

Property Reference	Unit 4		Issued on Date	15/02/2024	
Assessment Reference	Camden High Street_Copy	Prop Type Ref			
Property					

SAP Rating	85 B	DER	12.19	TER	13.53
Environmental	93 A	% DER < TER			9.90
CO ₂ Emissions (t/year)	0.42	DFEE	24.70	TFEE	20.24
Compliance Check	See BREL	% DFEE < TFEE			-22.01
% DPER < TPER	2.57	DPER	71.19	TPER	73.06

	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 (m2)	Storey height (m)	Volume (m3)	
Ground floor	36.7500 (1b)	x 2.5400 (2b)	= 93.3450 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	36.7500			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 93.3450 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(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) =	0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498	(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) =												76.5000	(23c)
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673	(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	
G (Uw = 1.00)			4.7000	0.9615	4.5192			(27)
EW	16.0100	4.7000	11.3100	0.2600	2.9406	110.0000	1244.1000	(29a)
Corridor	13.7600		13.7600	0.1800	2.4768	190.0000	2614.4000	(29a)
Total net area of external elements Aum(A, m2)			29.7700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	9.9366			(33)
PW			35.8300	0.0000	0.0000	45.0000	1612.3500	(32)
Party Floor 1			36.0700			40.0000	1442.8000	(32d)
Party Ceiling 1			36.7500			30.0000	1102.5000	(32b)
IW			44.9500			9.0000	404.5500	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8420.7000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							229.1347	(35)
Thermal bridges (Default value 0.200 * total exposed area)							5.9540	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	15.8906	(37)

Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$

(38)m	Jan 8.6270	Feb 8.5288	Mar 8.4306	Apr 7.9397	May 7.8415	Jun 7.3506	Jul 7.3506	Aug 7.2524	Sep 7.5469	Oct 7.8415	Nov 8.0379	Dec 8.2343 (38)
Heat transfer coeff	24.5176	24.4194	24.3213	23.8303	23.7321	23.2412	23.2412	23.1430	23.4376	23.7321	23.9285	24.1249 (39)
Average = Sum(39)m / 12 =												23.8058
HLP	Jan 0.6671	Feb 0.6645	Mar 0.6618	Apr 0.6484	May 0.6458	Jun 0.6324	Jul 0.6324	Aug 0.6297	Sep 0.6378	Oct 0.6458	Nov 0.6511	Dec 0.6565 (40)
HLP (average)												0.6478
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3229 (42)
Hot water usage for mixer showers													
59.5145	58.6201	57.3168	54.8232	52.9830	50.9308	49.7643	51.0577	52.4756	54.6790	57.2262	59.2865	(42a)	
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses													
28.1777	27.1531	26.1284	25.1038	24.0791	23.0545	23.0545	24.0791	25.1038	26.1284	27.1531	28.1777	(42c)	
Average daily hot water use (litres/day)												80.4865 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
87.6922	85.7732	83.4453	79.9270	77.0621	73.9853	72.8188	75.1369	77.5794	80.8075	84.3793	87.4642	(44)	
Energy content (annual)	138.8831	122.1399	128.2523	109.4161	103.7404	90.9735	88.0680	93.0351	95.6631	109.6549	120.2138	136.9478 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1336.9881	
20.8325	18.3210	19.2378	16.4124	15.5611	13.6460	13.2102	13.9553	14.3495	16.4482	18.0321	20.5422	(46)	
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	44.6870	39.4792	42.5228	39.4161	39.2700	36.4859	37.1077	38.2889	38.2583	41.1786	41.6117	44.5708 (61)	
Total heat required for water heating calculated for each month													
183.5701	161.6191	170.7751	148.8321	143.0104	127.4594	125.1757	131.3241	133.9214	150.8335	161.8255	181.5186 (62)		
WWHRS	-45.9478	-40.6366	-42.5523	-35.2350	-32.8377	-28.0995	-26.3388	-28.0086	-29.0728	-34.2736	-38.8279	-45.0969 (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	(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	(63c)	
FGHRS	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													
137.6223	120.9825	128.2228	113.5972	110.1727	99.3599	98.8369	103.3154	104.8486	116.5599	122.9976	136.4218 (64)		
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			1392.9376 (64)	
Electric shower(s)												1393 (64)	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month													
57.3504	50.4813	53.2746	46.2349	44.3112	39.3702	38.5595	40.5064	41.3726	46.7549	50.3740	56.6779 (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	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	64.5021	71.4130	64.5021	66.6522	64.5021	66.6522	64.5021	64.5021	66.6522	64.5021	66.6522	64.5021
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	113.4551	114.6324	111.6657	105.3497	97.3770	89.8838	84.8778	83.7005	86.6673	92.9832	100.9560	108.4492
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.6145	29.6145	29.6145	29.6145	29.6145	29.6145	29.6145	29.6145	29.6145	29.6145	29.6145	29.6145
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
Losses e.g. evaporation (negative values) (Table 5)	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156
Water heating gains (Table 5)	77.0838	75.1210	71.6056	64.2151	59.5581	54.6808	51.8273	54.4441	57.4619	62.8426	69.9639	76.1799
Total internal gains	300.8844	307.0098	293.6167	282.0603	267.2805	254.0601	244.0506	245.4901	253.6247	266.1713	283.4154	294.9745

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			
East				4.7000	19.6403	0.6300	0.7000	0.7700	28.2109 (76)			
Solar gains	28.2109	55.1865	90.8843	132.5494	162.4442	166.2906	158.3154	135.9906	105.7022	65.4834	35.1757	23.1993 (83)
Total gains	329.0953	362.1963	384.5010	414.6097	429.7247	420.3506	402.3660	381.4807	359.3269	331.6548	318.5910	318.1738 (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	95.4041	95.7877	96.1744	98.1558	98.5619	100.6438	100.6438	101.0708	99.8006	98.5619	97.7530	96.9573
alpha	7.3603	7.3858	7.4116	7.5437	7.5708	7.7096	7.7096	7.7381	7.6534	7.5708	7.5169	7.4638
util living area												
	0.9531	0.9136	0.8397	0.6811	0.5120	0.3538	0.2541	0.2791	0.4495	0.7221	0.9007	0.9595 (86)
MIT	20.7101	20.7968	20.8809	20.9433	20.9571	20.9596	20.9596	20.9598	20.9588	20.9399	20.8401	20.6991 (87)
Th 2	20.3699	20.3723	20.3747	20.3866	20.3890	20.4009	20.4009	20.4033	20.3961	20.3890	20.3842	20.3795 (88)
util rest of house												

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

[illegible]

[illegible]

adjusted MIT 20.1065 20.2660 20.4606 20.6666 20.7429 20.7634 20.7646 20.7653 20.7571 20.6594 20.3848 20.0979 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9711	0.9491	0.9043	0.7846	0.6134	0.4256	0.3010	0.3315	0.5390	0.8179	0.9418	0.9749	(94)
Useful gains	317.7790	341.7973	346.0110	323.7684	262.4374	178.0625	120.5314	125.8271	192.6494	269.7315	298.2279	308.3705	(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	485.0019	469.1590	424.1765	349.3121	267.2772	178.4253	120.5611	125.8821	194.2752	297.3186	396.1573	478.4644	(97)
Space heating kWh	124.4138	85.5870	58.1552	18.3915	3.6008	0.0000	0.0000	0.0000	0.0000	20.5248	70.5092	126.5498	(98a)
Solar heating contribution - total per year (kWh/year)	124.4138	85.5870	58.1552	18.3915	3.6008	0.0000	0.0000	0.0000	0.0000	20.5248	70.5092	126.5498	(98b)
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	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	124.4138	85.5870	58.1552	18.3915	3.6008	0.0000	0.0000	0.0000	0.0000	20.5248	70.5092	126.5498	(98d)
Space heating per m2										(98c) / (4) =		13.8158	(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 %)													92.4000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	124.4138	85.5870	58.1552	18.3915	3.6008	0.0000	0.0000	0.0000	0.0000	20.5248	70.5092	126.5498	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	134.6470	92.6267	62.9385	19.9042	3.8970	0.0000	0.0000	0.0000	0.0000	22.2130	76.3086	136.9587	(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	156.3625	137.5565	145.5781	127.9680	123.5659	110.8205	109.5794	114.7390	116.7062	130.5387	138.8339	154.8149	(64)
Efficiency of water heater (217)m	83.8962	83.3943	82.5803	81.2881	80.5206	80.3000	80.3000	80.3000	80.3000	81.3695	83.0045	80.3000	(216)
Fuel for water heating, kWh/month	186.3761	164.9472	176.2866	157.4252	153.4588	138.0082	136.4625	142.8879	145.3378	160.4271	167.2607	184.4071	(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	13.0127	10.4392	9.3994	6.8864	5.3192	4.3459	4.8524	6.3073	8.1926	10.7491	12.1411	13.3743	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-8.3175	-12.5685	-19.3539	-23.3757	-26.6719	-25.4643	-25.1831	-23.0536	-19.5453	-15.0861	-9.4472	-7.0980	(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	-2.4443	-5.2997	-10.8281	-16.6967	-22.4948	-22.7321	-22.4367	-18.7810	-13.5046	-7.6892	-3.3003	-1.9196	(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												549.4936	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												1913.2853	(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)												105.0196	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-363.2922	(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												2290.5063	(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	549.4936	0.2100	115.3937	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1913.2853	0.2100	401.7899	(264)
Space and water heating			517.1836	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	105.0196	0.1443	15.1576	(268)

Energy saving/generation technologies			
PV Unit electricity used in dwelling	-215.1651	0.1331	-28.6441
PV Unit electricity exported	-148.1271	0.1252	-18.5403
Total			-47.1844 (269)
Total CO2, kg/year			497.0860 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP			

	Energy	Primary energy factor	Primary energy
	kWh/year	kg CO2/kWh	kWh/year
Space heating - main system 1	549.4936	1.1300	620.9278 (275)
Water heating (other than space heating)			0.0000 (473)
Space and water heating	1913.2853	1.1300	2162.0124 (278)
Pumps, fans and electric keep-hot	86.0000	1.5128	2782.9401 (279)
Energy for lighting	105.0196	1.5338	130.1008 (281)
			161.0825 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-215.1651	1.4919	-321.0106
PV Unit electricity exported	-148.1271	0.4594	-68.0508
Total			-389.0614 (283)
Total Primary energy kWh/year			2685.0621 (286)
Target Primary Energy Rate (TPER)			73.0600 (287)

Property Reference	Unit 5		Issued on Date	15/02/2024	
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Property					

SAP Rating	85 B	DER	12.36	TER	13.58
Environmental	93 A	% DER < TER		8.98	
CO ₂ Emissions (t/year)	0.42	DFEE	25.14	TFEE	18.47
Compliance Check	See BREL	% DFEE < TFEE		-36.08	
% DPER < TPER	1.78	DPER	72.37	TPER	73.69

Assessor Name	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)
Ground floor	36.0700 (1b)	2.5400 (2b)	91.6178 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	36.0700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	91.6178 (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	3.0000 (17)
Infiltration rate	0.1500 (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) = 0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (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) =												76.5000 (23c)
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673 (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
G (Uw = 1.00)			2.3400	0.9615	2.2500		(27)
EW	16.1200	2.3400	13.7800	0.2600	3.5828	110.0000	1515.8000 (29a)
Corridor	16.3600		16.3600	0.1800	2.9448	190.0000	3108.4000 (29a)
Total net area of external elements Aum(A, m ²)			32.4800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		8.7776		(33)
PW			41.3500	0.0000	0.0000	45.0000	1860.7500 (32)
Party Floor 1			36.0700			40.0000	1442.8000 (32d)
Party Ceiling 1			36.0700			30.0000	1082.1000 (32b)
IW			32.3600			9.0000	291.2400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		9301.0900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							257.8622 (35)
Thermal bridges (Default value 0.200 * total exposed area)							6.4960 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		15.2736 (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	8.4674	8.3710	8.2746	7.7928	7.6964	7.2146	7.2146	7.1182	7.4073	7.6964	7.8892	8.0819 (38)
Average = Sum(39)m / 12 =	23.7410	23.6446	23.5482	23.0664	22.9700	22.4882	22.4882	22.3918	22.6809	22.9700	23.1628	23.3555 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6582	0.6555	0.6528	0.6395	0.6368	0.6235	0.6235	0.6208	0.6288	0.6368	0.6422	0.6475 (40)
HLP (average)												0.6388
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Final SAP Calculation Summary



11. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.3063 (42)
Hot water usage for mixer showers	59.1549	58.2659	56.9705	54.4920	52.6628	50.6230	49.4636	50.7492	52.1585	54.3486	56.8804	58.9283 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	28.0073	26.9889	25.9704	24.9520	23.9335	22.9151	22.9151	23.9335	24.9520	25.9704	26.9889	28.0073 (42c)
Average daily hot water use (litres/day)												80.0001 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	87.1622	85.2548	82.9409	79.4439	76.5964	73.5381	72.3787	74.6827	77.1105	80.3191	83.8693	86.9356 (44)
Energy content (annual)	138.0437	121.4017	127.4771	108.7548	103.1134	90.4237	87.5357	92.4728	95.0849	108.9922	119.4872	136.1201 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1328.9074
Water storage loss:	20.7066	18.2103	19.1216	16.3132	15.4670	13.5636	13.1304	13.8709	14.2627	16.3488	17.9231	20.4180 (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	44.4169	39.2406	42.2658	39.1778	39.0327	36.2654	36.8834	38.0575	38.0271	40.9297	41.3602	44.3014 (61)
Total heat required for water heating calculated for each month	182.4606	160.6423	169.7429	147.9326	142.1461	126.6891	124.4191	130.5303	133.1120	149.9219	160.8474	180.4216 (62)
WWHRS	-45.6701	-40.3910	-42.2952	-35.0221	-32.6393	-27.9297	-26.1796	-27.8394	-28.8971	-34.0665	-38.5933	-44.8244 (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	136.7905	120.2512	127.4478	112.9105	109.5068	98.7594	98.2395	102.6909	104.2149	115.8554	122.2541	135.5972 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 1384.5181 (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	57.0038	50.1762	52.9526	45.9554	44.0434	39.1322	38.3265	40.2616	41.1225	46.4723	50.0695	56.3353 (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	65.3125	65.3125	65.3125	65.3125	65.3125	65.3125	65.3125	65.3125	65.3125	65.3125	65.3125	65.3125 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	72.0332	79.7510	72.0332	74.4343	72.0332	74.4343	72.0332	72.0332	74.4343	72.0332	74.4343	72.0332 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	111.7916	112.9516	110.0283	103.8050	95.9492	88.5658	83.6333	82.4733	85.3965	91.6199	99.4757	106.8590 (68)
Pumps, fans	29.5313	29.5313	29.5313	29.5313	29.5313	29.5313	29.5313	29.5313	29.5313	29.5313	29.5313	29.5313 (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)	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500	-52.2500 (71)
Total internal gains	76.6179	74.6670	71.1728	63.8270	59.1981	54.3503	51.5141	54.1150	57.1146	62.4628	69.5410	75.7195 (72)
	306.0365	312.9634	298.8281	287.6600	272.7742	259.9442	249.7743	251.2152	259.5392	271.7096	289.0447	300.2055 (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			

West		2.3400				19.6403		0.6300		0.7000		0.7700		14.0454 (80)	

Solar gains	14.0454	27.4758	45.2488	65.9927	80.8765	82.7915	78.8209	67.7060	52.6262	32.6024	17.5130	11.5503	(83)		
Total gains	320.0819	340.4392	344.0769	353.6527	353.6507	342.7357	328.5952	318.9212	312.1654	304.3120	306.5577	311.7557	(84)		

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)												21.0000 (85)
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	108.8260	109.2696	109.7168	112.0087	112.4787	114.8887	114.8887	115.3832	113.9124	112.4787	111.5427	110.6222
util living area	8.2551	8.2846	8.3145	8.4672	8.4986	8.6592	8.6592	8.6922	8.5942	8.4986	8.4362	8.3748
MIT	0.9618	0.9351	0.8892	0.7641	0.6007	0.4198	0.3011	0.3230	0.5007	0.7610	0.9146	0.9661 (86)
Th 2	20.7511	20.8138	20.8779	20.9420	20.9605	20.9639	20.9640	20.9642	20.9633	20.9459	20.8637	20.7451 (87)
util rest of house	20.3779	20.3803	20.3827	20.3946	20.3970	20.4089	20.4089	20.4113	20.4041	20.3970	20.3922	20.3874 (88)

	0.9531	0.9217	0.8684	0.7322	0.5630	0.3811	0.2607	0.2816	0.4577	0.7238	0.8959	0.9583 (89)
MIT 2	20.0951	20.1722	20.2486	20.3284	20.3479	20.3627	20.3628	20.3653	20.3574	20.3353	20.2429	20.0967 (90)
Living area fraction									fLA = Living area / (4) =			0.7208 (91)
MIT	20.5680	20.6347	20.7022	20.7707	20.7895	20.7961	20.7962	20.7970	20.7941	20.7754	20.6904	20.5641 (92)
Temperature adjustment												-0.1500
adjusted MIT	20.4180	20.4847	20.5522	20.6207	20.6395	20.6461	20.6462	20.6470	20.6441	20.6254	20.5404	20.4141 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9537	0.9241	0.8744	0.7444	0.5782	0.3966	0.2769	0.2982	0.4751	0.7382	0.9008	0.9587 (94)	
Useful gains	305.2554	314.6050	300.8637	263.2432	204.4870	135.9377	90.9898	95.0956	148.2953	224.6418	276.1401	298.8653 (95)	
Net loss due to		0.000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Space heating kWh	382.6560	368.4935	330.9038	270.3540	205.3402	135.9651	90.9908	95.0974	148.4262	230.2839	311.3156	378.6873 (97)	
Space heating requirement - total per year (kWh/year)	57.5860	36.2131	22.3498	5.1197	0.6348	0.0000	0.0000	0.0000	0.0000	4.1977	25.3264	59.3875 (98a)	210.8151
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)	0.0000
Solar heating contribution - total per year (kWh/year)	57.5860	36.2131	22.3498	5.1197	0.6348	0.0000	0.0000	0.0000	0.0000	4.1977	25.3264	59.3875 (98c)	210.8151
Space heating requirement after solar contribution - total per year (kWh/year)													5.8446 (99)
Space heating per m2										(98c) / (4) =			

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	57.5860	36.2131	22.3498	5.1197	0.6348	0.0000	0.0000	0.0000	0.0000	4.1977	25.3264	59.3875 (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)	62.3901	39.2341	24.2144	5.5468	0.6877	0.0000	0.0000	0.0000	0.0000	4.5479	27.4392	64.3419 (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	136.7905	120.2512	127.4478	112.9105	109.5068	98.7594	98.2395	102.6909	104.2149	115.8554	122.2541	135.5972 (64)	
Efficiency of water heater	83.1356	82.3822	81.4457	80.2715	79.8623	79.8000	79.8000	79.8000	79.8000	80.1797	81.6987	79.8000 (216)	
Fuel for water heating, kWh/month	164.5391	145.9675	156.4819	140.6607	137.1194	123.7586	123.1071	128.6854	130.5951	144.4947	149.6402	162.9123 (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	15.2783	13.7998	15.2783	14.7855	15.2783	14.7855	15.2783	15.2783	14.7855	15.2783	14.7855	15.2783 (231)	
Lighting	12.1439	9.7423	8.7718	6.4266	4.9641	4.0557	4.5284	5.8862	7.6456	10.0315	11.3305	12.4814 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												228.4020 (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												1707.9620 (219)	
Space cooling fuel												0.0000 (221)	

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, DataSheet: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												93.8899 (230a)	
central heating pump												41.0000 (230c)	
main heating flue fan												45.0000 (230e)	
Total electricity for the above, kWh/year												179.8899 (231)	
Electricity for lighting (calculated in Appendix L)												98.0080 (232)	

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000 (233)	
Wind generation												0.0000 (234)	
Hydro-electric generation (Appendix N)												0.0000 (235a)	
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)	
Appendix Q - special features													
Energy saved or generated												-0.0000 (236)	
Energy used												0.0000 (237)	
Total delivered energy for all uses												2214.2619 (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	228.4020	0.2100	47.9644 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1707.9620	0.2100	358.6720 (264)
Space and water heating			406.6364 (265)
Pumps, fans and electric keep-hot	179.8899	0.1387	24.9529 (267)
Energy for lighting	98.0080	0.1443	14.1456 (268)
Total CO2, kg/year			445.7350 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.3600 (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	228.4020	1.1300	258.0943 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1707.9620	1.1300	1929.9970 (278)
Space and water heating			2188.0913 (279)
Pumps, fans and electric keep-hot	179.8899	1.5128	272.1375 (281)
Energy for lighting	98.0080	1.5338	150.3279 (282)
Total Primary energy kWh/year			2610.5567 (286)
Dwelling Primary energy Rate (DPER)			72.3700 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	36.0700	2.5400	91.6178
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	36.0700		91.6178
Dwelling volume			91.6178

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) =	0.2183 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4683	(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) =		0.3981 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Adj infilt rate	0.5075	0.4976	0.4876	0.4379	0.4279	0.3782	0.3782	0.3682	0.3981	0.4279	0.4478	0.4677
Effective ac	0.6288	0.6238	0.6189	0.5959	0.5916	0.5715	0.5715	0.5678	0.5792	0.5916	0.6003	0.6094

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
TER Opening Type (Uw = 1.20)			2.3400	1.1450	2.6794		(27)
EW	16.1200	2.3400	13.7800	0.1800	2.4804		(29a)
Corriudor	16.3600		16.3600	0.1800	2.9448		(29a)
Total net area of external elements Aum (A, m2)			32.4800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	8.1046	(33)
PW			41.3500	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							267.8622 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							1.6240 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	9.7286 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	19.0107	18.8595	18.7113	18.0152	17.8849	17.2786	17.2786
Heat transfer coeff							

[illegible]

adjusted MIT 20.3972 20.5021 20.6305 20.7974 20.8734 20.8942 20.8954 20.8958 20.8900 20.8143 20.6133 20.3961 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9779	0.9636	0.9372	0.8512	0.7009	0.4969	0.3545	0.3807	0.5906	0.8484	0.9521	0.9804	(94)
Useful gains	311.6003	326.4840	321.1005	299.7560	246.8699	169.5673	115.9791	120.8672	183.4685	256.9407	290.4545	304.2148	(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	462.6230	446.0337	401.8709	330.0791	253.3087	169.9885	116.0067	120.9135	184.9643	282.0518	376.7113	455.9597	(97)
Space heating kWh	112.3609	80.3374	60.0931	21.8327	4.7905	0.0000	0.0000	0.0000	0.0000	18.6827	62.1049	112.8982	(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	
Space heating kWh	112.3609	80.3374	60.0931	21.8327	4.7905	0.0000	0.0000	0.0000	0.0000	18.6827	62.1049	112.8982	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												473.1003	
Space heating per m2										(98c) / (4) =		13.1162	(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 %)												92.4000	(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	112.3609	80.3374	60.0931	21.8327	4.7905	0.0000	0.0000	0.0000	0.0000	18.6827	62.1049	112.8982	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	121.6027	86.9452	65.0358	23.6284	5.1845	0.0000	0.0000	0.0000	0.0000	20.2193	67.2131	122.1843	(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	155.4174	136.7251	144.6982	127.1946	122.8190	110.1507	108.9171	114.0455	116.0008	129.7497	137.9948	153.8792	(64)
Efficiency of water heater (217)m	83.6974	83.2818	82.6460	81.4544	80.5927	80.3000	80.3000	80.3000	80.3000	81.2898	82.7856	80.3000	(216)
Fuel for water heating, kWh/month	185.6897	164.1716	175.0819	156.1544	152.3948	137.1740	135.6377	142.0243	144.4593	159.6138	166.6893	83.7277	(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	14.6655	11.7652	10.5933	7.7611	5.9949	4.8979	5.4687	7.1085	9.2332	12.1145	13.6833	15.0731	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-8.1821	-12.3712	-19.0578	-23.0242	-26.2736	-25.0849	-24.8137	-22.7214	-19.2644	-14.8607	-9.2980	-6.9820	(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	-2.3807	-5.1663	-10.5657	-16.3068	-21.9833	-22.2197	-21.9250	-18.3392	-13.1740	-7.4931	-3.2137	-1.8688	(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												512.0134	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												1902.8760	(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)												118.3592	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-356.5700	(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												2262.6785	(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	512.0134	0.2100	107.5228	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1902.8760	0.2100	399.6040	(264)
Space and water heating			507.1268	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	118.3592	0.1443	17.0829	(268)

Energy saving/generation technologies			
PV Unit electricity used in dwelling	-211.9338	0.1331	-28.2121
PV Unit electricity exported	-144.6362	0.1251	-18.1004
Total			-46.3125 (269)
Total CO2, kg/year			489.8264 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.5800 (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	512.0134	1.1300	578.5751 (275)
Water heating (other than space heating)			0.0000 (473)
Space and water heating	1902.8760	1.1300	2150.2499 (278)
Pumps, fans and electric keep-hot	86.0000	1.5128	2728.8250 (279)
Energy for lighting	118.3592	1.5338	130.1008 (281)
			181.5432 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-211.9338	1.4919	-316.1833
PV Unit electricity exported	-144.6362	0.4593	-66.4360
Total			-382.6192 (283)
Total Primary energy kWh/year			2657.8498 (286)
Target Primary Energy Rate (TPER)			73.6900 (287)

Property Reference	Unit 9		Issued on Date	15/02/2024	
Assessment Reference	Camden High Street_Copy	Prop Type Ref			
Property					
SAP Rating	85 B	DER	11.49	TER	16.61
Environmental	92 A	% DER < TER		30.82	
CO ₂ Emissions (t/year)	0.54	DFEE	29.79	TFEE	41.93
Compliance Check	See BREL	% DFEE < TFEE		28.96	
% DPER < TPER	24.95	DPER	67.26	TPER	89.62
EN16 246 Calculation Summary					
Assessor Name	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)
Ground floor	50.9500 (1b)	x 2.6000 (2b)	= 132.4700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	50.9500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 132.4700 (5)

2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.0000 (17)
Infiltration rate		0.1500 (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) =	0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (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) =												76.5000 (23c)
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673 (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
G (Uw = 1.00)			2.2000	0.9615	2.1154		(27)
EW	54.5600	2.2000	52.3600	0.1400	7.3304	110.0000	5759.6000 (29a)
Corridor	17.3500		17.3500	0.1300	2.2555	190.0000	3296.5000 (29a)
External Roof 1	50.9500		50.9500	0.1000	5.0950	9.0000	458.5500 (30)
Total net area of external elements Aum(A, m ²)			122.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.7963		(33)
PW			12.7500	0.0000	0.0000	45.0000	573.7500 (32)
Party Floor 1			50.9500			40.0000	2038.0000 (32d)
IW			90.6400			9.0000	815.7600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12942.1600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							254.0169 (35)
Thermal bridges (User defined value 0.060 * total exposed area)							7.3716 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		24.1679 (37)

Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$

(38)m	Jan 12.2430	Feb 12.1036	Mar 11.9643	Apr 11.2676	May 11.1282	Jun 10.4315	Jul 10.4315	Aug 10.2922	Sep 10.7102	Oct 11.1282	Nov 11.4069	Dec 11.6856 (38)
Heat transfer coeff	36.4108	36.2715	36.1322	35.4355	35.2961	34.5994	34.5994	34.4601	34.8781	35.2961	35.5748	35.8535 (39)
Average = Sum(39)m / 12 =												35.4006
HLP	Jan 0.7146	Feb 0.7119	Mar 0.7092	Apr 0.6955	May 0.6928	Jun 0.6791	Jul 0.6791	Aug 0.6764	Sep 0.6846	Oct 0.6928	Nov 0.6982	Dec 0.7037 (40)
HLP (average)												0.6948
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7181 (42)
Hot water usage for mixer showers	68.0552	67.0325	65.5422	62.6907	60.5864	58.2397	56.9058	58.3848	60.0061	62.5258	65.4385	67.7945 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	32.2250	31.0532	29.8814	28.7096	27.5377	26.3659	26.3659	27.5377	28.7096	29.8814	31.0532	32.2250 (42c)
Average daily hot water use (litres/day)												92.0401 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	100.2803	98.0857	95.4236	91.4003	88.1241	84.6056	83.2717	85.9226	88.7157	92.4072	96.4917	100.0195 (44)
Energy content (annual)	158.8194	139.6727	146.6625	125.1224	118.6320	104.0324	100.7099	106.3901	109.3954	125.3957	137.4702	156.6064 (45)
Distribution loss (46)m = 0.15 x (45)m	23.8229	20.9509	21.9994	18.7684	17.7948	15.6049	15.1065	15.9585	16.4093	18.8094	20.6205	23.4910 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combustion loss	50.9589	45.1463	48.6268	45.0741	44.9071	41.7233	42.4344	43.7852	43.7502	47.0897	47.5850	50.9589 (61)
Total heat required for water heating calculated for each month												
209.7783	184.8190	195.2892	170.1965	163.5391	145.7557	143.1443	150.1753	153.1456	172.4854	185.0551	207.5653 (62)	
WWHRS	-52.5416	-46.4682	-48.6588	-40.2914	-37.5502	-32.1319	-30.1186	-32.0281	-33.2449	-39.1921	-44.3999	-51.5686 (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	157.2368	138.3509	146.6304	129.9051	125.9889	113.6238	113.0257	118.1472	119.9006	133.2933	140.6552	155.9967 (64)
12Total per year (kWh/year)												1592.7547 (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	65.5472	57.7278	60.9220	52.8717	50.6719	45.0216	44.0946	46.3210	47.3115	53.4665	57.6051	64.8114 (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	85.9048	85.9048	85.9048	85.9048	85.9048	85.9048	85.9048	85.9048	85.9048	85.9048	85.9048	85.9048 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.3789	112.2409	101.3789	104.7582	101.3789	104.7582	101.3789	101.3789	104.7582	101.3789	104.7582	101.3789 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.7010	151.2544	147.3398	139.0061	128.4863	118.5992	111.9940	110.4406	114.3552	122.6889	133.2087	143.0958 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5905	31.5905	31.5905	31.5905	31.5905	31.5905	31.5905	31.5905	31.5905	31.5905	31.5905	31.5905 (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)	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239	-68.7239 (71)
Water heating gains (Table 5)	88.1011	85.9044	81.8844	73.4329	68.1074	62.5300	59.2670	62.2594	65.7104	71.8636	80.0070	87.1120 (72)
Total internal gains	390.9524	401.1712	382.3745	368.9687	349.7441	334.6589	321.4113	322.8504	333.5952	347.7028	369.7454	383.3582 (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
East					2.2000	19.6403	0.6300		0.7000	0.7700		13.2051 (76)
Solar gains	13.2051	25.8320	42.5416	62.0444	76.0377	77.8381	74.1051	63.6552	49.4776	30.6518	16.4652	10.8592 (83)
Total gains	404.1575	427.0032	424.9161	431.0131	425.7818	412.4970	395.5164	386.5055	383.0729	378.3546	386.2106	394.2174 (84)

7. Mean internal temperature (heating season)

[illegible]

	0.9802	0.9665	0.9424	0.8571	0.7008	0.4823	0.3288	0.3532	0.5665	0.8399	0.9530	0.9827 (89)
MIT 2	19.8686	19.9588	20.0647	20.2147	20.2811	20.3083	20.3089	20.3115	20.3013	20.2387	20.0665	19.8699 (90)
Living area fraction									fLA = Living area / (4) =			0.4514 (91)
MIT	20.2004	20.2818	20.3780	20.5144	20.5791	20.6022	20.6031	20.6046	20.5971	20.5360	20.3760	20.1985 (92)
Temperature adjustment												-0.1500
adjusted MIT	20.0504	20.1318	20.2280	20.3644	20.4291	20.4522	20.4531	20.4546	20.4471	20.3860	20.2260	20.0485 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9781	0.9641	0.9403	0.8580	0.7065	0.4900	0.3370	0.3614	0.5746	0.8420	0.9508	0.9808	(94)
Useful gains	395.3154	411.6729	399.5487	369.8087	300.8300	202.1168	133.3001	139.6940	220.1167	318.5654	367.2240	386.6297	(95)
Net loss	573.4859	552.4810	496.0233	406.2465	308.1046	202.4835	133.3160	139.7213	221.3734	345.4076	466.9564	568.2245	(96)
Space heating	132.5589	94.6230	71.7771	26.2352	5.4123	0.0000	0.0000	0.0000	0.0000	19.9705	71.8073	135.1066	(98a)
Space heating requirement - total per year (kWh/year)												557.4909	
Solar heating	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	132.5589	94.6230	71.7771	26.2352	5.4123	0.0000	0.0000	0.0000	0.0000	19.9705	71.8073	135.1066	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												557.4909	
Space heating per m2										(98c) / (4) =		10.9419	(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	132.5589	94.6230	71.7771	26.2352	5.4123	0.0000	0.0000	0.0000	0.0000	19.9705	71.8073	135.1066	(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)	143.6174	102.5168	77.7650	28.4238	5.8638	0.0000	0.0000	0.0000	0.0000	21.6365	77.7977	146.3777	(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	157.2368	138.3509	146.6304	129.9051	125.9889	113.6238	113.0257	118.1472	119.9006	133.2933	140.6552	155.9967	(64)
Efficiency of water heater	85.0699	84.4448	83.5171	81.6581	80.2476	79.8000	79.8000	79.8000	79.8000	81.2335	83.6278	79.8000	(216)
Fuel for water heating, kWh/month	184.8325	163.8358	175.5694	159.0841	157.0002	142.3857	141.6362	148.0542	150.2514	164.0866	168.1920	183.1975	(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	18.8340	17.0114	18.8340	18.2265	18.8340	18.2265	18.8340	18.8340	18.2265	18.8340	18.2265	18.8340	(231)
Lighting	17.6708	14.1762	12.7641	9.3515	7.2234	5.9016	6.5894	8.5652	11.1253	14.5970	16.4873	18.1619	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												603.9988	(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												1938.1256	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:		
(BalancedWithHeatRecovery, DataSheet: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)		135.7553 (230a)
central heating pump		41.0000 (230c)
main heating flue fan		45.0000 (230e)
Total electricity for the above, kWh/year		221.7553 (231)
Electricity for lighting (calculated in Appendix L)		142.6135 (232)

Energy saving/generation technologies (Appendices M, N and Q)		
PV generation		0.0000 (233)
Wind generation		0.0000 (234)
Hydro-electric generation (Appendix N)		0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)		0.0000 (235)
Appendix Q - special features		
Energy saved or generated		-0.0000 (236)
Energy used		0.0000 (237)
Total delivered energy for all uses		2906.4931 (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	603.9988	0.2100	126.8397 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1938.1256	0.2100	407.0064 (264)
Space and water heating			533.8461 (265)
Pumps, fans and electric keep-hot	221.7553	0.1387	30.7602 (267)
Energy for lighting	142.6135	0.1443	20.5835 (268)
Total CO2, kg/year			585.1898 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.4900 (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	603.9988	1.1300	682.5186 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1938.1256	1.1300	2190.0820 (278)
Space and water heating			2872.6006 (279)
Pumps, fans and electric keep-hot	221.7553	1.5128	335.4714 (281)
Energy for lighting	142.6135	1.5338	218.7453 (282)
Total Primary energy kWh/year			3426.8173 (286)
Dwelling Primary energy Rate (DPER)			67.2600 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.9500 (1b)	x 2.6000 (2b)	= 132.4700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.9500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 132.4700 (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) = 0.1510 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4010 (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) = 0.3408 (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	0.4346	0.4260	0.4175	0.3749	0.3664	0.3238	0.3238	0.3153	0.3408	0.3664	0.3834	0.4005 (22b)
Effective ac	0.5944	0.5908	0.5872	0.5703	0.5671	0.5524	0.5524	0.5497	0.5581	0.5671	0.5735	0.5802 (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
TER Opening Type (Uw = 1.20)			2.2000	1.1450	2.5191		(27)
EW	54.5600	2.2000	52.3600	0.1800	9.4248		(29a)
Corriudor	17.3500		17.3500	0.1800	3.1230		(29a)
External Roof 1	50.9500		50.9500	0.1100	5.6045		(30)
Total net area of external elements Aum(A, m2)			122.8600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.6714		(33)
PW			12.7500	0.0000	0.0000		(32)

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

254.0169 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	20.0000	0.0500	1.0000
E3 Sill	20.0000	0.0500	1.0000
E4 Jamb	24.1400	0.0500	1.2070
E22 Basement floor	0.0000	0.0700	0.0000
E5 Ground floor (normal)	29.1300	0.1600	4.6608

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Full SAP Calculation Printout

Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3920.3301 (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	2027.4879	0.2100	425.7725 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2142.9393	0.2100	450.0173 (264)
Space and water heating			875.7897 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
	167.5692	0.1443	24.1854 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-292.4428	0.1332	-38.9588
PV Unit electricity exported	-211.2234	0.1251	-26.4337
Total			-65.3925 (269)
Total CO2, kg/year			846.5119 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.6100 (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	2027.4879	1.1300	2291.0613 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2142.9393	1.1300	2421.5214 (278)
Space and water heating			4712.5827 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	167.5692	1.5338	257.0233 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-292.4428	1.4923	-436.4053
PV Unit electricity exported	-211.2234	0.4593	-97.0223
Total			-533.4276 (283)
Total Primary energy kWh/year			4566.2792 (286)
Target Primary Energy Rate (TPER)			89.6200 (287)