

Property Reference	Unit 01			Issued on Date	25/02/2025
Assessment Reference	Sandy Lane	Prop Type Ref	Sandy Lane		
Property					
SAP Rating	104 A	DER	-2.69	TER	7.82
Environmental	102 A	% DER < TER			134.40
CO ₂ Emissions (t/year)	-0.23	DFEE	33.29	TFEE	39.68
Compliance Check	See BREL	% DFEE < TFEE			16.09
% DPER < TPER	113.25	DPER	-5.67	TPER	42.76
Calculation Printout	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 ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	42.5600 (1b)	x 2.3500 (2b)	= 100.0160 (1b) - (3b)
First floor	42.5600 (1c)	x 3.1000 (2c)	= 131.9360 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	231.9520 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour	
Pressure test	0.0000 / (5) =	0.0000 (8)
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate		2.5000 (17)
Number of sides sheltered		0.1250 (18)
		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1156 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 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	0.1474 0.1445 0.1416 0.1272 0.1243 0.1098 0.1098 0.1070 0.1156 0.1243 0.1301 0.1359	(22b)
Balanced mechanical ventilation with heat recovery		
If mechanical ventilation		0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)		0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =		78.3000 (23c)
Effective ac	0.2559 0.2530 0.2501 0.2357 0.2328 0.2183 0.2183 0.2155 0.2241 0.2328 0.2386 0.2444	(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							
DOOR			1.9700	1.0000	1.9700		(26)
G			17.4800	0.9615	16.8077		(27)
GF			42.5600	0.1500	6.3840	110.0000	4681.6000 (28a)
EW	103.0100	19.4500	83.5600	0.1600	13.3696	60.0000	5013.6000 (29a)
PR	53.9900		53.9900	0.1200	6.4788	9.0000	485.9100 (30)
Total net area of external elements Aum(A, m ²)			199.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.0101		(33)
Main dwelling							
PW			25.2400	0.0000	0.0000	45.0000	1135.8000 (32)
IW			119.7400			75.0000	8980.5000 (32c)
Internal Floor 1			42.5600			18.0000	766.0800 (32d)
Internal Ceiling 1			42.5600			9.0000	383.0400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21446.5300 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				251.9564 (35)
List of Thermal Bridges				
K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	10.5100	0.0380	0.3994	
E3 Sill	10.5100	0.0160	0.1682	
E4 Jamb	19.6000	0.0140	0.2744	
E5 Ground floor (normal)	26.5800	0.0790	2.0998	
E6 Intermediate floor within a dwelling	26.5800	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.1230	0.0000	
E24 Eaves (insulation at ceiling level - inverted)	0.0000	0.0000	0.0000	
E11 Eaves (insulation at rafter level)	15.8200	-0.0060	-0.0949	
E12 Gable (insulation at ceiling level)	0.0000	0.0730	0.0000	
E13 Gable (insulation at rafter level)	13.6500	0.0730	0.9964	
E14 Flat roof	0.0000	0.0620	0.0000	
E16 Corner (normal)	13.2000	0.0570	0.7524	
E17 Corner (inverted - internal area greater than external area)	0.0000	-0.1100	-0.0000	
E18 Corner (inverted - dwellings)	4.4000	0.0430	0.1892	
E19 Steel lintel with perforated steel base plate	0.0000	0.0000	0.0000	
E21 Exposed floor (inverted)	0.0000	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	0.0000	0.0980	0.0000	
E15 Flat roof with parapet	0.0000	0.0000	0.0000	
E20 Exposed floor (normal)	0.0000	0.1430	0.0000	
R4 Ridge (vaulted ceiling)	7.9100	0.1200	0.9492	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)												5.7341 (36)
Point Thermal bridges												(36a) = 0.0000
Total fabric heat loss												(33) + (36) + (36a) = 50.7442 (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	19.5893	19.3681	19.1468	18.0405	17.8192	16.7129	16.7129	16.4917	17.1555	17.8192	18.2618	18.7043 (38)
Average = Sum(39)m / 12 =	70.3335	70.1122	69.8910	68.7847	68.5634	67.4571	67.4571	67.2359	67.8996	68.5634	69.0059	69.4485 (39)
												68.7294
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8263	0.8237	0.8211	0.8081	0.8055	0.7925	0.7925	0.7899	0.7977	0.8055	0.8107	0.8159 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5529 (42)
Hot water usage for mixer showers												
	67.0229	66.0157	64.5480	61.7398	59.6674	57.3563	56.0426	57.4992	59.0959	61.5774	64.4459	66.7662 (42a)
Hot water usage for baths												
	28.9453	28.5154	27.9100	26.7939	25.9581	25.0314	24.5308	25.1319	25.7864	26.7781	27.9172	28.8474 (42b)
Hot water usage for other uses												
	40.7739	39.2912	37.8085	36.3259	34.8432	33.3605	33.3605	34.8432	36.3259	37.8085	39.2912	40.7739 (42c)
Average daily hot water use (litres/day)												125.6970 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	136.7422	133.8224	130.2666	124.8595	120.4686	115.7481	113.9339	117.4743	121.2082	126.1640	131.6544	136.3875 (44)
Energy conte	216.5661	190.5613	200.2149	170.9264	162.1740	142.3258	137.7931	145.4577	149.4619	171.2034	187.5658	213.5499 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	32.4849	28.5842	30.0322	25.6390	24.3261	21.3489	20.6690	21.8187	22.4193	25.6805	28.1349	32.0325 (46)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7614 (55)
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												
	263.4319	232.8917	247.0807	216.2804	209.0398	187.6798	184.6589	192.3235	194.8159	218.0692	232.9198	260.4157 (62)
WWHRS	-59.7207	-52.8175	-55.3074	-45.7968	-42.6809	-36.5224	-34.2339	-36.4043	-37.7875	-44.5472	-50.4666	-58.6148 (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												
	203.7112	180.0742	191.7733	170.4837	166.3588	151.1574	150.4250	155.9192	157.0284	173.5219	182.4532	201.8009 (64)
12Total per year (kWh/year)												2084.7071 (64)
Electric shower(s)												2085 (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												
	109.5009	97.2259	104.0641	93.1162	91.4155	83.6065	83.3089	85.8573	85.9793	94.4178	98.6488	108.4980 (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	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	118.4202	131.1081	118.4202	122.3675	118.4202	122.3675	118.4202	118.4202	122.3675	118.4202	122.3675	118.4202 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	229.8082	232.1929	226.1836	213.3904	197.2413	182.0634	171.9237	169.5390	175.5483	188.3415	204.4906	219.6685 (68)
Pumps, fans	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643 (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)	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147 (71)
Total internal gains	147.1786	144.6815	139.8711	129.3281	122.8703	116.1202	111.9743	115.3996	119.4157	126.9056	137.0123	145.8306 (72)
	556.7001	569.2755	545.7679	526.3791	499.8248	481.8442	463.6112	464.6519	478.6246	494.9603	525.1634	545.2123 (73)

FULL SAP Calculation Printout

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	84.7017	84.9690	85.2380	86.6090	86.8884	88.3134	88.3134	88.6040	87.7379	86.8884	86.3313	85.7812
alpha	6.6468	6.6646	6.6825	6.7739	6.7926	6.8876	6.8876	6.9069	6.8492	6.7926	6.7554	6.7187
util living area	0.9853	0.9602	0.9062	0.7744	0.5977	0.4161	0.2980	0.3277	0.5216	0.8188	0.9613	0.9888 (86)
Living	20.4834	20.6319	20.7780	20.9031	20.9457	20.9543	20.9548	20.9549	20.9519	20.8932	20.6811	20.4592
Non living	19.6333	19.8187	19.9944	20.1413	20.1835	20.2016	20.2019	20.2043	20.1955	20.1365	19.8914	19.6105
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	20.7357	20.6319	20.7780	20.9031	20.9457	20.9543	20.9548	20.9549	20.9519	20.8932	20.6811	20.5348 (87)
Th 2	20.2306	20.2329	20.2351	20.2463	20.2486	20.2598	20.2598	20.2621	20.2553	20.2486	20.2441	20.2396 (88)
util rest of house	0.9813	0.9502	0.8857	0.7380	0.5521	0.3683	0.2479	0.2752	0.4666	0.7785	0.9499	0.9856 (89)
MIT 2	19.9925	19.8187	19.9944	20.1413	20.1835	20.2016	20.2019	20.2043	20.1955	20.1365	19.8914	19.7239 (90)
Living area fraction									fLA = Living area / (4) =			0.3622 (91)
MIT	20.2617	20.1132	20.2782	20.4172	20.4596	20.4742	20.4746	20.4762	20.4695	20.4105	20.1774	20.0176 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2617	20.1132	20.2782	20.4172	20.4596	20.4742	20.4746	20.4762	20.4695	20.4105	20.1774	20.0176 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9815	0.9485	0.8870	0.7465	0.5651	0.3821	0.2625	0.2904	0.4825	0.7877	0.9488	0.9845 (94)
Useful gains	700.6321	796.7595	819.8072	753.1753	594.8113	395.9308	261.3506	274.0265	430.9252	627.2839	677.3842	668.8340 (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	1122.6409	1066.6331	962.9745	792.2088	600.5876	396.2573	261.3698	274.0646	432.4849	672.6439	902.4195	1098.5087 (97)
Space heating kWh	313.9746	181.3551	106.5164	28.1042	4.2975	0.0000	0.0000	0.0000	0.0000	33.7479	162.0254	319.6780 (98a)
Space heating requirement - total per year (kWh/year)												1149.6990
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	313.9746	181.3551	106.5164	28.1042	4.2975	0.0000	0.0000	0.0000	0.0000	33.7479	162.0254	319.6780 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1149.6990
Space heating per m2										(98c) / (4) =		13.5068 (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 %)

310.6015 (206)

Efficiency of main space heating system 2 (in %)

0.0000 (207)

Efficiency of secondary/supplementary heating system, %

0.0000 (208)

[illegible]

(233b)m	-34.8450	-78.8828	-168.8496	-269.0004	-364.1514	-368.2540	-362.0729	-301.2355	-213.8513	-119.1457	-48.6166	-27.0144	(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												370.1524	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												279.7750	
Water heating fuel used												745.1370	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans													
Database: in-use factor = 1.4000, SFP = 1.0780)													
(SFP = 1.0780)													
Total electricity for the above, kWh/year												305.0540	(230a)
Electricity for lighting (calculated in Appendix L)												203.5010	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3622.7372	(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												-1998.8928	(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	370.1524	0.1585	58.6735	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	745.1370	0.1406	104.7971	(264)
Space and water heating			163.4706	(265)
Pumps, fans and electric keep-hot	305.0540	0.1387	42.3147	(267)
Energy for lighting	203.5010	0.1443	29.3715	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1266.8176	0.1350	-171.0666	
PV Unit electricity exported	-2355.9196	0.1245	-293.3630	
Total			-464.4296	(269)
Total CO2, kg/year			-229.2727	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-2.6900	(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	370.1524	1.5867	587.3278	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	745.1370	1.5200	1132.6288	(278)
Space and water heating			1719.9567	(279)
Pumps, fans and electric keep-hot	305.0540	1.5128	461.4857	(281)
Energy for lighting	203.5010	1.5338	312.1366	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1266.8176	1.4991	-1899.0885	
PV Unit electricity exported	-2355.9196	0.4570	-1076.7571	
Total			-2975.8456	(283)
Total Primary energy kWh/year			-482.2667	(286)
Dwelling Primary energy Rate (DPER)			-5.6700	(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				
Ground floor	42.5600 (1b)	x 2.3500 (2b)	= 100.0160 (1b) - (3b)	
First floor	42.5600 (1c)	x 3.1000 (2c)	= 131.9360 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1200		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 231.9520 (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	3 * 10 =	30.0000 (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) = 30.0000 / (5) = 0.1293 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3793 (18)
Number of sides sheltered 1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3509 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	1.1750	1.1500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22)
Adj infilt rate													(22a)
Effective ac	0.4474	0.4386	0.4298	0.3860	0.3772	0.3333	0.3333	0.3246	0.3509	0.3772	0.3947	0.4123	(22b)
	0.6001	0.5962	0.5924	0.5745	0.5711	0.5556	0.5556	0.5527	0.5616	0.5711	0.5779	0.5850	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			1.9700	1.0000	1.9700		(26)
TER Opening Type			17.4800	1.1450	20.0153		(27)
GF			42.5600	0.1300	5.5328		(28a)
EW	103.0100	19.4500	83.5600	0.1800	15.0408		(29a)
PR	53.9900		53.9900	0.1100	5.9389		(30)
Total net area of external elements Aum(A, m2)			199.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.4978		(33)
Main dwelling							
PW			25.2400	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 251.9564 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.5100	0.0500	0.5255
E3 Sill	10.5100	0.0500	0.5255
E4 Jamb	19.6000	0.0500	0.9800
E5 Ground floor (normal)	26.5800	0.1600	4.2528
E6 Intermediate floor within a dwelling	26.5800	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E24 Eaves (insulation at ceiling level - inverted)	0.0000	0.2400	0.0000
E11 Eaves (insulation at rafter level)	15.8200	0.0400	0.6328
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E13 Gable (insulation at rafter level)	13.6500	0.0800	1.0920
E14 Flat roof	0.0000	0.0800	0.0000
E16 Corner (normal)	13.2000	0.0900	1.1880
E17 Corner (inverted - internal area greater than external area)	0.0000	-0.0900	-0.0000
E18 Party wall between dwellings	4.4000	0.0600	0.2640
E1 Steel lintel with perforated steel base plate	0.0000	0.0500	0.0000
E21 Exposed floor (inverted)	0.0000	0.3200	0.0000
E7 Party floor between dwellings (in blocks of flats)	0.0000	0.0700	0.0000
E15 Flat roof with parapet	0.0000	0.5600	0.0000
E20 Exposed floor (normal)	0.0000	0.3200	0.0000
R4 Ridge (vaulted ceiling)	7.9100	0.0800	0.6328

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.0934 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 58.5912 (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	
	45.9322	45.6348	45.3432	43.9737	43.7175	42.5248	42.5248	42.3039	42.9842	43.7175	44.2359	44.7777	(38)
Heat transfer coeff	104.5234	104.2259	103.9344	102.5649	102.3087	101.1159	101.1159	100.8951	101.5754	102.3087	102.8270	103.3689	(39)
Average = Sum(39)m / 12 =												102.5637	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2280	1.2245	1.2210	1.2049	1.2019	1.1879	1.1879	1.1853	1.1933	1.2019	1.2080	1.2144	(40)
HLP (average)												1.2049	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5529 (42)

Hot water usage for mixer showers 66.7662 (42a)

Hot water usage for baths 28.8474 (42b)

Hot water usage for other uses 40.7739 (42c)

Average daily hot water use (litres/day) 125.6970 (43)

Daily hot water use 136.7422 (44)

Energy conte 190.5613 (45)

Energy content (annual) 2087.8002

Distribution loss (46)m = 0.15 x (45)m 32.4849 (46)

Water storage loss: 210.0000 (47)

Store volume 1.7016 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 0.9188 (55)

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

Total storage loss 28.4842 (56)

If cylinder contains dedicated solar storage 28.4842 (57)

Primary loss 23.2624 (59)

Combi loss 0.0000 (61)

Total heat required for water heating calculated for each month												
WWHRS	268.3127	237.3001	251.9615	221.0038	213.9205	192.4031	189.5397	197.2043	199.5392	222.9499	237.6432	265.2965 (62)
PV diverter	-30.6401	-27.0983	-28.3758	-23.4963	-21.8977	-18.7380	-17.5639	-18.6775	-19.3871	-22.8552	-25.8922	-30.0727 (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	237.6726	210.2018	223.5857	197.5075	192.0228	173.6651	171.9758	178.5268	180.1521	200.0947	211.7509	235.2238 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2412.3797 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	113.4055	100.7527	107.9687	96.8949	95.3201	87.3852	87.2135	89.7620	89.7579	98.3224	102.4275	112.4026 (65)

Table 5a Calculation Summary

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	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.4338	128.9089	116.4338	120.3150	116.4338	120.3150	116.4338	116.4338	120.3150	116.4338	120.3150	116.4338 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	229.8082	232.1929	226.1836	213.3904	197.2413	182.0634	171.9237	169.5390	175.5483	188.3415	204.4906	219.6685 (68)
Pumps, fans	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147 (71)
Total internal gains	152.4268	149.9296	145.1193	134.5763	128.1184	121.3683	117.2224	120.6478	124.6638	132.1537	142.2604	151.0788 (72)
	562.9619	575.3245	552.0297	532.5747	506.0866	485.0398	466.8730	467.9137	481.8201	501.2221	531.3590	551.4741 (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	
Southeast	12.0000		36.7938		0.6300		0.7000		0.7700		134.9361 (77)	
Southwest	2.5500		36.7938		0.6300		0.7000		0.7700		28.6739 (79)	
Northwest	2.9300		11.2829		0.6300		0.7000		0.7700		10.1033 (81)	
Solar gains	173.7133	299.2539	418.3660	533.3168	610.9967	612.5770	588.0932	529.2234	458.0310	333.1427	208.6796	148.2669 (83)
Total gains	736.6751	874.5783	970.3957	1065.8915	1117.0833	1097.6167	1054.9662	997.1371	939.8511	834.3648	740.0386	699.7410 (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	56.9956	57.1582	57.3186	58.0839	58.2294	58.9162	58.9162	59.0452	58.6497	58.2294	57.9358	57.6321
alpha	4.7997	4.8105	4.8212	4.8723	4.8820	4.9277	4.9277	4.9363	4.9100	4.8820	4.8624	4.8421
util living area	0.9907	0.9787	0.9538	0.8862	0.7573	0.5709	0.4182	0.4597	0.6912	0.9134	0.9799	0.9926 (86)
MIT	19.7464	19.9847	20.2814	20.6326	20.8692	20.9744	20.9954	20.9928	20.9364	20.6257	20.1279	19.7108 (87)
Th 2	19.8977	19.9005	19.9032	19.9160	19.9185	19.9297	19.9297	19.9318	19.9253	19.9185	19.9136	19.9085 (88)
util rest of house	0.9878	0.9721	0.9395	0.8529	0.6954	0.4834	0.3184	0.3559	0.6039	0.8802	0.9725	0.9903 (89)
MIT 2	18.4682	18.7702	19.1400	19.5651	19.8166	19.9163	19.9284	19.9295	19.8868	19.5701	18.9634	18.4307 (90)
Living area fraction	18.9311	19.2101	19.5534	19.9517	20.1979	20.2996	20.3148	20.3146	20.2670	19.9524	19.3851	0.3622 (91)
MIT	18.9311	19.2101	19.5534	19.9517	20.1979	20.2996	20.3148	20.3146	20.2670	19.9524	19.3851	18.8944 (92)
Temperature adjustment	18.9311	19.2101	19.5534	19.9517	20.1979	20.2996	20.3148	20.3146	20.2670	19.9524	19.3851	0.0000 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9842	0.9668	0.9340	0.8542	0.7125	0.5144	0.3546	0.3936	0.6331	0.8814	0.9678	0.9872 (94)
Useful gains	725.0436	845.5242	906.3727	910.4610	795.8777	564.6174	374.1354	392.4891	595.0629	735.4408	716.2401	690.7952 (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	1529.2961	1491.4815	1356.6981	1133.5170	869.4064	576.3181	375.6302	394.9662	626.4114	956.8343	1263.2447	1518.9427 (97)
Space heating kWh	598.3638	434.0833	335.0421	160.6004	54.7054	0.0000	0.0000	0.0000	0.0000	164.7168	393.8433	616.1417 (98a)
Space heating requirement - total per year (kWh/year)												2757.4968
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	598.3638	434.0833	335.0421	160.6004	54.7054	0.0000	0.0000	0.0000	0.0000	164.7168	393.8433	616.1417 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2757.4968
Space heating per m2												(98c) / (4) = 32.3954 (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	598.3638	434.0833	335.0421	160.6004	54.7054	0.0000	0.0000	0.0000	0.0000	164.7168	393.8433	616.1417	(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)	648.2815	470.2961	362.9926	173.9982	59.2691	0.0000	0.0000	0.0000	0.0000	178.4580	426.6991	667.5425	(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													
Efficiency of water heater (217)m	86.0413	85.6485	84.9647	83.5999	81.6345	79.8000	79.8000	79.8000	79.8000	83.6269	85.4310	86.1166	(217)
Fuel for water heating, kWh/month	276.2308	245.4238	263.1512	236.2533	235.2227	217.6254	215.5085	223.7179	225.7545	239.2708	247.8619	273.1458	(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	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	24.1926	19.4082	17.4750	12.8029	9.8893	8.0797	9.0214	11.7263	15.2314	19.9844	22.5723	24.8650	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-70.2001	-90.5772	-119.3046	-122.5981	-123.2628	-112.0122	-110.5601	-108.4882	-103.9479	-97.5866	-74.0955	-61.7245	(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	-69.8650	-141.9765	-273.5127	-398.9431	-516.6399	-515.2623	-509.2103	-435.9875	-326.1954	-198.8327	-91.8130	-55.6388	(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												2987.5372	(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												2899.1667	(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)												195.2485	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-4728.2352	(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												1439.7173	(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	2987.5372	0.2100	627.3828 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2899.1667	0.2100	608.8250 (264)
Space and water heating			1236.2078 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	195.2485	0.1443	28.1804 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1194.3579	0.1365	-163.0581
PV Unit electricity exported	-3533.8773	0.1268	-448.0283
Total			-611.0863 (269)
Total CO2, kg/year			665.2311 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.8200 (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	2987.5372	1.1300	3375.9170 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2899.1667	1.1300	3276.0584 (278)
Space and water heating			6651.9754 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	195.2485	1.5338	299.4787 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1194.3579	1.5047	-1797.1175
PV Unit electricity exported	-3533.8773	0.4654	-1644.7081
Total			-3441.8256 (283)
Total Primary energy kWh/year			3639.7293 (286)
Target Primary Energy Rate (TPER)			42.7600 (287)

Property Reference	Unit 02		Issued on Date	25/02/2025	
Assessment Reference	Sandy Lane	Prop Type Ref	Sandy Lane		
Property					
SAP Rating	104 A	DER	-2.70	TER	8.05
Environmental	102 A	% DER < TER			133.54
CO ₂ Emissions (t/year)	-0.24	DFEE	34.24	TFEE	40.74
Compliance Check	See BREL	% DFEE < TFEE			15.96
% DPER < TPER	112.59	DPER	-5.54	TPER	44.03
Client	Mr. Neil Ingham		Assessor ID	AV35-0001	

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	42.5600 (1b)	x 2.3500 (2b)	= 100.0160 (1b) - (3b)
First floor	42.5600 (1c)	x 3.1000 (2c)	= 131.9360 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 231.9520 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.5000 (17)
Infiltration rate	0.1250 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1156 (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	0.1474	0.1445	0.1416	0.1272	0.1243	0.1098	0.1098	0.1070	0.1156	0.1243	0.1301	0.1359 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												78.3000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2559	0.2530	0.2501	0.2357	0.2328	0.2183	0.2183	0.2155	0.2241	0.2328	0.2386	0.2444 (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							
DOOR			1.9700	1.0000	1.9700		(26)
G			17.4800	0.9615	16.8077		(27)
GF			42.5600	0.1500	6.3840	110.0000	4681.6000 (28a)
EW	103.0100	19.4500	83.5600	0.1600	13.3696	60.0000	5013.6000 (29a)
PR	53.9900		53.9900	0.1200	6.4788	9.0000	485.9100 (30)
Total net area of external elements Aum(A, m ²)			199.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.0101		(33)
Main dwelling							
PW			25.2400	0.0000	0.0000	45.0000	1135.8000 (32)
IW			119.7400			75.0000	8980.5000 (32c)
Internal Floor 1			42.5600			18.0000	766.0800 (32d)
Internal Ceiling 1			42.5600			9.0000	383.0400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21446.5300 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				251.9564 (35)
List of Thermal Bridges				
K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	10.5100	0.0380	0.3994	
E3 Sill	10.5100	0.0160	0.1682	
E4 Jamb	19.6000	0.0140	0.2744	
E5 Ground floor (normal)	26.5800	0.0790	2.0998	
E6 Intermediate floor within a dwelling	26.5800	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.1230	0.0000	
E24 Eaves (insulation at ceiling level - inverted)	0.0000	0.0000	0.0000	
E11 Eaves (insulation at rafter level)	15.8200	-0.0060	-0.0949	
E12 Gable (insulation at ceiling level)	0.0000	0.0730	0.0000	
E13 Gable (insulation at rafter level)	13.6500	0.0730	0.9964	
E14 Flat roof	0.0000	0.0620	0.0000	
E16 Corner (normal)	13.2000	0.0570	0.7524	
E17 Corner (inverted - internal area greater than external area)	0.0000	-0.1100	-0.0000	
E18 Corner (inverted - dwellings)	4.4000	0.0430	0.1892	
E19 Steel lintel with perforated steel base plate	0.0000	0.0000	0.0000	
E21 Exposed floor (inverted)	0.0000	0.0000	0.0000	
E7 Party floor between dwellings (in blocks of flats)	0.0000	0.0980	0.0000	
E15 Flat roof with parapet	0.0000	0.0000	0.0000	
E20 Exposed floor (normal)	0.0000	0.1430	0.0000	
R4 Ridge (vaulted ceiling)	7.9100	0.1200	0.9492	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)												5.7341 (36)
Point Thermal bridges												(36a) = 0.0000
Total fabric heat loss												(33) + (36) + (36a) = 50.7442 (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	19.5893	19.3681	19.1468	18.0405	17.8192	16.7129	16.7129	16.4917	17.1555	17.8192	18.2618	18.7043 (38)
Average = Sum(39)m / 12 =	70.3335	70.1122	69.8910	68.7847	68.5634	67.4571	67.4571	67.2359	67.8996	68.5634	69.0059	69.4485 (39)
												68.7294
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8263	0.8237	0.8211	0.8081	0.8055	0.7925	0.7925	0.7899	0.7977	0.8055	0.8107	0.8159 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5529 (42)
Hot water usage for mixer showers												
	67.0229	66.0157	64.5480	61.7398	59.6674	57.3563	56.0426	57.4992	59.0959	61.5774	64.4459	66.7662 (42a)
Hot water usage for baths												
	28.9453	28.5154	27.9100	26.7939	25.9581	25.0314	24.5308	25.1319	25.7864	26.7781	27.9172	28.8474 (42b)
Hot water usage for other uses												
	40.7739	39.2912	37.8085	36.3259	34.8432	33.3605	33.3605	34.8432	36.3259	37.8085	39.2912	40.7739 (42c)
Average daily hot water use (litres/day)												125.6970 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	136.7422	133.8224	130.2666	124.8595	120.4686	115.7481	113.9339	117.4743	121.2082	126.1640	131.6544	136.3875 (44)
Energy conte	216.5661	190.5613	200.2149	170.9264	162.1740	142.3258	137.7931	145.4577	149.4619	171.2034	187.5658	213.5499 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	32.4849	28.5842	30.0322	25.6390	24.3261	21.3489	20.6690	21.8187	22.4193	25.6805	28.1349	32.0325 (46)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7614 (55)
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												
	263.4319	232.8917	247.0807	216.2804	209.0398	187.6798	184.6589	192.3235	194.8159	218.0692	232.9198	260.4157 (62)
WWHRS	-59.7207	-52.8175	-55.3074	-45.7968	-42.6809	-36.5224	-34.2339	-36.4043	-37.7875	-44.5472	-50.4666	-58.6148 (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												
	203.7112	180.0742	191.7733	170.4837	166.3588	151.1574	150.4250	155.9192	157.0284	173.5219	182.4532	201.8009 (64)
12Total per year (kWh/year)												2084.7071 (64)
Electric shower(s)												2085 (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												
	109.5009	97.2259	104.0641	93.1162	91.4155	83.6065	83.3089	85.8573	85.9793	94.4178	98.6488	108.4980 (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	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	118.4202	131.1081	118.4202	122.3675	118.4202	122.3675	118.4202	118.4202	122.3675	118.4202	122.3675	118.4202 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	229.8082	232.1929	226.1836	213.3904	197.2413	182.0634	171.9237	169.5390	175.5483	188.3415	204.4906	219.6685 (68)
Pumps, fans	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643 (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)	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147 (71)
Total internal gains	147.1786	144.6815	139.8711	129.3281	122.8703	116.1202	111.9743	115.3996	119.4157	126.9056	137.0123	145.8306 (72)
	556.7001	569.2755	545.7679	526.3791	499.8248	481.8442	463.6112	464.6519	478.6246	494.9603	525.1634	545.2123 (73)

[Jan]				Area	Solar flux		g	FF	Access		Gains	
				m2	Table 6a		Specific data	Specific data	factor		W	
					W/m2		or Table 6b	or Table 6c	Table 6d			
Northeast				2.5500	11.2829		0.5700	0.7000	0.7700		7.9555 (75)	
Southeast				12.0000	36.7938		0.5700	0.7000	0.7700		122.0850 (77)	
Northwest				2.9300	11.2829		0.5700	0.7000	0.7700		9.1410 (81)	
Solar gains	139.1816	242.7565	347.2340	455.5226	533.3003	539.5946	516.0025	456.4249	384.4910	272.3647	167.7416	118.4413 (83)
Total gains	695.8817	812.0320	893.0019	981.9017	1033.1251	1021.4388	979.6137	921.0768	863.1155	767.3250	692.9051	663.6536 (84)

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7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	84.7017	84.9690	85.2380	86.6090	86.8884	88.3134	88.3134	88.6040	87.7379	86.8884	86.3313	85.7812
alpha	6.6468	6.6646	6.6825	6.7739	6.7926	6.8876	6.8876	6.9069	6.8492	6.7926	6.7554	6.7187
util living area	0.9872	0.9660	0.9179	0.7894	0.6081	0.4220	0.3029	0.3357	0.5390	0.8376	0.9664	0.9901 (86)
Living	20.4670	20.6098	20.7601	20.8969	20.9448	20.9542	20.9548	20.9549	20.9513	20.8838	20.6644	20.4446
Non living	19.6127	19.7920	19.9742	20.1353	20.1828	20.2016	20.2019	20.2043	20.1952	20.1274	19.8714	19.5921
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	20.7274	20.6098	20.7601	20.8969	20.9448	20.9542	20.9548	20.9549	20.9513	20.8838	20.6644	20.5222 (87)
Th 2	20.2306	20.2329	20.2351	20.2463	20.2486	20.2598	20.2598	20.2621	20.2553	20.2486	20.2441	20.2396 (88)
util rest of house	0.9836	0.9573	0.8991	0.7535	0.5620	0.3735	0.2520	0.2819	0.4825	0.7988	0.9563	0.9873 (89)
MIT 2	19.9843	19.7920	19.9742	20.1353	20.1828	20.2016	20.2019	20.2043	20.1952	20.1274	19.8714	19.7088 (90)
Living area fraction									fLA = Living area / (4) =			0.3622 (91)
MIT	20.2534	20.0882	20.2589	20.4111	20.4588	20.4742	20.4746	20.4762	20.4690	20.4014	20.1586	20.0034 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2534	20.0882	20.2589	20.4111	20.4588	20.4742	20.4746	20.4762	20.4690	20.4014	20.1586	20.0034 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9837	0.9554	0.8997	0.7616	0.5751	0.3876	0.2668	0.2975	0.4988	0.8072	0.9550	0.9863	(94)
Useful gains	684.5464	775.8388	803.4275	747.8601	594.1312	395.8977	261.3482	274.0195	430.5483	619.3860	661.7026	654.5322	(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	1122.0604	1064.8785	961.6201	791.7894	600.5346	396.2546	261.3696	274.0640	432.4550	672.0159	901.1224	1097.5241	(97)
Space heating kWh	325.5104	194.2347	117.6953	31.6291	4.7642	0.0000	0.0000	0.0000	0.0000	39.1566	172.3823	329.5860	(98a)
Space heating requirement - total per year (kWh/year)												1214.9586	
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	325.5104	194.2347	117.6953	31.6291	4.7642	0.0000	0.0000	0.0000	0.0000	39.1566	172.3823	329.5860	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1214.9586	
Space heating per m2											(98c) / (4) =	14.2735	(99)

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 %)	310.6015	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

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(233b)m	-35.1849	-79.5743	-170.4084	-271.8925	-368.2619	-372.4216	-366.1727	-304.6883	-216.3539	-120.3903	-49.0738	-27.2886	(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												391.1631	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												279.7750	
Water heating fuel used												745.1370	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans													
Mechanical ventilation fans (SFP = 1.0780)													
Total electricity for the above, kWh/year												305.0540	(230a)
Electricity for lighting (calculated in Appendix L)												203.5010	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3655.6712	(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												-2010.8161	(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	391.1631	0.1583	61.9355 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	745.1370	0.1406	104.7971 (264)
Space and water heating			166.7326 (265)
Pumps, fans and electric keep-hot	305.0540	0.1387	42.3147 (267)
Energy for lighting	203.5010	0.1443	29.3715 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1273.9600	0.1351	-172.0838
PV Unit electricity exported	-2381.7112	0.1245	-296.5249
Total			-468.6087 (269)
Total CO2, kg/year			-230.1899 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-2.7000 (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	391.1631	1.5861	620.4173	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	745.1370	1.5200	1132.6288	(278)
Space and water heating			1753.0461	(279)
Pumps, fans and electric keep-hot	305.0540	1.5128	461.4857	(281)
Energy for lighting	203.5010	1.5338	312.1366	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1273.9600	1.4993	-1909.9944	
PV Unit electricity exported	-2381.7112	0.4570	-1088.3602	
Total			-2998.3546	(283)
Total Primary energy kWh/year			-471.6862	(286)
Dwelling Primary energy Rate (DPER)			-5.5400	(287)

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

1. Overall dwelling characteristics													
Main dwelling				Area	Storey height		Volume						
Ground floor				42.5600 (1b)	x	2.3500 (2b)	=	100.0160	(1b) - (3b)				
First floor				42.5600 (1c)	x	3.1000 (2c)	=	131.9360	(1c) - (3c)				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)				85.1200					(4)				
Dwelling volume							(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =		231.9520 (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										3 * 10 =	30.0000 (7a)		

[illegible]

Total heat required for water heating calculated for each month												
WWHRS	268.3127	237.3001	251.9615	221.0038	213.9205	192.4031	189.5397	197.2043	199.5392	222.9499	237.6432	265.2965 (62)
PV diverter	-30.6401	-27.0983	-28.3758	-23.4963	-21.8977	-18.7380	-17.5639	-18.6775	-19.3871	-22.8552	-25.8922	-30.0727 (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	237.6726	210.2018	223.5857	197.5075	192.0228	173.6651	171.9758	178.5268	180.1521	200.0947	211.7509	235.2238 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2412.3797 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	113.4055	100.7527	107.9687	96.8949	95.3201	87.3852	87.2135	89.7620	89.7579	98.3224	102.4275	112.4026 (65)

Table 5a Calculation Summary

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	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434	127.6434 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.4338	128.9089	116.4338	120.3150	116.4338	120.3150	116.4338	116.4338	120.3150	116.4338	120.3150	116.4338 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.8082	232.1929	226.1836	213.3904	197.2413	182.0634	171.9237	169.5390	175.5483	188.3415	204.4906	219.6685 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643	35.7643 (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)	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147	-102.1147 (71)
Water heating gains (Table 5)	152.4268	149.9296	145.1193	134.5763	128.1184	121.3683	117.2224	120.6478	124.6638	132.1537	142.2604	151.0788 (72)
Total internal gains	562.9619	575.3245	552.0297	532.5747	506.0866	485.0398	466.8730	467.9137	481.8201	501.2221	531.3590	551.4741 (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	
Northeast	2.5500		11.2829		0.6300		0.7000		0.7700		8.7929 (75)	
Southeast	12.0000		36.7938		0.6300		0.7000		0.7700		134.9361 (77)	
Northwest	2.9300		11.2829		0.6300		0.7000		0.7700		10.1033 (81)	
Solar gains	153.8323	268.3099	383.7849	503.4724	589.4372	596.3941	570.3185	504.4697	424.9637	301.0347	185.3987	130.9088 (83)
Total gains	716.7942	843.6343	935.8146	1036.0470	1095.5238	1081.4338	1037.1915	972.3833	906.7839	802.2568	716.7577	682.3829 (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	56.9956	57.1582	57.3186	58.0839	58.2294	58.9162	58.9162	59.0452	58.6497	58.2294	57.9358	57.6321
alpha	4.7997	4.8105	4.8212	4.8723	4.8820	4.9277	4.9277	4.9363	4.9100	4.8820	4.8624	4.8421
util living area	0.9917	0.9815	0.9594	0.8951	0.7667	0.5783	0.4251	0.4707	0.7095	0.9235	0.9823	0.9934 (86)
MIT	19.7230	19.9502	20.2471	20.6113	20.8617	20.9730	20.9951	20.9921	20.9286	20.5993	20.1017	19.6901 (87)
Th 2	19.8977	19.9005	19.9032	19.9160	19.9185	19.9297	19.9297	19.9318	19.9253	19.9185	19.9136	19.9085 (88)
util rest of house	0.9891	0.9757	0.9465	0.8636	0.7054	0.4901	0.3238	0.3648	0.6222	0.8929	0.9757	0.9912 (89)
MIT 2	18.4385	18.7273	19.0988	19.5421	19.8101	19.9155	19.9283	19.9292	19.8816	19.5414	18.9310	18.4045 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.9037	19.1702	19.5147	19.9293	20.1910	20.2985	20.3147	20.3142	20.2608	19.9246	19.3550	18.8701 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.9037	19.1702	19.5147	19.9293	20.1910	20.2985	20.3147	20.3142	20.2608	19.9246	19.3550	18.8701 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9857	0.9706	0.9409	0.8640	0.7219	0.5214	0.3606	0.4033	0.6512	0.8932	0.9712	0.9884 (94)
Useful gains	706.5660	818.8470	880.5226	895.1440	790.8632	563.8160	374.0012	392.1630	590.4530	716.5371	696.1166	674.4529 (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	1526.4325	1487.3255	1352.6758	1131.2235	868.7046	576.2113	375.6110	394.9206	625.7852	953.9837	1260.1461	1516.4374 (97)
Space heating kWh	609.9807	449.2176	351.2820	169.9772	57.9140	0.0000	0.0000	0.0000	0.0000	176.6603	406.1012	626.4365 (98a)
Space heating requirement - total per year (kWh/year)												2847.5695
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	609.9807	449.2176	351.2820	169.9772	57.9140	0.0000	0.0000	0.0000	0.0000	176.6603	406.1012	626.4365 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2847.5695
Space heating per m2												(98c) / (4) = 33.4536 (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)



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	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	3085.1241	1.1300	3486.1902 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2897.2044	1.1300	3273.8410 (278)
Space and water heating			6760.0312 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	195.2485	1.5338	299.4787 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1194.3579	1.5047	-1797.1175
PV Unit electricity exported	-3533.8773	0.4654	-1644.7081
Total			-3441.8256 (283)
Total Primary energy kWh/year			3747.7851 (286)
Target Primary Energy Rate (TPER)			44.0300 (287)