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

SAP Rating	86 B	**DER**	3.58	**TER**	13.51
Environmental	98 A	**% DER < TER**			73.50
CO_2 Emissions (t/year)	0.14	**DFEE**	24.70	**TFEE**	20.24
Compliance Check	See BREL	**% DFEE < TFEE**			-22.01
% DPER < TPER	39.47	**DPER**	44.16	**TPER**	72.96

Assessor Details	Mr. Neil Ingham	**Assessor ID**	AV35-0001
Client			

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

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1. Overall dwelling characteristics

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

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2. Ventilation rate

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		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)
	Air changes per hour		
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)

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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)
Corriudor	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 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	8.6270	8.5288	8.4306	7.9397	7.8415	7.3506	7.3506	7.2524	7.5469	7.8415	8.0379	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	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6671	0.6645	0.6618	0.6484	0.6458	0.6324	0.6324	0.6297	0.6378	0.6458	0.6511	0.6565	(40)
HLP (average)												0.6478	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1336.9881	
Distribution loss (46)m = 0.15 x (45)m													
	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:													
Store volume												170.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5600	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8424	(55)
Total storage loss													
	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144	(56)
If cylinder contains dedicated solar storage													
	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	164.9975	145.7271	154.3667	134.6881	129.8548	116.2455	114.1824	119.1495	120.9351	135.7693	145.4858	163.0622	(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	-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													
	119.0497	105.0905	111.8144	99.4531	97.0171	88.1460	87.8436	91.1409	91.8623	101.4957	106.6579	117.9654	(64)
									Total per year (kWh/year) = Sum(64)m =			1217.5367	(64)
12Total per year (kWh/year)												1218	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			0.0000	(64a)
Heat gains from water heating, kWh/month													
	46.1786	40.6115	42.6439	36.3808	34.4937	30.2487	29.2826	30.9342	31.8080	36.4603	39.9711	45.5352	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(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	(66)
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	(67)
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	(68)
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	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	(71)
Water heating gains (Table 5)													
	62.0680	60.4338	57.3170	50.5289	46.3625	42.0121	39.3584	41.5782	44.1778	49.0057	55.5154	61.2032	(72)
Total internal gains													
	282.8686	289.3226	276.3281	265.3742	251.0849	241.3914	231.5816	232.6242	240.3406	249.3344	265.9668	276.9978	(73)

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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	311.0795	344.5091	367.2125	397.9236	413.5292	407.6819	389.8970	368.6148	346.0428	314.8179	301.1425	300.1971	(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	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													
	0.9646	0.9303	0.8626	0.7059	0.5316	0.3648	0.2623	0.2888	0.4666	0.7534	0.9215	0.9700	(86)

Living	20.6750	20.7699	20.8650	20.9394	20.9566	20.9595	20.9596	20.9598	20.9587	20.9338	20.8156	20.6626	
Non living	19.9963	20.1130	20.2254	20.3160	20.3345	20.3491	20.3491	20.3517	20.3435	20.3143	20.1802	19.9898	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	31	28	31	30	31	30	31	31	30	31	30	31	
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	(87)
Th 2	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													
	0.9571	0.9173	0.8407	0.6746	0.4974	0.3307	0.2266	0.2513	0.4261	0.7170	0.9050	0.9635	(89)
MIT 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	(90)
Living area fraction										fLA = Living area / (4) =		0.6803	(91)
MIT	20.7986	20.7993	20.8001	20.8039	20.8046	20.8085	20.8085	20.8092	20.8069	20.8046	20.8031	20.8016	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.7986	20.7993	20.8001	20.8039	20.8046	20.8085	20.8085	20.8092	20.8069	20.8046	20.8031	20.8016	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9624	0.9264	0.8558	0.6960	0.5207	0.3539	0.2509	0.2768	0.4537	0.7420	0.9165	0.9681	(94)
Useful gains	299.3792	319.1481	314.2766	276.9607	215.3123	144.2609	97.8078	102.0391	156.9894	233.6034	276.0101	290.6203	(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													
	404.5055	388.2524	347.7958	283.6732	216.0725	144.2920	97.8096	102.0426	157.1941	242.1779	327.8951	400.5115	(97)
Space heating kWh													
	78.2139	46.4381	24.9383	4.8330	0.5657	0.0000	0.0000	0.0000	0.0000	6.3794	37.3572	81.7591	(98a)
Space heating requirement - total per year (kWh/year)												280.4847	
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													
	78.2139	46.4381	24.9383	4.8330	0.5657	0.0000	0.0000	0.0000	0.0000	6.3794	37.3572	81.7591	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												280.4847	
Space heating per m2											(98c) / (4) =	7.6322	(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 %)												123.7604	(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													
	78.2139	46.4381	24.9383	4.8330	0.5657	0.0000	0.0000	0.0000	0.0000	6.3794	37.3572	81.7591	(98)
Space heating efficiency (main heating system 1)													
	123.7604	123.7604	123.7604	123.7604	123.7604	0.0000	0.0000	0.0000	0.0000	123.7604	123.7604	123.7604	(210)
Space heating fuel (main heating system)													
	63.1979	37.5226	20.1505	3.9051	0.4571	0.0000	0.0000	0.0000	0.0000	5.1546	30.1851	66.0624	(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													
	119.0497	105.0905	111.8144	99.4531	97.0171	88.1460	87.8436	91.1409	91.8623	101.4957	106.6579	117.9654	(64)
Efficiency of water heater												118.6605	(216)
(217)m	118.6605	118.6605	118.6605	118.6605	118.6605	118.6605	118.6605	118.6605	118.6605	118.6605	118.6605	118.6605	(217)
Fuel for water heating, kWh/month													
	100.3280	88.5640	94.2305	83.8131	81.7602	74.2842	74.0294	76.8081	77.4161	85.5345	89.8849	99.4142	(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	15.7178	14.1967	15.7178	15.2108	15.7178	15.2108	15.7178	15.7178	15.2108	15.7178	15.2108	15.7178	(231)
Lighting	10.8742	8.7237	7.8547	5.7547	4.4451	3.6317	4.0550	5.2708	6.8463	8.9827	10.1459	11.1765	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-15.3367	-23.1105	-35.3294	-42.1129	-48.0068	-45.9019	-45.4126	-41.6784	-35.1965	-27.2216	-17.2709	-13.0923	(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	-4.1971	-9.4857	-20.1857	-32.2882	-43.9095	-44.4665	-43.7615	-36.2335	-25.8241	-14.4483	-5.8990	-3.2541	(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												226.6353	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												118.6605	
Water heating fuel used												1026.0673	(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)												185.0646	(230a)
Total electricity for the above, kWh/year												185.0646	(231)
Electricity for lighting (calculated in Appendix L)												87.7612	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-673.6234	(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	851.9050	(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	226.6353	0.1590	36.0338	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1026.0673	0.1406	144.3071	(264)
Space and water heating			180.3409	(265)
Pumps, fans and electric keep-hot	185.0646	0.1387	25.6707	(267)
Energy for lighting	87.7612	0.1443	12.6667	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-389.6702	0.1332	-51.9170	
PV Unit electricity exported	-283.9531	0.1245	-35.3435	
Total			-87.2606	(269)
Total CO2, kg/year			131.4177	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5800	(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	226.6353	1.5885	360.0120	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1026.0673	1.5200	1559.6486	(278)
Space and water heating			1919.6606	(279)
Pumps, fans and electric keep-hot	185.0646	1.5128	279.9657	(281)
Energy for lighting	87.7612	1.5338	134.6111	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-389.6702	1.4923	-581.5165	
PV Unit electricity exported	-283.9531	0.4568	-129.7238	
Total			-711.2403	(283)
Total Primary energy kWh/year			1622.9971	(286)
Dwelling Primary energy Rate (DPER)			44.1600	(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	36.7500 (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	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.2143 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4643 (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) =	0.3946 (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	0.5031	0.4933	0.4834	0.4341	0.4242	0.3749	0.3749	0.3650	0.3946	0.4242	0.4439	0.4637	(22b)
Effective ac	0.6266	0.6217	0.6168	0.5942	0.5900	0.5703	0.5703	0.5666	0.5779	0.5900	0.5985	0.6075	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K

	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type (Uw = 1.20)			4.7000	1.1450	5.3817			(27)
EW	16.0100	4.7000	11.3100	0.1800	2.0358			(29a)
Corriudor	13.7600		13.7600	0.1800	2.4768			(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) =	9.8943			(33)
PW			35.8300	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							239.1347	(35)
Thermal bridges (User defined value 0.050 * total exposed area)							1.4885	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		11.3828	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.3009	19.1495	19.0011	18.3041	18.1737	17.5665	17.5665	17.4541	17.8004	18.1737	18.4375	18.7133	(38)
(39)m	30.6857	30.5323	30.3839	29.6868	29.5564	28.9493	28.9493	28.8369	29.1832	29.5564	29.8203	30.0961	(39)

Average = Sum(39)m / 12 = 29.6862

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8349	0.8308	0.8268	0.8078	0.8043	0.7877	0.7877	0.7847	0.7941	0.8043	0.8114	0.8189	(40)
HLP (average)												0.8078	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1336.9881	
Distribution loss (46)m = 0.15 x (45)m	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:

Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	185.4780	164.2256	174.8472	154.5079	150.3353	136.0654	134.6629	139.6300	140.7549	156.2499	165.3056	183.5427	(62)
WWHRS	-27.2076	-24.0626	-25.1970	-20.8641	-19.4446	-16.6389	-15.5963	-16.5851	-17.2152	-20.2948	-22.9916	-26.7037	(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	158.2704	140.1630	149.6502	133.6438	130.8908	119.4265	119.0666	123.0450	123.5397	135.9550	142.3140	156.8390	(64)
										Total per year (kWh/year) = Sum(64)m =		1632.8042	(64)
12Total per year (kWh/year)												1633	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	83.4545	74.2801	79.9198	72.4543	71.7696	66.3222	66.5585	68.2101	67.8815	73.7362	76.0445	82.8111	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	66.1445	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	62.6270	69.3370	62.6270	64.7146	62.6270	64.7146	62.6270	62.6270	64.7146	62.6270	64.7146	62.6270	(67)
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	(68)
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	(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)	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	-52.9156	(71)
Water heating gains (Table 5)	112.1701	110.5359	107.4191	100.6310	96.4645	92.1141	89.4604	91.6802	94.2798	99.1078	105.6174	111.3052	(72)
Total internal gains	334.0956	340.3487	327.5551	316.5387	302.3119	289.5558	279.8086	280.8511	288.5050	300.5614	317.1313	328.2248	(73)

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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	362.3065	395.5352	418.4394	449.0880	464.7561	455.8464	438.1240	416.8417	394.2073	366.0448	352.3070	351.4240	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	79.5590	79.9536	80.3441	82.2306	82.5934	84.3255	84.3255	84.6543	83.6498	82.5934	81.8627	81.1124	
alpha	6.3039	6.3302	6.3563	6.4820	6.5062	6.6217	6.6217	6.6436	6.5767	6.5062	6.4575	6.4075	
util living area	0.9642	0.9381	0.8853	0.7535	0.5834	0.4058	0.2907	0.3181	0.5078	0.7806	0.9252	0.9682	(86)
MIT	20.4763	20.6126	20.7744	20.9328	20.9879	20.9991	20.9999	20.9999	20.9961	20.9300	20.7143	20.4672	(87)
Th 2	20.2232	20.2267	20.2302	20.2466	20.2496	20.2640	20.2640	20.2666	20.2584	20.2496	20.2434	20.2369	(88)
util rest of house	0.9246	0.8628	0.7172	0.5390	0.3594	0.2421	0.2675	0.4545	0.7391	0.9074	0.9607	(89)	
MIT 2	19.9051	19.9983	20.1854	20.2405	20.2635	20.2639	20.2666	20.2561	20.1888	19.9442	19.6373	(90)	
Living area fraction									fLA = Living area / (4) =			0.6803	(91)
MIT	20.2078	20.3544	20.5263	20.6938	20.7489	20.7639	20.7646	20.7654	20.7595	20.6930	20.4681	20.2019	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2078	20.3544	20.5263	20.6938	20.7489	20.7639	20.7646	20.7654	20.7595	20.6930	20.4681	20.2019	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9556	0.9270	0.8718	0.7391	0.5687	0.3910	0.2751	0.3019	0.4906	0.7642	0.9131	0.9603	(94)
Useful gains	346.2179	366.6789	364.8133	331.9295	264.2856	178.2221	120.5455	125.8539	193.4008	279.7337	321.6808	337.4584	(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	488.1118	471.8583	426.1727	350.1209	267.4532	178.4403	120.5625	125.8847	194.3462	298.3145	398.6402	481.5932	(97)
Space heating kWh	105.5691	70.6806	45.6514	13.0978	2.3567	0.0000	0.0000	0.0000	0.0000	13.8241	55.4108	107.2363	(98a)
Space heating requirement - total per year (kWh/year)												413.8267	
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	105.5691	70.6806	45.6514	13.0978	2.3567	0.0000	0.0000	0.0000	0.0000	13.8241	55.4108	107.2363	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												413.8267	
Space heating per m2											(98c) / (4) =	11.2606	(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	105.5691	70.6806	45.6514	13.0978	2.3567	0.0000	0.0000	0.0000	0.0000	13.8241	55.4108	107.2363	(98)
Space heating efficiency (main heating system 1)	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)	114.3761	76.5770	49.4598	14.1904	2.5533	0.0000	0.0000	0.0000	0.0000	14.9773	60.0333	116.1823	(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	158.2704	140.1630	149.6502	133.6438	130.8908	119.4265	119.0666	123.0450	123.5397	135.9550	142.3140	156.8390	(64)
Efficiency of water heater												79.8000	(216)
(217)m	83.1729	82.6066	81.7364	80.5285	79.9433	79.8000	79.8000	79.8000	79.8000	80.5535	82.1328	83.2253	(217)
Fuel for water heating, kWh/month	190.2908	169.6753	183.0888	165.9585	163.7295	149.6573	149.2063	154.1917	154.8117	168.7760	173.2731	188.4511	(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 1 448.3496 (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 2011.1101 (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	2287.1871 (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	448.3496	0.2100	94.1534	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2011.1101	0.2100	422.3331	(264)
Space and water heating			516.4865	(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			496.3890	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.5100	(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	448.3496	1.1300	506.6350	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2011.1101	1.1300	2272.5544	(278)
Space and water heating			2779.1894	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	105.0196	1.5338	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			2681.3114	(286)
Target Primary Energy Rate (TPER)			72.9600	(287)

Property Reference	Unit 5			**Issued on Date**	15/02/2024
Assessment Reference	Camden High Street_Copy		**Prop Type Ref**		
Property					

SAP Rating	85 B	**DER**	3.87	**TER**	13.53
Environmental	97 A	**% DER < TER**			71.40
CO₂ Emissions (t/year)	0.15	**DFEE**	25.14	**TFEE**	18.47
Compliance Check	See BREL	**% DFEE < TFEE**			-36.08
% DPER < TPER	35.47	**DPER**	47.37	**TPER**	73.41

Assessor Details	Mr. Neil Ingham	**Assessor ID**	AV35-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	36.0700	(1b)	x 2.5400	(2b) =	91.6178	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	36.0700					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		91.6178	(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)
	Air changes per hour		
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)			2.3400	0.9615	2.2500			(27)
EW	16.1200	2.3400	13.7800	0.2600	3.5828	110.0000	1515.8000	(29a)
Corriudor	16.3600		16.3600	0.1800	2.9448	190.0000	3108.4000	(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) =		8.7776			(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/m2K							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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	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)
Heat transfer coeff	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)
Average = Sum(39)m / 12 =												23.0423	

	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	

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4. 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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1328.9074	
Distribution loss (46)m = 0.15 x (45)m	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)
Water storage loss:													
Store volume												170.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5600	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8424	(55)
Total storage loss	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144	(56)
If cylinder contains dedicated solar storage	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	164.1581	144.9889	153.5915	134.0268	129.2278	115.6957	113.6501	118.5872	120.3569	135.1066	144.7592	162.2345	(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	118.4879	104.5979	111.2964	99.0047	96.5885	87.7660	87.4705	90.7478	91.4598	101.0401	106.1659	117.4101	(64)
										Total per year (kWh/year) = Sum(64)m =		1212.0356	(64)
12Total per year (kWh/year)												1212	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	45.8995	40.3661	42.3861	36.1610	34.2852	30.0659	29.1056	30.7472	31.6157	36.2399	39.7295	45.2599	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	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)
Lighting gains (calculated in Appendix L, equation L9 or L9a), 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)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	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)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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)
Water heating gains (Table 5)	61.6929	60.0686	56.9706	50.2236	46.0823	41.7582	39.1205	41.3269	43.9107	48.7096	55.1799	60.8333	(72)
Total internal gains	288.1114	295.3649	281.6259	271.0566	256.6584	247.3520	237.3807	238.4271	246.3353	254.9563	271.6836	282.3192	(73)

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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	302.1568	322.8408	326.8747	337.0493	337.5349	330.1435	316.2016	306.1330	298.9615	287.5587	289.1966	293.8695	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	108.8260	109.2696	109.7168	112.0087	112.4787	114.8887	114.8887	115.3832	113.9124	112.4787	111.5427	110.6222	
alpha	8.2551	8.2846	8.3145	8.4672	8.4986	8.6592	8.6592	8.6922	8.5942	8.4986	8.4362	8.3748	
util living area	0.9725	0.9505	0.9111	0.7935	0.6281	0.4358	0.3129	0.3364	0.5225	0.7956	0.9354	0.9761	(86)

Living	20.7177	20.7864	20.8584	20.9353	20.9595	20.9639	20.9640	20.9642	20.9631	20.9392	20.8401	20.7108	
Non living	20.0546	20.1401	20.2271	20.3220	20.3470	20.3627	20.3628	20.3653	20.3572	20.3292	20.2163	20.0549	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	31	28	31	30	31	30	31	31	30	31	30	31	
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	(87)
Th 2	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)
util rest of house													
	0.9658	0.9394	0.8927	0.7621	0.5890	0.3956	0.2709	0.2934	0.4778	0.7591	0.9198	0.9702	(89)
MIT 2	20.3779	20.3803	20.3827	20.3946	20.3970	20.4089	20.4089	20.4113	20.4041	20.3970	20.3922	20.3874	(90)
Living area fraction									fLA = Living area / (4) =			0.7208	(91)
MIT	20.8263	20.8270	20.8277	20.8310	20.8316	20.8350	20.8350	20.8357	20.8337	20.8316	20.8303	20.8290	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.8263	20.8270	20.8277	20.8310	20.8316	20.8350	20.8350	20.8357	20.8337	20.8316	20.8303	20.8290	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9708	0.9476	0.9062	0.7850	0.6173	0.4246	0.3012	0.3244	0.5101	0.7858	0.9313	0.9746	(94)
Useful gains	293.3299	305.9268	296.2199	264.5695	208.3456	140.1648	95.2350	99.3185	152.4924	225.9568	269.3361	286.4014	(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													
	392.3511	376.5874	337.3909	275.2046	209.7541	140.2134	95.2370	99.3222	152.7252	235.0211	318.0319	388.3781	(97)
Space heating kWh													
	73.6718	47.4839	30.6313	7.6573	1.0479	0.0000	0.0000	0.0000	0.0000	6.7438	35.0610	75.8707	(98a)
Space heating requirement - total per year (kWh/year)												278.1674	
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													
	73.6718	47.4839	30.6313	7.6573	1.0479	0.0000	0.0000	0.0000	0.0000	6.7438	35.0610	75.8707	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												278.1674	
Space heating per m2											(98c) / (4) =	7.7119	(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 %)												118.1742	(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													
	73.6718	47.4839	30.6313	7.6573	1.0479	0.0000	0.0000	0.0000	0.0000	6.7438	35.0610	75.8707	(98)
Space heating efficiency (main heating system 1)													
	118.1742	118.1742	118.1742	118.1742	118.1742	0.0000	0.0000	0.0000	0.0000	118.1742	118.1742	118.1742	(210)
Space heating fuel (main heating system)													
	62.3417	40.1812	25.9204	6.4796	0.8867	0.0000	0.0000	0.0000	0.0000	5.7067	29.6689	64.2024	(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													
	118.4879	104.5979	111.2964	99.0047	96.5885	87.7660	87.4705	90.7478	91.4598	101.0401	106.1659	117.4101	(64)
Efficiency of water heater												114.2187	(216)
(217)m	114.2187	114.2187	114.2187	114.2187	114.2187	114.2187	114.2187	114.2187	114.2187	114.2187	114.2187	114.2187	(217)
Fuel for water heating, kWh/month													
	103.7378	91.5768	97.4415	86.6799	84.5646	76.8403	76.5816	79.4509	80.0743	88.4619	92.9497	102.7942	(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	15.9756	14.4296	15.9756	15.4603	15.9756	15.4603	15.9756	15.9756	15.4603	15.9756	15.4603	15.9756	(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	-15.3492	-23.1857	-35.5694	-42.3518	-48.1744	-46.0394	-45.5555	-41.8145	-35.3059	-27.3028	-17.2935	-13.0981	(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	-4.1845	-9.4105	-19.9457	-32.0493	-43.7419	-44.3290	-43.6186	-36.0974	-25.7147	-14.3671	-5.8763	-3.2483	(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												235.3876	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												114.2187	
Water heating fuel used												1061.1535	(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)												188.1004	(230a)
Total electricity for the above, kWh/year												188.1004	(231)
Electricity for lighting (calculated in Appendix L)												98.0080	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-673.6234	(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	909.0262	(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	235.3876	0.1586	37.3212	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1061.1535	0.1406	149.2385	(264)
Space and water heating			186.5597	(265)
Pumps, fans and electric keep-hot	188.1004	0.1387	26.0918	(267)
Energy for lighting	98.0080	0.1443	14.1456	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-391.0400	0.1332	-52.1005	
PV Unit electricity exported	-282.5834	0.1244	-35.1580	
Total			-87.2585	(269)
Total CO2, kg/year			139.5386	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8700	(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	235.3876	1.5869	373.5433	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1061.1535	1.5200	1612.9689	(278)
Space and water heating			1986.5121	(279)
Pumps, fans and electric keep-hot	188.1004	1.5128	284.5582	(281)
Energy for lighting	98.0080	1.5338	150.3279	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-391.0400	1.4923	-583.5646	
PV Unit electricity exported	-282.5834	0.4566	-129.0415	
Total			-712.6060	(283)
Total Primary energy kWh/year			1708.7923	(286)
Dwelling Primary energy Rate (DPER)			47.3700	(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 (1b)	x	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

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.2183	(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	(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	0.5075	0.4976	0.4876	0.4379	0.4279	0.3782	0.3782	0.3682	0.3981	0.4279	0.4478	0.4677	(22b)
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	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K

	m2	m2	m2	W/m2K	W/K	kJ/m2K	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.0107	18.8595	18.7113	18.0152	17.8849	17.2786	17.2786	17.1664	17.5122	17.8849	18.1484	18.4238	(38)
(39)m	28.1524	28.0388	28.4399	27.7438	27.6135	27.0072	27.0072	26.8949	27.2408	27.6135	27.8770	28.1524	(39)

Average = Sum(39)m / 12 = 27.7431

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7968	0.7926	0.7885	0.7692	0.7656	0.7487	0.7487	0.7456	0.7552	0.7656	0.7729	0.7805	(40)
HLP (average)												0.7691	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3063 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1328.9074	
Distribution loss (46)m = 0.15 x (45)m	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)

Water storage loss:

Store volume	150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):	1.3938	(48)
Temperature factor from Table 2b	0.5400	(49)
Enter (49) or (54) in (55)	0.7527	(55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss 23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

184.6386	163.4874	174.0720	153.8466	149.7083	135.5155	134.1306	139.0677	140.1768	155.5871	164.5790	182.7150	(62)
WWHRS -27.0432	-23.9172	-25.0447	-20.7380	-19.3271	-16.5383	-15.5020	-16.4849	-17.1112	-20.1722	-22.8526	-26.5424	(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

157.5954	139.5702	149.0273	133.1086	130.3813	118.9772	118.6286	122.5829	123.0656	135.4149	141.7264	156.1727	(64)

Total per year (kWh/year) = Sum(64)m = 1626.2511 (64)

12Total per year (kWh/year) 1626 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

83.1754	74.0346	79.6621	72.2344	71.5611	66.1393	66.3816	68.0231	67.6892	73.5158	75.8030	82.5359	(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	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)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	70.5819	78.1442	70.5819	72.9346	70.5819	72.9346	70.5819	70.5819	72.9346	70.5819	72.9346	70.5819	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	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)
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)	-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)
Water heating gains (Table 5)	111.7950	110.1706	107.0727	100.3256	96.1843	91.8602	89.2225	91.4290	94.0128	98.8116	105.2819	110.9353	(72)
Total internal gains	339.7622	346.8602	333.2767	322.6590	308.3092	295.9544	286.0315	287.0779	294.9377	306.6071	323.2860	333.9700	(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	353.8076	374.3361	378.5255	388.6517	389.1857	378.7459	364.8523	354.7838	347.5639	339.2095	340.7989	345.5203	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	93.3855	93.8794	94.3686	96.7364	97.1927	99.3746	99.3746	99.7894	98.5226	97.1927	96.2741	95.3321	
alpha	7.2257	7.2586	7.2912	7.4491	7.4795	7.6250	7.6250	7.6526	7.5682	7.4795	7.4183	7.3555	
util living area	0.9684	0.9491	0.9135	0.8081	0.6495	0.4557	0.3257	0.3486	0.5384	0.7972	0.9296	0.9711	(86)
MIT	20.5887	20.6853	20.8003	20.9349	20.9879	20.9993	21.0000	20.9999	20.9975	20.9495	20.7874	20.5872	(87)
Th 2	20.6016	20.6037	20.6058	20.6154	20.6172	20.6256	20.6256	20.6272	20.6224	20.6172	20.6136	20.6098	(88)
util rest of house	0.9428	0.9033	0.7899	0.6250	0.4293	0.2980	0.3204	0.5096	0.7757	0.9204	0.9674	(89)	
MIT 2	20.4281	20.5611	20.6082	20.6252	20.6256	20.6271	20.6208	20.5766	20.4239	20.2260	(90)		
Living area fraction	fLA = Living area / (4) =											0.7208	(91)
MIT	20.4858	20.5822	20.6964	20.8305	20.8819	20.8948	20.8954	20.8959	20.8923	20.8454	20.6859	20.4863	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4858	20.5822	20.6964	20.8305	20.8819	20.8948	20.8954	20.8959	20.8923	20.8454	20.6859	20.4863	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9630	0.9425	0.9058	0.8002	0.6420	0.4483	0.3179	0.3408	0.5302	0.7887	0.9222	0.9661	(94)
Useful gains	340.7010	352.7968	342.8575	311.0017	249.8631	169.7974	115.9953	120.8946	184.2918	267.5268	314.2974	333.7902	(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	465.1680	448.3228	403.7424	330.9973	253.5440	170.0061	116.0080	120.9157	185.0279	282.9111	378.7342	458.4997	(97)
Space heating kWh	92.6035	64.1935	45.2983	14.3968	2.7386	0.0000	0.0000	0.0000	0.0000	11.4459	46.3946	92.7839	(98a)
Space heating requirement - total per year (kWh/year)												369.8550	
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	92.6035	64.1935	45.2983	14.3968	2.7386	0.0000	0.0000	0.0000	0.0000	11.4459	46.3946	92.7839	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												369.8550	
Space heating per m2	(98c) / (4) =											10.2538	(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	92.6035	64.1935	45.2983	14.3968	2.7386	0.0000	0.0000	0.0000	0.0000	11.4459	46.3946	92.7839	(98)
Space heating efficiency (main heating system 1)	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)	100.3288	69.5487	49.0773	15.5979	2.9671	0.0000	0.0000	0.0000	0.0000	12.4007	50.2650	100.5242	(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	157.5954	139.5702	149.0273	133.1086	130.3813	118.9772	118.6286	122.5829	123.0656	135.4149	141.7264	156.1727	(64)
Efficiency of water heater	79.8000	(216)											
(217)m	82.9101	82.4320	81.7309	80.5973	79.9667	79.8000	79.8000	79.8000	79.8000	80.4354	81.8458	82.9326	(217)
Fuel for water heating, kWh/month	190.0798	169.3156	182.3389	165.1527	163.0444	149.0942	148.6574	153.6126	154.2175	168.3525	173.1628	188.3128	(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	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 1 400.7096 (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 2005.3412 (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	2253.8400	(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	400.7096	0.2100	84.1490	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2005.3412	0.2100	421.1217	(264)
Space and water heating			505.2707	(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			487.9703	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.5300	(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	400.7096	1.1300	452.8018	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2005.3412	1.1300	2266.0356	(278)
Space and water heating			2718.8374	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	118.3592	1.5338	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			2647.8622	(286)
Target Primary Energy Rate (TPER)			73.4100	(287)

Property Reference	Unit 9			**Issued on Date**	15/02/2024
Assessment Reference	Camden High Street_Copy		**Prop Type Ref**		
Property					

SAP Rating	90 B	**DER**	1.97	**TER**	16.04
Environmental	98 A	**% DER < TER**			87.72
CO_2 Emissions (t/year)	0.11	**DFEE**	29.79	**TFEE**	41.93
Compliance Check	See BREL	**% DFEE < TFEE**			28.96
% DPER < TPER	71.16	**DPER**	24.96	**TPER**	86.53

Assessor Details	Mr. Neil Ingham	**Assessor ID**	AV35-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	50.9500	(1b)	x 2.6000	(2b) =	132.4700	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.9500					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		132.4700	(5)

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2. Ventilation rate

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		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)

	Air changes per hour		
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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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)

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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)			2.2000	0.9615	2.1154			(27)
EW	54.5600	2.2000	52.3600	0.1400	7.3304	110.0000	5759.6000	(29a)
Corriudor	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, m2)			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/m2K	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 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	12.2430	12.1036	11.9643	11.2676	11.1282	10.4315	10.4315	10.2922	10.7102	11.1282	11.4069	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	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7146	0.7119	0.7092	0.6955	0.6928	0.6791	0.6791	0.6764	0.6846	0.6928	0.6982	0.7037	(40)
HLP (average)												0.6948	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1528.9091	
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:													
Store volume												170.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5600	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8424	(55)
Total storage loss	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144	(56)
If cylinder contains dedicated solar storage	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	184.9338	163.2599	172.7769	150.3944	144.7464	129.3044	126.8243	132.5045	134.6674	151.5101	162.7422	182.7208	(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	132.3923	116.7918	124.1180	110.1030	107.1963	97.1725	96.7058	100.4764	101.4224	112.3180	118.3423	131.1522	(64)
									Total per year (kWh/year) = Sum(64)m =			1348.1909	(64)
12Total per year (kWh/year)												1348	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			0.0000	(64a)
Heat gains from water heating, kWh/month	52.8075	46.4412	48.7653	41.6032	39.4451	34.5908	33.4860	35.3747	36.3740	41.6941	45.7088	52.0716	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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)	70.9778	69.1089	65.5447	57.7822	53.0177	48.0428	45.0081	47.5467	50.5194	56.0404	63.4845	69.9887	(72)
Total internal gains	370.8291	381.3757	363.0349	350.3180	331.6543	320.1716	307.1525	308.1376	318.4042	328.8796	350.2228	363.2349	(73)

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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	384.0342	407.2077	405.5765	412.3624	407.6921	398.0098	381.2576	371.7928	367.8818	359.5315	366.6880	374.0941	(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	98.7355	99.1148	99.4971	101.4533	101.8538	103.9048	103.9048	104.3250	103.0746	101.8538	101.0559	100.2705	
alpha	7.5824	7.6077	7.6331	7.7636	7.7903	7.9270	7.9270	7.9550	7.8716	7.7903	7.7371	7.6847	
util living area	0.9885	0.9796	0.9641	0.9024	0.7711	0.5540	0.3991	0.4261	0.6460	0.8952	0.9724	0.9901	(86)

Living	20.5728	20.6461	20.7343	20.8638	20.9365	20.9591	20.9606	20.9607	20.9553	20.8833	20.7259	20.5665	
Non living	19.8301	19.9240	20.0354	20.1990	20.2770	20.3081	20.3089	20.3115	20.3006	20.2246	20.0349	19.8307	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	31	28	31	30	31	30	31	31	30	31	30	31	
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	(87)
Th 2	20.3279	20.3303	20.3327	20.3448	20.3472	20.3593	20.3593	20.3618	20.3545	20.3472	20.3424	20.3376	(88)
util rest of house													
	0.9853	0.9741	0.9542	0.8784	0.7272	0.4996	0.3411	0.3671	0.5890	0.8658	0.9641	0.9873	(89)
MIT 2	20.3279	20.3303	20.3327	20.3448	20.3472	20.3593	20.3593	20.3618	20.3545	20.3472	20.3424	20.3376	(90)
Living area fraction										fLA = Living area / (4) =		0.4514	(91)
MIT	20.6313	20.6326	20.6340	20.6406	20.6419	20.6486	20.6486	20.6499	20.6459	20.6419	20.6393	20.6366	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.6313	20.6326	20.6340	20.6406	20.6419	20.6486	20.6486	20.6499	20.6459	20.6419	20.6393	20.6366	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9868	0.9767	0.9589	0.8898	0.7475	0.5243	0.3673	0.3938	0.6150	0.8798	0.9681	0.9887	(94)
Useful gains	378.9743	397.7375	388.9239	366.9105	304.7689	208.6666	140.0458	146.3975	226.2519	316.3218	354.9981	369.8546	(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													
	594.6369	570.6463	510.6904	416.0328	315.6145	209.2762	140.0774	146.4512	228.3082	354.4403	481.6562	589.3094	(97)
Space heating kWh													
	160.4529	116.1947	90.5943	35.3680	8.0691	0.0000	0.0000	0.0000	0.0000	28.3601	91.1938	163.2744	(98a)
Space heating requirement - total per year (kWh/year)												693.5073	
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													
	160.4529	116.1947	90.5943	35.3680	8.0691	0.0000	0.0000	0.0000	0.0000	28.3601	91.1938	163.2744	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												693.5073	
Space heating per m2											(98c) / (4) =	13.6115	(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 %)	232.3158	(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													
	160.4529	116.1947	90.5943	35.3680	8.0691	0.0000	0.0000	0.0000	0.0000	28.3601	91.1938	163.2744	(98)
Space heating efficiency (main heating system 1)													
	232.3158	232.3158	232.3158	232.3158	232.3158	0.0000	0.0000	0.0000	0.0000	232.3158	232.3158	232.3158	(210)
Space heating fuel (main heating system)													
	69.0667	50.0158	38.9962	15.2241	3.4733	0.0000	0.0000	0.0000	0.0000	12.2076	39.2542	70.2812	(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													
	132.3923	116.7918	124.1180	110.1030	107.1963	97.1725	96.7058	100.4764	101.4224	112.3180	118.3423	131.1522	(64)
Efficiency of water heater												192.7609	(216)
(217)m	192.7609	192.7609	192.7609	192.7609	192.7609	192.7609	192.7609	192.7609	192.7609	192.7609	192.7609	192.7609	(217)
Fuel for water heating, kWh/month													
	68.6821	60.5889	64.3896	57.1189	55.6110	50.4109	50.1688	52.1249	52.6157	58.2680	61.3933	68.0388	(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	13.1613	11.8876	13.1613	12.7368	13.1613	12.7368	13.1613	13.1613	12.7368	13.1613	12.7368	13.1613	(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	-15.4448	-23.4591	-36.2059	-43.2306	-48.8676	-46.4877	-45.9546	-42.1035	-35.5550	-27.6282	-17.4550	-13.1653	(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	-4.0889	-9.1371	-19.3091	-31.1705	-43.0487	-43.8806	-43.2195	-35.8083	-25.4656	-14.0417	-5.7148	-3.1811	(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	298.5192	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	192.7609	
Water heating fuel used	699.4109	(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)	154.9639	(230a)
Total electricity for the above, kWh/year	154.9639	(231)
Electricity for lighting (calculated in Appendix L)	142.6135	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-673.6234	(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	621.8841	(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	298.5192	0.1571	46.9058	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	699.4109	0.1407	98.4100	(264)
Space and water heating			145.3158	(265)
Pumps, fans and electric keep-hot	154.9639	0.1387	21.4954	(267)
Energy for lighting	142.6135	0.1443	20.5835	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.5573	0.1333	-52.7148	
PV Unit electricity exported	-278.0661	0.1242	-34.5281	
Total			-87.2429	(269)
Total CO2, kg/year			100.1518	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.9700	(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	298.5192	1.5817	472.1732	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	699.4109	1.5203	1063.2881	(278)
Space and water heating			1535.4613	(279)
Pumps, fans and electric keep-hot	154.9639	1.5128	234.4293	(281)
Energy for lighting	142.6135	1.5338	218.7453	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.5573	1.4925	-590.3537	
PV Unit electricity exported	-278.0661	0.4557	-126.7224	
Total			-717.0762	(283)
Total Primary energy kWh/year			1271.5598	(286)
Dwelling Primary energy Rate (DPER)			24.9600	(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)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1510	(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	Openings	NetArea	U-value	A x U	K-value	A x K

			m2	m2	m2	W/m2K	W/K	kJ/m2K	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
		29.1300	0.1600	4.6608
	Exposed floor (normal)	0.0000	0.3200	0.0000
E6	Intermediate floor within a dwelling	53.7200	0.0000	0.0000
E14	Flat roof	8.1800	0.0800	0.6544
E16	Corner (normal)	2.7000	0.0900	0.2430
E17	Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18	Party wall between dwellings	36.0000	0.0600	2.1600
E10	Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E11	Eaves (insulation at rafter level)	8.5400	0.0400	0.3416
E13	Gable (insulation at rafter level)	14.3900	0.0800	1.1512

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.1750 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 32.8464 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	25.9852	25.8249	25.6678	24.9299	24.7918	24.1491	24.1491	24.0301	24.3966	24.7918	25.0711	25.3631	(38)
Heat transfer coeff	58.8316	58.6713	58.5142	57.7762	57.6382	56.9955	56.9955	56.8764	57.2430	57.6382	57.9175	58.2095	(39)

Average = Sum(39)m / 12 = 57.7756

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1547	1.1515	1.1485	1.1340	1.1313	1.1187	1.1187	1.1163	1.1235	1.1313	1.1368	1.1425	(40)
HLP (average)												1.1340	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7181 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1528.9091	
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:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.3938 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss 23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

205.4143	181.7585	193.2574	170.2142	165.2269	149.1243	147.3048	152.9850	154.4872	171.9906	182.5620	203.2013	(62)
WWHRS -31.1120	-27.5157	-28.8129	-23.8582	-22.2350	-19.0266	-17.8344	-18.9651	-19.6857	-23.2073	-26.2910	-30.5359	(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												
174.3023	154.2427	164.4445	146.3560	142.9919	130.0976	129.4704	134.0199	134.8015	148.7833	156.2710	172.6654	(64)
									Total per year (kWh/year) = Sum(64)m =		1788.4467	(64)
12Total per year (kWh/year)											1788	(64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

90.0834	80.1098	86.0412	77.6767	76.7211	70.6643	70.7620	72.6506	72.4474	78.9700	81.7823	89.3475	(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	99.9276	110.6342	99.9276	103.2586	99.9276	103.2586	99.9276	99.9276	103.2586	99.9276	103.2586	99.9276	(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)	121.0798	119.2110	115.6468	107.8843	103.1197	98.1448	95.1102	97.6487	100.6214	106.1425	113.5865	120.0908	(72)
Total internal gains	422.4799	432.8710	414.6857	401.9204	383.3051	368.7740	355.8033	356.7884	367.0066	380.5304	401.8252	414.8857	(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	435.6850	458.7030	457.2273	463.9648	459.3429	446.6122	429.9084	420.4435	416.4842	411.1822	418.2904	425.7449 (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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	61.1074	61.2744	61.4389	62.2236	62.3726	63.0760	63.0760	63.2080	62.8032	62.3726	62.0718	61.7605	
alpha	5.0738	5.0850	5.0959	5.1482	5.1582	5.2051	5.2051	5.2139	5.1869	5.1582	5.1381	5.1174	
util living area	0.9909	0.9868	0.9798	0.9557	0.8949	0.7438	0.5681	0.6014	0.8153	0.9502	0.9831	0.9919	(86)
MIT	19.8567	19.9782	20.1678	20.4673	20.7394	20.9319	20.9863	20.9816	20.8844	20.5649	20.1798	19.8441	(87)
Th 2	19.9564	19.9590	19.9615	19.9732	19.9754	19.9856	19.9856	19.9875	19.9817	19.9754	19.9709	19.9663	(88)
util rest of house	0.9881	0.9825	0.9728	0.9390	0.8530	0.6535	0.4450	0.4795	0.7382	0.9283	0.9768	0.9894	(89)
MIT 2	18.6496	18.8054	19.0470	19.4275	19.7476	19.9451	19.9812	19.9810	19.9033	19.5509	19.0707	18.6408	(90)
Living area fraction										fLA = Living area / (4) =		0.4514	(91)
MIT	19.1945	19.3348	19.5530	19.8968	20.1953	20.3906	20.4349	20.4327	20.3462	20.0086	19.5714	19.1840	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1945	19.3348	19.5530	19.8968	20.1953	20.3906	20.4349	20.4327	20.3462	20.0086	19.5714	19.1840	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9853	0.9792	0.9693	0.9375	0.8631	0.6918	0.5009	0.5348	0.7684	0.9291	0.9737	0.9868	(94)
Useful gains	429.2712	449.1719	443.1809	434.9610	396.4815	308.9700	215.3476	224.8354	320.0156	382.0344	407.2721	420.1236	(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	876.2688	846.9078	763.7827	635.3564	489.6544	330.0372	218.5734	229.3645	357.5507	542.2952	722.3114	872.2114	(97)
Space heating kWh	332.5662	267.2786	238.5278	144.2847	69.3206	0.0000	0.0000	0.0000	0.0000	119.2340	226.8283	336.3533	(98a)
Space heating requirement - total per year (kWh/year)												1734.3934	
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	332.5662	267.2786	238.5278	144.2847	69.3206	0.0000	0.0000	0.0000	0.0000	119.2340	226.8283	336.3533	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1734.3934	
Space heating per m2											(98c) / (4) =	34.0411	(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	332.5662	267.2786	238.5278	144.2847	69.3206	0.0000	0.0000	0.0000	0.0000	119.2340	226.8283	336.3533	(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)	360.3101	289.5759	258.4266	156.3214	75.1036	0.0000	0.0000	0.0000	0.0000	129.1810	245.7512	364.4131	(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	174.3023	154.2427	164.4445	146.3560	142.9919	130.0976	129.4704	134.0199	134.8015	148.7833	156.2710	172.6654	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.4846	85.2805	84.8929	84.0278	82.5311	79.8000	79.8000	79.8000	79.8000	83.5680	84.8944	85.5280	(217)
Fuel for water heating, kWh/month	203.8991	180.8651	193.7082	174.1757	173.2583	163.0296	162.2436	167.9447	168.9242	178.0387	184.0769	201.8819	(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	20.7630	16.6568	14.9976	10.9879	8.4874	6.9343	7.7425	10.0640	13.0721	17.1513	19.3723	21.3401	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-11.4368	-17.2240	-26.4206	-31.7657	-36.0936	-34.3843	-33.9985	-31.2028	-26.5658	-20.6160	-12.9690	-9.7658	(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	-3.4833	-7.5484	-15.4235	-23.7905	-32.0708	-32.4349	-32.0214	-26.7964	-19.2544	-10.9595	-4.7041	-2.7361	(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	1879.0828	(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	2152.0459	(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)	167.5692	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
	-503.6663	(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	3781.0317	(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	1879.0828	0.2100	394.6074	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2152.0459	0.2100	451.9296	(264)
Space and water heating			846.5370	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	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			817.2592	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.0400	(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	1879.0828	1.1300	2123.3636	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2152.0459	1.1300	2431.8119	(278)
Space and water heating			4555.1755	(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			4408.8719	(286)
Target Primary Energy Rate (TPER)			86.5300	(287)