

# Full SAP Calculation Printout



Property Reference	2 GREEN Gilbert Road		Issued on Date	12/03/2024	
Assessment Reference	Gilbert Road	Prop Type Ref			
Property					
SAP Rating	73 C	DER	9.72	TER	18.27
Environmental	94 A	% DER < TER	46.80		
CO <sub>2</sub> Emissions (t/year)	0.32	DFEE	75.04	TFEE	41.97
Compliance Check	See BREL	% DFEE < TFEE	-78.79		
% DPER < TPER	-3.29	DPER	100.68	TPER	97.48
Assessor Details	Mr. Neil Ingham			Assessor ID	AV35-0001
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 <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	37.5000	2.3500	88.1250
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5000		88.1250
Dwelling volume			88.1250

## 2. Ventilation rate

	m <sup>3</sup> 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) =	0.2270 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4770 (18)
Number of sides sheltered		2 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.4054 (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	0.5169	0.5068	0.4966	0.4459	0.4358	0.3851	0.3851	0.3750	0.4054	0.4358	0.4561	0.4764 (22b)
Effective ac	0.6336	0.6284	0.6233	0.5994	0.5950	0.5742	0.5742	0.5703	0.5822	0.5950	0.6040	0.6135 (25)

## 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
G (Uw = 1.10)			4.9100	1.0536	5.1734		(27)
DOOR			2.0000	1.1000	2.2000		(26)
GF			37.5000	0.1400	5.2500	110.0000	4125.0000 (28a)
EW	47.8100	4.9100	42.9000	0.2600	11.1540	9.0000	386.1000 (29a)
SW	25.8500	2.0000	23.8500	0.2500	5.9625	9.0000	214.6500 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			111.1600				(31)
Fabric heat loss, W/K = Sum (A x U)					29.7399		(33)
Party Wall 1			2.4400	0.0000	0.0000	180.0000	439.2000 (32)
Party Ceiling 1			37.5000			20.0000	750.0000 (32b)
IS			54.8900			9.0000	494.0100 (32c)
IF			221.3100			18.0000	3983.5800 (32d)
IC			221.3100			9.0000	1991.7900 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12384.3300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K		330.2488 (35)
Thermal bridges (Default value 0.200 * total exposed area)		22.2320 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	51.9719 (37)

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

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	18.4256	18.2747	18.1269	17.4323	17.3024	16.6974	16.6974	16.5854	16.9305	17.3024	17.5653	17.8401	(38)
Heat transfer coeff	70.3975	70.2466	70.0987	69.4042	69.2742	68.6693	68.6693	68.5573	68.9023	69.2742	69.5371	69.8120	(39)
Average = Sum(39)m / 12 =													69.4036

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8773	1.8732	1.8693	1.8508	1.8473	1.8312	1.8312	1.8282	1.8374	1.8473	1.8543	1.8617	(40)
HLP (average)													1.8508
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

#### 4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3416	(42)
Hot water usage for mixer showers													46.5345	(42a)
Hot water usage for baths													20.1432	(42b)
Hot water usage for other uses													28.3692	(42c)
Average daily hot water use (litres/day)													87.5978	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	150.9228	132.8017	139.5304	119.1191	113.0200	99.1880	96.0282	101.3687	104.1584	119.3097	130.7128	148.8205	(45)	
Energy content (annual)													1454.9803	
Distribution loss (46)m = 0.15 x (45)m													22.3231	(46)
Water storage loss:													210.0000	(47)
Store volume													1.4100	(48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400	(49)
Temperature factor from Table 2b													0.7614	(55)
Enter (49) or (54) in (55)													0.0000	(56)
Total storage loss	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	(56)	
If cylinder contains dedicated solar storage	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034	(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	197.7886	175.1321	186.3962	164.4731	159.8858	144.5420	142.8940	148.2345	149.5124	166.1755	176.0668	195.6863	(62)	
WWHRS	-36.0648	-31.8960	-33.3997	-27.6562	-25.7746	-22.0555	-20.6735	-21.9842	-22.8195	-26.9017	-30.4763	-35.3969	(63a)	
PV diverter	-3.8877	-8.4881	-17.4909	-27.3113	-36.9274	-37.3876	-36.8158	-30.4821	-21.7282	-12.2749	-5.2350	-3.0362	(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	157.8361	134.7479	135.5056	109.5056	97.1837	85.0989	85.4047	95.7682	104.9647	126.9989	140.3555	157.2533	(64)	
12Total per year (kWh/year)													1430.6231	(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	87.6745	78.0209	83.8865	75.8903	75.0718	69.2632	69.4220	71.1977	70.9159	77.1631	79.7452	86.9755	(65)	

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts	67.0796	67.0796	67.0796	67.0796	67.0796	67.0796	67.0796	67.0796	67.0796	67.0796	67.0796	67.0796	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	64.8112	71.7552	64.8112	66.9715	64.8112	66.9715	64.8112	64.8112	66.9715	64.8112	66.9715	64.8112	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.3012	116.4977	113.4827	107.0640	98.9615	91.3463	86.2589	85.0625	88.0775	94.4962	102.5987	110.2139	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7080	29.7080	29.7080	29.7080	29.7080	29.7080	29.7080	29.7080	29.7080	29.7080	29.7080	29.7080	(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)	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	-53.6637	(71)
Water heating gains (Table 5)	117.8420	116.1025	112.7507	105.4032	100.9029	96.1989	93.3092	95.6959	98.4943	103.7139	110.7572	116.9025	(72)
Total internal gains	341.0783	347.4793	334.1683	322.5625	307.7995	297.6406	287.5031	288.6934	296.6672	306.1451	323.4513	335.0514	(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	1.8700	10.6334	0.6300	0.6300	0.7700	5.4692 (74)							
South	3.0400	46.7521	0.6300	0.6300	0.7700	39.0921 (78)							
Solar gains	44.5613	74.4748	99.3141	120.7013	134.4801	133.5755	128.7246	118.1815	106.5463	81.4963	53.0845	38.3386	(83)
Total gains	385.6396	421.9540	433.4825	443.2638	442.2795	431.2162	416.2277	406.8749	403.2135	387.6414	376.5358	373.3900	(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)													0.9941	(86)
tau	48.8667	48.9716	49.0749	49.5660	49.6590	50.0965	50.0965	50.1783	49.9271	49.6590	49.4713	49.2765		
alpha	4.2578	4.2648	4.2717	4.3044	4.3106	4.3398	4.3398	4.3452	4.3285	4.3106	4.2981	4.2851		
util living area	0.9941	0.9906	0.9848	0.9688	0.9283	0.8204	0.6654	0.6976	0.8726	0.9668	0.9893	0.9949	(86)	

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Living	19.7021	19.8242	20.0149	20.2913	20.5655	20.7954	20.8896	20.8798	20.7364	20.3916	20.0065	19.6860
Non living	17.9702	18.1273	18.3710	18.7258	19.0532	19.2910	19.3489	19.3474	19.2401	18.8543	18.3701	17.9577
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	30	31	30	31	31	30	31	30	31
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000 (87)
Th 2	19.4164	19.4192	19.4219	19.4347	19.4371	19.4483	19.4483	19.4503	19.4439	19.4371	19.4322	19.4272 (88)
util rest of house												
	0.9915	0.9863	0.9771	0.9509	0.8806	0.6956	0.4603	0.4997	0.7737	0.9439	0.9835	0.9926 (89)
MIT 2	19.4164	19.4192	19.4219	19.4347	19.4371	19.4483	19.4483	19.4503	19.4439	19.4371	19.4322	19.4272 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.9020	19.9040	19.9058	19.9147	19.9164	19.9241	19.9241	19.9256	19.9211	19.9164	19.9130	19.9095 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	19.9020	19.9040	19.9058	19.9147	19.9164	19.9241	19.9241	19.9256	19.9211	19.9164	19.9130	19.9095 (93)

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9924	0.9878	0.9799	0.9574	0.8982	0.7403	0.5294	0.5673	0.8102	0.9525	0.9856	0.9935 (94)
Useful gains	382.7241	416.8118	424.7663	424.3815	397.2417	319.2092	220.3420	230.8221	326.6745	369.2137	371.1148	370.9480 (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	1098.3445	1053.9775	939.7327	764.4667	569.1826	365.6039	228.2652	241.7030	401.0895	645.3843	890.9796	1096.7108 (97)
Space heating kWh	532.4216	428.1754	383.1350	244.8613	127.9240	0.0000	0.0000	0.0000	0.0000	205.4709	374.3027	539.9675 (98a)
Space heating requirement - total per year (kWh/year)												2836.2585
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	532.4216	428.1754	383.1350	244.8613	127.9240	0.0000	0.0000	0.0000	0.0000	205.4709	374.3027	539.9675 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2836.2585
Space heating per m2										(98c) / (4) =		75.6336 (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 %)												168.7243 (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	532.4216	428.1754	383.1350	244.8613	127.9240	0.0000	0.0000	0.0000	0.0000	205.4709	374.3027	539.9675 (98)
Space heating efficiency (main heating system 1)	168.7243	168.7243	168.7243	168.7243	168.7243	0.0000	0.0000	0.0000	0.0000	168.7243	168.7243	168.7243 (210)
Space heating fuel (main heating system)	315.5572	253.7722	227.0776	145.1251	75.8184	0.0000	0.0000	0.0000	0.0000	121.7791	221.8428	320.0295 (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	157.8361	134.7479	135.5056	109.5056	97.1837	85.0989	85.4047	95.7682	104.9647	126.9989	140.3555	157.2533 (64)
Efficiency of water heater (217)m	134.0863	134.0863	134.0863	134.0863	134.0863	134.0863	134.0863	134.0863	134.0863	134.0863	134.0863	134.0863 (216)
Fuel for water heating, kWh/month	117.7123	100.4934	101.0585	81.6680	72.4785	63.4657	63.6939	71.4228	78.2815	94.7143	104.6755	117.2777 (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	14.8372	11.9029	10.7173	7.8519	6.0651	4.9552	5.5327	7.1917	9.3413	12.2562	13.8434	15.2495 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.2010	-28.0266	-43.5701	-51.6668	-55.8260	-47.3933	-46.8999	-43.8009	-37.7557	-32.5055	-20.6463	-15.4839 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.4825	0.6827	0.3721	-1.9270	-6.8440	-13.0190	-12.8004	-10.2307	-6.9456	-0.8678	0.3227	0.4153 (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												1681.0020 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												134.0863
Water heating fuel used												1066.9421 (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)												119.7444 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-492.1351 (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												2375.5534 (238)

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## 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	1681.0020	0.1545	259.7682 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1066.9421	0.1425	152.0127 (264)
Space and water heating			411.7809 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	119.7444	0.1443	17.2828 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-441.7760	0.1343	-59.3418
PV Unit electricity exported	-50.3591	0.1022	-5.1448
Total			-64.4866 (269)
Total CO2, kg/year			364.5771 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.7200 (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	1681.0020	1.5721	2642.7371 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1066.9421	1.5269	1629.1093 (278)
Space and water heating			4271.8465 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	119.7444	1.5338	183.6679 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-441.7760	1.4965	-661.0985
PV Unit electricity exported	-50.3591	0.3731	-18.7881
Total			-679.8865 (283)
Total Primary energy kWh/year			3775.6278 (286)
Dwelling Primary energy Rate (DPER)			100.6800 (287)

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

### 1. Overall dwelling characteristics

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	37.5000 (1b)	x 2.3500 (2b)	= 88.1250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 88.1250 (5)

### 2. Ventilation rate

		m <sup>3</sup> 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) = 0.2270 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4770 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.4054 (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 infltr rate	0.5169	0.5068	0.4966	0.4459	0.4358	0.3851	0.3851	0.3750	0.4054	0.4358	0.4561	0.4764 (22b)
Effective ac	0.6336	0.6284	0.6233	0.5994	0.5950	0.5742	0.5742	0.5703	0.5822	0.5950	0.6040	0.6135 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
TER Opaque door			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			4.9100	1.1450	5.6221		(27)



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## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
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	73.0839	73.3120	73.5369	74.6121	74.8168	75.7845	75.7845	75.9665	75.4088	74.8168	74.4039	73.9771
alpha	5.8723	5.8875	5.9025	5.9741	5.9878	6.0523	6.0523	6.0644	6.0273	5.9878	5.9603	5.9318
util living area	0.9922	0.9851	0.9718	0.9312	0.8338	0.6454	0.4711	0.5024	0.7296	0.9272	0.9822	0.9934 (86)
MIT	20.0940	20.2409	20.4320	20.6865	20.8824	20.9802	20.9974	20.9962	20.9588	20.7405	20.3879	20.0760 (87)
Th 2	19.8461	19.8493	19.8524	19.8670	19.8697	19.8825	19.8825	19.8848	19.8776	19.8697	19.8642	19.8584 (88)
util rest of house	0.9889	0.9789	0.9598	0.9016	0.7691	0.5426	0.3531	0.3830	0.6309	0.8905	0.9736	0.9907 (89)
MIT 2	18.8364	19.0235	19.2632	19.5774	19.7850	19.8740	19.8820	19.8840	19.8568	19.6455	19.2212	18.8230 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.2221	19.3968	19.6216	19.9175	20.1215	20.2132	20.2240	20.2251	20.1948	19.9813	19.5790	19.2073 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2221	19.3968	19.6216	19.9175	20.1215	20.2132	20.2240	20.2251	20.1948	19.9813	19.5790	19.2073 (93)

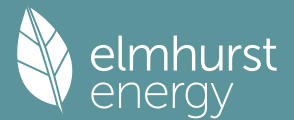
## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9864	0.9758	0.9567	0.9032	0.7850	0.5741	0.3895	0.4198	0.6605	0.8948	0.9708	0.9885 (94)
Useful gains	391.9553	426.2389	431.7345	418.5199	364.2199	258.2197	169.1390	177.9148	276.5957	361.0217	377.7858	379.9850 (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	723.6580	700.8470	632.4222	523.3595	398.9499	262.5178	169.4871	178.4611	286.4583	444.4140	594.4425	719.0014 (97)
Space heating kWh	246.7868	184.5366	149.3117	75.4844	25.8391	0.0000	0.0000	0.0000	0.0000	62.0438	155.9929	252.2282 (98a)
Space heating requirement - total per year (kWh/year)												1152.2236
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	246.7868	184.5366	149.3117	75.4844	25.8391	0.0000	0.0000	0.0000	0.0000	62.0438	155.9929	252.2282 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1152.2236
Space heating per m2										(98c) / (4) =		30.7260 (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)
Space heating requirement	246.7868	184.5366	149.3117	75.4844	25.8391	0.0000	0.0000	0.0000	0.0000	62.0438	155.9929	252.2282 (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)	267.3747	199.9313	161.7678	81.7816	27.9947	0.0000	0.0000	0.0000	0.0000	67.2198	169.0064	273.2700 (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	181.3139	160.6536	171.4997	152.8200	149.5043	136.2053	135.5332	140.0976	140.7234	155.1267	162.7439	179.6072 (64)
Efficiency of water heater (217)m	84.7517	84.3714	83.7506	82.5668	81.0099	79.8000	79.8000	79.8000	79.8000	82.1795	83.9649	79.8000 (216)
Fuel for water heating, kWh/month	213.9355	190.4124	204.7743	185.0865	184.5507	170.6834	169.8410	175.5609	176.3451	188.7657	193.8238	84.8212 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	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	13.1557	10.5540	9.5027	6.9621	5.3777	4.3936	4.9057	6.3767	8.2826	10.8673	12.2746	13.5213 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-13.0847	-19.2169	-28.7748	-33.7727	-37.6958	-35.7004	-35.3143	-32.7328	-28.3518	-22.6485	-14.6738	-11.2280 (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	-5.2177	-11.1711	-22.5550	-34.3777	-45.9210	-46.2662	-45.6718	-38.4145	-27.8555	-16.0849	-7.0057	-4.1080 (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												1248.3462 (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												2265.5271 (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)												106.1741 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-617.8438 (233)

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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	3088.2036 (238)

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 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP  
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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1248.3462	0.2100	262.1527 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2265.5271	0.2100	475.7607 (264)
Space and water heating			737.9134 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	106.1741	0.1443	15.3242 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-313.1945	0.1337	-41.8704
PV Unit electricity exported	-304.6493	0.1255	-38.2316
Total			-80.1020 (269)
Total CO2, kg/year			685.0649 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.2700 (273)

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 13a. Primary energy - Individual heating systems including micro-CHP  
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	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1248.3462	1.1300	1410.6313 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2265.5271	1.1300	2560.0457 (278)
Space and water heating			3970.6769 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	106.1741	1.5338	162.8533 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-313.1945	1.4940	-467.9245
PV Unit electricity exported	-304.6493	0.4606	-140.3310
Total			-608.2556 (283)
Total Primary energy kWh/year			3655.3755 (286)
Target Primary Energy Rate (TPER)			97.4800 (287)