug 1.1686	Sep 1.1741	Oct 1.1800	Nov 1.1841	Dec 1.1885	(40)
HLP (average)												1.1820	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

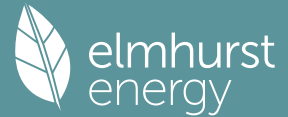
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4985	(42)
Hot water usage for mixer showers														
	49.3445	48.6029	47.5223	45.4548	43.9290	42.2275	41.2604	42.3328	43.5083	45.3353	47.4472	49.1554	(42a)	
Hot water usage for baths														
	21.3430	21.0260	20.5796	19.7566	19.1403	18.4570	18.0879	18.5311	19.0138	19.7449	20.5849	21.2708	(42b)	
Hot water usage for other uses														
	29.9762	28.8862	27.7961	26.7061	25.6160	24.5260	24.5260	25.6160	26.7061	27.7961	28.8862	29.9762	(42c)	
Average daily hot water use (litres/day)													92.5333	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	100.6636	98.5151	95.8981	91.9175	88.6854	85.2105	83.8743	86.4800	89.2282	92.8763	96.9182	100.4024	(44)	
Energy content (annual)	159.4266	140.2841	147.3917	125.8305	119.3876	104.7763	101.4387	107.0803	110.0273	126.0323	138.0778	157.2059	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1536.9590		
	23.9140	21.0426	22.1088	18.8746	17.9081	15.7164	15.2158	16.0620	16.5041	18.9048	20.7117	23.5809	(46)	
Water storage loss (or HIU loss):														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8600	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													1.0044	(55)
Total storage loss														
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)	
If cylinder contains dedicated solar storage														
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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														
	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(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														
	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(64)	
Electric shower(s)										Total per year (kWh/year) = Sum(64)m =		2177.4610	(64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
	96.5284	85.9520	92.5268	83.9538	83.2154	76.9533	77.2474	79.1232	78.6993	85.4248	88.0261	95.7900	(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	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	13.7722	12.2323	9.9480	7.5313	5.6297	4.7529	5.1356	6.6755	8.9598	11.3765	13.2781	14.1550	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	194.1678	196.1827	191.1053	180.2962	166.6516	153.8276	145.2604	143.2456	148.3230	159.1321	172.7766	185.6006	(68)
Pumps, fans	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	(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)	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	(71)
Total internal gains	129.7424	127.9047	124.3640	116.6025	111.8487	106.8796	103.8271	106.3484	109.3045	114.8183	122.2584	128.7500	(72)
	413.1421	411.7794	400.8769	379.8897	359.5897	340.9198	329.6829	331.7292	342.0470	360.7865	383.7728	403.9653	(73)

Full SAP Calculation Printout



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				6.9100	10.6334	0.6300	0.7000			0.7700	22.4554 (74)	
East				1.4300	19.6403	0.6300	0.7000			0.7700	8.5833 (76)	
West				4.1300	19.6403	0.6300	0.7000			0.7700	24.7896 (80)	
Solar gains	55.8283	108.1980	180.4348	273.9322	349.9517	365.6302	344.9847	285.9896	212.7176	128.5485	69.3138	46.1642 (83)
Total gains	468.9705	519.9774	581.3117	653.8218	709.5414	706.5500	674.6676	617.7187	554.7646	489.3350	453.0866	450.1295 (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	78.3962	78.5531	78.7076	79.4413	79.5801	80.2326	80.2326	80.3546	79.9800	79.5801	79.2998	79.0089	
alpha	6.2264	6.2369	6.2472	6.2961	6.3053	6.3488	6.3488	6.3570	6.3320	6.3053	6.2867	6.2673	
util living area	0.9899	0.9796	0.9457	0.8392	0.6519	0.4580	0.3308	0.3769	0.6200	0.8966	0.9782	0.9920	(86)
Living	20.2256	20.3751	20.6147	20.8622	20.9743	20.9976	20.9997	20.9994	20.9857	20.8200	20.4793	20.1935	
Non living	19.0613	19.2493	19.5401	19.8184	19.9199	19.9428	19.9437	19.9451	19.9342	19.7864	19.3888	19.0269	
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	20.6038	20.3751	20.6147	20.8622	20.9743	20.9976	20.9997	20.9994	20.9857	20.8200	20.4793	20.3063	(87)
Th 2	19.9218	19.9237	19.9256	19.9344	19.9361	19.9438	19.9438	19.9452	19.9408	19.9361	19.9327	19.9292	(88)
util rest of house	0.9858	0.9717	0.9260	0.7933	0.5848	0.3834	0.2515	0.2908	0.5312	0.8526	0.9683	0.9887	(89)
MIT 2	19.5788	19.2493	19.5401	19.8184	19.9199	19.9428	19.9437	19.9451	19.9342	19.7864	19.3888	19.1895	(90)
Living area fraction	20.1023	19.8243	20.0889	20.3515	20.4584	20.4815	20.4831	20.4836	20.4712	20.3143	19.9458	19.7599	(91)
MIT	20.1023	19.8243	20.0889	20.3515	20.4584	20.4815	20.4831	20.4836	20.4712	20.3143	19.9458	19.7599	(92)
Temperature adjustment	20.1023	19.8243	20.0889	20.3515	20.4584	20.4815	20.4831	20.4836	20.4712	20.3143	19.9458	19.7599	(93)
adjusted MIT	20.1023	19.8243	20.0889	20.3515	20.4584	20.4815	20.4831	20.4836	20.4712	20.3143	19.9458	19.7599	(93)

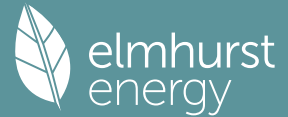
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9866	0.9709	0.9294	0.8124	0.6184	0.4215	0.2921	0.3348	0.5765	0.8698	0.9684	0.9881	(94)
Useful gains	462.7030	504.8250	540.2945	531.1521	438.7619	297.8083	197.0416	206.8288	319.8168	425.6403	438.7881	444.7593	(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	820.8879	773.7283	703.1156	587.0497	448.2071	298.5359	197.0981	206.9606	324.4146	497.1254	659.6999	802.0268	(97)
Space heating kWh	266.4895	180.7030	121.1389	40.2463	7.0272	0.0000	0.0000	0.0000	0.0000	53.1849	159.0565	265.8071	(98a)
Space heating requirement - total per year (kWh/year)												1093.6534	
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	266.4895	180.7030	121.1389	40.2463	7.0272	0.0000	0.0000	0.0000	0.0000	53.1849	159.0565	265.8071	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1093.6534	
Space heating per m2										(98c) / (4) =		25.2168	(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 %)												213.5892	(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	266.4895	180.7030	121.1389	40.2463	7.0272	0.0000	0.0000	0.0000	0.0000	53.1849	159.0565	265.8071	(98)
Space heating efficiency (main heating system 1)	213.5892	213.5892	213.5892	213.5892	213.5892	0.0000	0.0000	0.0000	0.0000	213.5892	213.5892	213.5892	(210)
Space heating fuel (main heating system)	124.7674	84.6031	56.7158	18.8429	3.2900	0.0000	0.0000	0.0000	0.0000	24.9006	74.4684	124.4478	(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	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(64)
Efficiency of water heater	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	177.5049	(217)
Fuel for water heating, kWh/month	120.4617	106.7117	113.6817	100.5462	97.9052	88.6851	87.7933	90.9716	91.6433	101.6485	107.4460	119.2107	(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	12.0547	9.6708	8.7074	6.3794	4.9277	4.0259	4.4952	5.8430	7.5895	9.9578	11.2473	12.3898	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-23.8128	-35.3485	-52.8694	-60.6467	-66.7605	-62.9630	-62.1644	-57.7300	-49.6675	-40.3871	-26.5571	-20.3591	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													

Full SAP Calculation Printout



(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	-7.4913	-16.8889	-36.0971	-58.5858	-80.5413	-81.8581	-80.7428	-67.1287	-48.1220	-26.3916	-10.5740	-5.8371	(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												512.0360	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												177.5049	
Water heating fuel used												1226.7050	(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)												97.2886	(232)

Energy saving/generation technologies (Appendices M, N and Q)													
PV generation												-1079.5246	(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												756.5050	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	512.0360	16.4900	84.4347	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1226.7050	16.4900	202.2837	(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	97.2886	16.4900	16.0429	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-559.2661	16.4900	-92.2230	
PV Unit electricity exported	-520.2585	5.5900	-29.0824	
Total			-121.3054	(252)
Total energy cost			181.4558	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.7392	(257)
SAP value	[(255) x (256)] / [(4) + 45.0] =	88.0174	
SAP rating (Section 12)		88	(258)
SAP band		B	

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

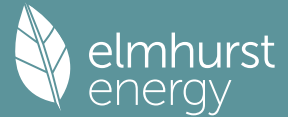
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	512.0360	0.1574	80.5961	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1226.7050	0.1407	172.6405	(264)
Space and water heating			253.2366	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	97.2886	0.1443	14.0417	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-559.2661	0.1339	-74.9134	
PV Unit electricity exported	-520.2585	0.1241	-64.5682	
Total			-139.4817	(269)
Total CO2, kg/year			127.7967	(272)
CO2 emissions per m2			2.9500	(273)
EI value			98.0622	
EI rating			98	(274)
EI band			A	

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

1. Overall dwelling characteristics

		Area	Storey height	Volume	
		(m2)	(m)	(m3)	
Main dwelling					
Ground floor		43.3700 (1b)	x 2.3900 (2b)	= 103.6543 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	43.3700				(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e) ... (3n) =		103.6543 (5)	

Full SAP Calculation Printout



2. Ventilation rate

m3 per hour												
Number of open chimneys												0 * 80 = 0.0000 (6a)
Number of open flues												0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire												0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler												0 * 20 = 0.0000 (6d)
Number of flues attached to other heater												0 * 35 = 0.0000 (6e)
Number of blocked chimneys												0 * 20 = 0.0000 (6f)
Number of intermittent extract fans												2 * 10 = 20.0000 (7a)
Number of passive vents												0 * 10 = 0.0000 (7b)
Number of flueless gas fires												0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =										Air changes per hour		
Pressure test										20.0000 / (5) = 0.1929 (8)		
Pressure Test Method										Yes		
Measured/design AP50										Blower Door		
Infiltration rate										5.0000 (17)		
Number of sides sheltered										0.4429 (18)		
										4 (19)		
Shelter factor										(20) = 1 - [0.075 x (19)] = 0.7000 (20)		
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) = 0.3101 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.6000	4.4000	4.4000	4.1000	4.1000	3.7000	3.7000	3.5000	3.8000	4.2000	4.0000	4.3000 (22)
Adj infilt rate	1.1500	1.1000	1.1000	1.0250	1.0250	0.9250	0.9250	0.8750	0.9500	1.0500	1.0000	1.0750 (22a)
Effective ac	0.3566	0.3411	0.3411	0.3178	0.3178	0.2868	0.2868	0.2713	0.2946	0.3256	0.3101	0.3333 (22b)
	0.5636	0.5582	0.5582	0.5505	0.5505	0.5411	0.5411	0.5368	0.5434	0.5530	0.5481	0.5556 (25)

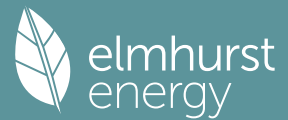
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Opening Type 1			1.8900	1.4000	2.6460			(26)				
Opening Type 2			12.4700	1.1450	14.2786			(27)				
Heatloss Floor 1			43.3700	0.1000	4.3370	75.0000	3252.7500	(28a)				
External Wall 1	49.8100	12.4700	37.3400	0.1800	6.7212	60.0000	2240.4000	(29a)				
External Wall 2	13.0700	1.8900	11.1800	0.1700	1.9006	190.0000	2124.2000	(29a)				
Total net area of external elements Aum(A, m2)			106.2500					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.8834			(33)				
Main dwelling												
Party Ceiling 1			43.3700			100.0000	4337.0000	(32b)				
Internal Wall 1			51.6200			9.0000	464.5800	(32c)				
Internal Wall 2			22.4200			100.0000	2242.0000	(32c)				
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 14660.9300 (34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								338.0431 (35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E16 Corner (normal)				9.5600	0.0400	0.3824						
E2 Other lintels (including other steel lintels)				9.0400	0.0500	0.4520						
E3 Sill				8.1400	0.0240	0.1954						
E4 Jamb				23.3000	0.0190	0.4427						
E5 Ground floor (normal)				26.3100	0.0310	0.8156						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.2881	(36)				
Point Thermal bridges							(36a) =	0.0000				
Total fabric heat loss						(33) + (36) + (36a) =	32.1715	(37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 19.2775	Feb 19.0925	Mar 19.0925	Apr 18.8305	May 18.8305	Jun 18.5098	Jul 18.5098	Aug 18.3619	Sep 18.5869	Oct 18.9158	Nov 18.7472	Dec 19.0031 (38)
Heat transfer coeff	51.4490	51.2640	51.2640	51.0020	51.0020	50.6813	50.6813	50.5334	50.7584	51.0873	50.9187	51.1746 (39)
Average = Sum(39)m / 12 =												50.9847
HLP	Jan 1.1863	Feb 1.1820	Mar 1.1820	Apr 1.1760	May 1.1760	Jun 1.1686	Jul 1.1686	Aug 1.1652	Sep 1.1704	Oct 1.1779	Nov 1.1741	Dec 1.1800 (40)
HLP (average)												1.1756
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.4985 (42)											
Hot water usage for mixer showers												
49.3445	48.6029	47.5223	45.4548	43.9290	42.2275	41.2604	42.3328	43.5083	45.3353	47.4472	49.1554	(42a)
Hot water usage for baths												
21.3430	21.0260	20.5796	19.7566	19.1403	18.4570	18.0879	18.5311	19.0138	19.7449	20.5849	21.2708	(42b)
Hot water usage for other uses												
29.9762	28.8862	27.7961	26.7061	25.6160	24.5260	24.5260	25.6160	26.7061	27.7961	28.8862	29.9762	(42c)
Average daily hot water use (litres/day)												92.5333 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
100.6636	98.5151	95.8981	91.9175	88.6854	85.2105	83.8743	86.4800	89.2282	92.8763	96.9182	100.4024	(44)
Energy conte	159.4266	140.2841	147.3917	125.8305	119.3876	104.7763	101.4387	107.0803	110.0273	126.0323	138.0778	157.2059 (45)
Energy content (annual)										Total = Sum(45)m =	1536.9590	
Distribution loss (46)m = 0.15 x (45)m												
23.9140	21.0426	22.1088	18.8746	17.9081	15.7164	15.2158	16.0620	16.5041	18.9048	20.7117	23.5809	(46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0044 (55)
Total storage loss												
31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)
If cylinder contains dedicated solar storage												
31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(57)

Full SAP Calculation Printout



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												
	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047 (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	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047 (64)
Total per year (kWh/year) = Sum(64)m =												2177.4610 (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	96.5284	85.9520	92.5268	83.9538	83.2154	76.9533	77.2474	79.1232	78.6993	85.4248	88.0261	95.7900 (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	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104	89.9104 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.7722	12.2323	9.9480	7.5313	5.6297	4.7529	5.1356	6.6755	8.9598	11.3765	13.2781	14.1550 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.1678	196.1827	191.1053	180.2962	166.6516	153.8276	145.2604	143.2456	148.3230	159.1321	172.7766	185.6006 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895	45.4895 (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)	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403	-59.9403 (71)
Water heating gains (Table 5)	129.7424	127.9047	124.3640	116.6025	111.8487	106.8796	103.8271	106.3484	109.3045	114.8183	122.2584	128.7500 (72)
Total internal gains	413.1421	411.7794	400.8769	379.8897	359.5897	340.9198	329.6829	331.7292	342.0470	360.7865	383.7728	403.9653 (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						6.9100	12.7650	0.6300	0.7000	0.7700		26.9570 (74)
East						1.4300	23.8018	0.6300	0.7000	0.7700		10.4020 (76)
West						4.1300	23.8018	0.6300	0.7000	0.7700		30.0422 (80)
Solar gains	67.4012	114.5413	188.3978	293.5301	363.1345	401.1406	374.8047	318.7040	237.4402	144.3537	80.4604	55.9952 (83)
Total gains	480.5433	526.3207	589.2747	673.4198	722.7242	742.0603	704.4876	650.4331	579.4871	505.1402	464.2333	459.9605 (84)

7. Mean internal temperature (heating season)

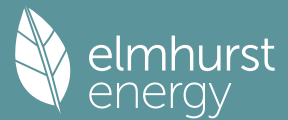
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	79.1557	79.4413	79.4413	79.8495	79.8495	80.3546	80.3546	80.5900	80.2326	79.7162	79.9800	79.5801
alpha	6.2770	6.2961	6.2961	6.3233	6.3233	6.3570	6.3570	6.3727	6.3488	6.3144	6.3320	6.3053
util living area	0.9868	0.9750	0.9322	0.7972	0.5965	0.3819	0.2661	0.2951	0.5543	0.8638	0.9703	0.9893 (86)
Living	20.2991	20.4386	20.6759	20.9044	20.9855	20.9992	20.9999	20.9999	20.9929	20.8663	20.5533	20.2702
Non living	19.1610	19.3364	19.6187	19.8633	19.9310	19.9450	19.9452	19.9480	19.9409	19.8336	19.4855	19.1291
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	20.6414	20.4386	20.6759	20.9044	20.9855	20.9992	20.9999	20.9999	20.9929	20.8663	20.5533	20.3723 (87)
Th 2	19.9310	19.9344	19.9344	19.9393	19.9393	19.9452	19.9452	19.9480	19.9438	19.9377	19.9408	19.9361 (88)
util rest of house	0.9815	0.9654	0.9083	0.7450	0.5274	0.3103	0.1903	0.2135	0.4661	0.8104	0.9569	0.9850 (89)
MIT 2	19.6240	19.3364	19.6187	19.8633	19.9310	19.9450	19.9452	19.9480	19.9409	19.8336	19.4855	19.2745 (90)
Living area fraction	20.1436	19.8993	20.1586	20.3950	20.4695	20.4834	20.4839	20.4852	20.4782	20.3610	20.0308	19.8352 (92)
MIT	20.1436	19.8993	20.1586	20.3950	20.4695	20.4834	20.4839	20.4852	20.4782	20.3610	20.0308	19.8352 (92)
Temperature adjustment	20.1436	19.8993	20.1586	20.3950	20.4695	20.4834	20.4839	20.4852	20.4782	20.3610	20.0308	19.8352 (93)
adjusted MIT	20.1436	19.8993	20.1586	20.3950	20.4695	20.4834	20.4839	20.4852	20.4782	20.3610	20.0308	19.8352 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9827	0.9650	0.9139	0.7685	0.5624	0.3469	0.2290	0.2552	0.5112	0.8334	0.9583	0.9845 (94)
Useful gains	472.2445	507.8859	538.5419	517.5079	406.4426	257.4326	161.3529	165.9916	296.2117	421.0088	444.8601	452.8134 (95)
Ext temp.	4.7000	5.3000	7.0000	9.5000	12.4000	15.4000	17.3000	17.2000	14.6000	11.1000	7.6000	4.7000 (96)
Heat loss rate W	794.5599	748.4212	674.5648	555.6663	411.5624	257.6346	161.3635	166.0122	298.3675	473.1203	632.9626	774.5366 (97)
Space heating kWh	239.8027	161.6397	101.2010	27.4741	3.8092	0.0000	0.0000	0.0000	0.0000	38.7710	135.4338	239.3620 (98a)
Space heating requirement - total per year (kWh/year)												947.4935
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	239.8027	161.6397	101.2010	27.4741	3.8092	0.0000	0.0000	0.0000	0.0000	38.7710	135.4338	239.3620 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												947.4935
Space heating per m ²										(98c) / (4) =		21.8467 (99)

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

Full SAP Calculation Printout



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 %)												213.4627	(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	239.8027	161.6397	101.2010	27.4741	3.8092	0.0000	0.0000	0.0000	0.0000	38.7710	135.4338	239.3620	(98)
Space heating efficiency (main heating system 1)	213.4627	213.4627	213.4627	213.4627	213.4627	0.0000	0.0000	0.0000	0.0000	213.4627	213.4627	213.4627	(210)
Space heating fuel (main heating system)	112.3394	75.7227	47.4092	12.8707	1.7845	0.0000	0.0000	0.0000	0.0000	18.1629	63.4461	112.1330	(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	213.8254	189.4185	201.7905	178.4745	173.7864	157.4203	155.8375	161.4791	162.6713	180.4311	190.7218	211.6047	(64)
Efficiency of water heater	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	177.5339	(216)
Fuel for water heating, kWh/month	120.4420	106.6943	113.6631	100.5298	97.8891	88.6705	87.7790	90.9567	91.6283	101.6319	107.4284	119.1911	(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	12.0547	9.6708	8.7074	6.3794	4.9277	4.0259	4.4952	5.8430	7.5895	9.9578	11.2473	12.3898	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-27.5738	-36.3975	-53.5316	-62.2992	-67.5288	-65.9000	-64.6885	-61.0419	-52.7721	-43.2151	-29.5447	-23.7415	(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	-9.8009	-18.1531	-37.9085	-63.5089	-83.2892	-91.0890	-88.6204	-76.0689	-54.6543	-30.6819	-13.0471	-7.7068	(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												443.8685	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												177.5339	
Water heating fuel used												1226.5042	(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)												97.2886	(232)
Energy saving/generation technologies (Appendices M, N and Q)													
PV generation												-1162.7634	(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												604.8978	(238)
10a. Fuel costs - using BEDF prices (597)													
	Fuel	Fuel price	Fuel cost										
	kWh/year	p/kWh	£/year										
Space heating - main system 1	443.8685	27.6700	122.8184	(240)									
Total CO2 associated with community systems			0.0000	(473)									
Water heating (other fuel)	1226.5042	27.6700	339.3737	(247)									
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)									
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)									
Energy for lighting	97.2886	27.6700	26.9197	(250)									
Additional standing charges			0.0000	(251)									
Energy saving/generation technologies													
PV Unit electricity used in dwelling	-588.2346	27.6700	-162.7645										
PV Unit electricity exported	-574.5288	5.8100	-33.3801										
Total			-196.1446	(252)									
Total energy cost			292.9672	(255)									
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP													
	Energy	Emission factor	Emissions										
	kWh/year	kg CO2/kWh	kg CO2/year										
Space heating - main system 1	443.8685	0.1579	70.0848	(261)									
Total CO2 associated with community systems			0.0000	(373)									
Water heating (other fuel)	1226.5042	0.1407	172.6122	(264)									
Space and water heating			242.6970	(265)									
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)									
Energy for lighting	97.2886	0.1443	14.0417	(268)									
Energy saving/generation technologies													
PV Unit electricity used in dwelling	-588.2346	0.1341	-78.9027										
PV Unit electricity exported	-574.5288	0.1241	-71.3174										
Total			-150.2201	(269)									
Total CO2, kg/year			106.5187	(272)									

Full SAP Calculation Printout



----- 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	443.8685	1.5845	703.3047 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1226.5042	1.5204	1864.7517 (278)
Space and water heating			2568.0564 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	97.2886	1.5338	149.2244 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-588.2346	1.4957	-879.8242
PV Unit electricity exported	-574.5288	0.4555	-261.7071
Total			-1141.5313 (283)
Total Primary energy kWh/year			1575.7495 (286)