Full SAP Calculation Printout

Property Reference	Plot 2	**Issued on Date**	21/12/2023
Assessment Reference	Plot 2 Be Lean	**Prop Type Ref**	Plot 1 Be Green
Property	Plot 1 , 95, Avenue Road, London, NW8 6HY		

SAP Rating	73 C	**DER**	25.47	**TER**	12.08
Environmental	73 C	**% DER < TER**			-110.84
CO_2 Emissions (t/year)	3.62	**DFEE**	97.01	**TFEE**	56.59
Compliance Check	See BREL	**% DFEE < TFEE**			-71.41
% DPER < TPER	-122.05	**DPER**	142.26	**TPER**	64.07

Assessor Details	Mr. Graham Suttill	**Assessor ID**	P035-0001
Client	Carnell Warren Associates Ltd, Wendy Warren		

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)	
Basement floor	99.1000	(1a)	x 2.6900	(2a) =	266.5790	(1a) - (3a)
Ground floor	69.6600	(1b)	x 3.2200	(2b) =	224.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	168.7600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		490.8842	(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		6.0000	(17)
Infiltration rate		0.3000	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2325	(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	0.2964	0.2906	0.2848	0.2557	0.2499	0.2209	0.2209	0.2151	0.2325	0.2499	0.2616	0.2732	(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) =	75.6000	(23c)

Effective ac	0.4184	0.4126	0.4068	0.3777	0.3719	0.3429	0.3429	0.3371	0.3545	0.3719	0.3836	0.3952	(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	
Entrance Door			2.8800	1.4000	4.0320			(26)
Windows (Uw = 1.40)			28.5800	1.3258	37.8902			(27)
Glazed Doors (Uw = 1.40)			6.0200	1.3258	7.9811			(27)
Glazed Wall (Uw = 1.40)			27.7200	1.3258	36.7500			(27)
GF RL			2.9500	1.2357	3.6454			(27a)
1F RL			7.1700	1.2357	8.8603			(27a)
Basement Floor			77.2700	0.2500	19.3175	110.0000	8499.7000	(28)
Basement Floor 2			21.8700	0.2500	5.4675	110.0000	2405.7000	(28)
Retaining Wall	92.3800		92.3800	0.3000	27.7140	9.0000	831.4200	(29a)
External Wall	57.9400		57.9400	0.3000	17.3820	9.0000	521.4600	(29a)
New External Wall	108.5300	65.2000	43.3300	0.1800	7.7994	150.0000	6499.5000	(29a)
Flat Roof GF	30.4900	2.9500	27.5400	0.1500	4.1310	9.0000	247.8600	(30)
Flat Roof First Floor	69.6600	7.1700	62.4900	0.1500	9.3735	9.0000	562.4100	(30)
Total net area of external elements Aum(A, m2)			458.1400					(31)

Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	190.3438			(33)
Party Wall 1	52.9900	0.0000	0.0000	70.0000	3709.3000 (32)
Internal Wall 1	265.7400			75.0000	19930.5000 (32c)
Internal Floor 1	68.2000			18.0000	1227.6000 (32d)
Internal Ceiling 1	68.2000			9.0000	613.8000 (32e)
Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =				45049.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					266.9427 (35)
Thermal bridges (Default value 0.200 * total exposed area)					91.6280 (36)
Point Thermal bridges				(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =	281.9718 (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	67.7834	66.8419	65.9003	61.1924	60.2508	55.5429	55.5429	54.6014	57.4261	60.2508	62.1340	64.0171	(38)
Heat transfer coeff	349.7553	348.8137	347.8721	343.1642	342.2226	337.5147	337.5147	336.5732	339.3979	342.2226	344.1058	345.9889	(39)
Average = Sum(39)m / 12 =												342.9288	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0725	2.0669	2.0613	2.0334	2.0279	2.0000	2.0000	1.9944	2.0111	2.0279	2.0390	2.0502	(40)
HLP (average)												2.0321	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9609	(42)
Hot water usage for mixer showers	83.0977	81.8489	80.0291	76.5474	73.9779	71.1125	69.4838	71.2898	73.2695	76.3460	79.9026	82.7793	(42a)
Hot water usage for baths	31.8874	31.4138	30.7469	29.5173	28.5966	27.5756	27.0242	27.6864	28.4075	29.4999	30.7548	31.7796	(42b)
Hot water usage for other uses	44.9527	43.3180	41.6834	40.0488	38.4141	36.7795	36.7795	38.4141	40.0488	41.6834	43.3180	44.9527	(42c)
Average daily hot water use (litres/day)												147.0440	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	159.9377	156.5807	152.4594	146.1134	140.9886	135.4676	133.2875	137.3903	141.7257	147.5293	153.9755	159.5116	(44)
Energy conte	253.3023	222.9689	234.3245	200.0220	189.7978	166.5732	161.1996	170.1179	174.7619	200.1959	219.3663	249.7565	(45)
Energy content (annual)										Total = Sum(45)m =		2442.3868	
Distribution loss (46)m = 0.15 x (45)m	37.9953	33.4453	35.1487	30.0033	28.4697	24.9860	24.1799	25.5177	26.2143	30.0294	32.9049	37.4635	(46)
Water storage loss:													
Store volume												300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9720	(55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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	306.6967	271.1961	287.7189	251.6940	243.1922	218.2452	214.5940	223.5123	226.4339	253.5903	271.0383	303.1509	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	306.6967	271.1961	287.7189	251.6940	243.1922	218.2452	214.5940	223.5123	226.4339	253.5903	271.0383	303.1509	(64)
										Total per year (kWh/year) = Sum(64)m =		3071.0628	(64)
12Total per year (kWh/year)												3071	(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	126.9385	112.7189	120.6284	107.8449	105.8233	96.7232	96.3144	99.2797	99.4459	109.2807	114.2769	125.7596	(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	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	171.6337	190.0230	171.6337	177.3548	171.6337	177.3548	171.6337	171.6337	177.3548	171.6337	177.3548	171.6337	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	340.2829	343.8140	334.9158	315.9726	292.0603	269.5860	254.5718	251.0407	259.9389	278.8821	302.7945	325.2687	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	(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)	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	(71)
Water heating gains (Table 5)	170.6163	167.7365	162.1350	149.7846	142.2356	134.3378	129.4548	133.4405	138.1194	146.8826	158.7179	169.0317	(72)
Total internal gains	752.9465	771.9871	739.0981	713.5257	676.3432	648.6922	623.0740	623.5285	642.8267	667.8120	709.2808	736.3477	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	7.8500	10.6334	0.4000	0.7000	0.5400	11.3589	(74)
East	17.3900	19.6403	0.4000	0.7000	0.5400	46.4773	(76)
West	3.3400	19.6403	0.4000	0.7000	0.5400	8.9266	(80)
North	6.0200	10.6334	0.4000	0.7000	0.5400	8.7109	(74)
North	20.2300	10.6334	0.4000	0.7000	0.5400	29.2726	(74)
West	7.4900	19.6403	0.4000	0.7000	0.5400	20.0181	(80)
East	7.1700	26.0000	0.4000	0.7000	1.0000	46.9778	(82)

West			2.9500		26.0000		0.4000		0.7000		1.0000		19.3284 (82)
Solar gains	191.0708	379.5505	648.0349	994.2813	1270.6476	1325.7858	1251.7769	1038.8822	768.5240	455.6334	239.0706	156.7128 (83)	
Total gains	944.0173	1151.5376	1387.1330	1707.8069	1946.9908	1974.4780	1874.8508	1662.4107	1411.3507	1123.4454	948.3515	893.0605 (84)	

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	35.7784	35.8750	35.9721	36.4656	36.5659	37.0760	37.0760	37.1797	36.8702	36.5659	36.3658	36.1679	
alpha	3.3852	3.3917	3.3981	3.4310	3.4377	3.4717	3.4717	3.4786	3.4580	3.4377	3.4244	3.4112	
util living area	0.9982	0.9963	0.9910	0.9715	0.9192	0.8099	0.6788	0.7483	0.9230	0.9869	0.9969	0.9986	(86)
MIT	18.9987	19.1651	19.4760	19.9323	20.3635	20.6901	20.8276	20.7914	20.5019	19.9484	19.4059	18.9843	(87)
Th 2	19.2854	19.2891	19.2928	19.3111	19.3148	19.3334	19.3334	19.3371	19.3259	19.3148	19.3074	19.3001	(88)
util rest of house	0.9975	0.9948	0.9868	0.9569	0.8721	0.6882	0.4698	0.5509	0.8549	0.9780	0.9953	0.9980	(89)
MIT 2	17.0172	17.2326	17.6319	18.2202	18.7425	19.0987	19.1984	19.1866	18.9253	18.2509	17.5541	17.0086	(90)
Living area fraction										fLA = Living area / (4) =		0.1647	(91)
MIT	17.3436	17.5509	17.9357	18.5022	19.0095	19.3609	19.4668	19.4510	19.1850	18.5306	17.8592	17.3341	(92)
Temperature adjustment												-0.1500	
adjusted MIT	17.1936	17.4009	17.7857	18.3522	18.8595	19.2109	19.3168	19.3010	19.0350	18.3806	17.7092	17.1841	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9960	0.9919	0.9810	0.9443	0.8543	0.6766	0.4673	0.5454	0.8369	0.9696	0.9927	0.9968	(94)
Useful gains	940.2648	1142.2457	1360.7137	1612.7567	1663.2637	1336.0140	876.1805	906.6814	1181.2263	1089.2690	941.3884	890.1651	(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	4509.6008	4360.4944	3925.9825	3243.6689	2450.1431	1556.2393	916.9586	976.3896	1674.9227	2662.6834	3650.6789	4492.3459	(97)
Space heating kWh	2655.5860	2162.6631	1908.5600	1174.2568	585.4382	0.0000	0.0000	0.0000	0.0000	1170.6204	1950.6891	2680.0225	(98a)
Space heating requirement - total per year (kWh/year)												14287.8363	
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	2655.5860	2162.6631	1908.5600	1174.2568	585.4382	0.0000	0.0000	0.0000	0.0000	1170.6204	1950.6891	2680.0225	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												14287.8363	
Space heating per m2										(98c) / (4) =		84.6636	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	3172.6386	2497.6091	2557.9561	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6267	0.7095	0.6445	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1988.2016	1771.9835	1648.6249	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2235.9315	2122.3664	1874.7290	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	178.3655	260.6849	168.2214	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		0.5926	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	26.4230	38.6177	24.9202	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												89.9609	(107)

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 %)	88.8000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)	5.6000 (209)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	2655.5860	2162.6631	1908.5600	1174.2568	585.4382	0.0000	0.0000	0.0000	0.0000	1170.6204	1950.6891	2680.0225	(98)
Space heating efficiency (main heating system 1)	88.8000	88.8000	88.8000	88.8000	88.8000	0.0000	0.0000	0.0000	0.0000	88.8000	88.8000	88.8000	(210)
Space heating fuel (main heating system)	2990.5248	2435.4315	2149.2792	1322.3613	659.2773	0.0000	0.0000	0.0000	0.0000	1318.2662	2196.7220	3018.0434	(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	306.6967	271.1961	287.7189	251.6940	243.1922	218.2452	214.5940	223.5123	226.4339	253.5903	271.0383	303.1509	(64)
Efficiency of water heater												79.8000	(216)
(217)m	87.7751	87.6979	87.5071	87.0668	85.9549	79.8000	79.8000	79.8000	79.8000	87.0519	87.5948	87.7938	(217)
Fuel for water heating, kWh/month	349.4120	309.2389	328.7949	289.0816	282.9300	273.4903	268.9148	280.0906	283.7518	291.3095	309.4228	345.2988	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	4.7184	6.8960	4.4500	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	67.1198	60.6243	67.1198	64.9546	67.1198	64.9546	67.1198	67.1198	64.9546	67.1198	64.9546	67.1198	(231)
Lighting	42.6002	34.1755	30.7712	22.5443	17.4139	14.2273	15.8855	20.6486	26.8205	35.1899	39.7469	43.7842	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													

(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	16089.9057	(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	3611.7360	(219)
Space cooling fuel	16.0644	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.1760)		
mechanical ventilation fans (SFP = 1.1760)	704.2814	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	790.2814	(231)
Electricity for lighting (calculated in Appendix L)	343.8080	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	20851.7955	(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	16089.9057	0.2100	3378.8802	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3611.7360	0.2100	758.4646	(264)
Space and water heating			4137.3448	(265)
Space cooling	16.0644	0.1139	1.8301	(266)
Pumps, fans and electric keep-hot	790.2814	0.1387	109.6218	(267)
Energy for lighting	343.8080	0.1443	49.6221	(268)
Total CO2, kg/year			4298.4187	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			25.4700	(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	16089.9057	1.1300	18181.5934	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3611.7360	1.1300	4081.2617	(278)
Space and water heating			22262.8551	(279)
Space cooling	16.0644	1.4199	22.8105	(280)
Pumps, fans and electric keep-hot	790.2814	1.5128	1195.5377	(281)
Energy for lighting	343.8080	1.5338	527.3442	(282)
Total Primary energy kWh/year			24008.5474	(286)
Dwelling Primary energy Rate (DPER)			142.2600	(287)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Basement floor	99.1000	(1a) x	2.6900	(2a) =	266.5790	(1a) - (3a)
Ground floor	69.6600	(1b) x	3.2200	(2b) =	224.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	168.7600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		490.8842	(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	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.0815	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3315	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2569	(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	0.3275	0.3211	0.3147	0.2826	0.2762	0.2441	0.2441	0.2376	0.2569	0.2762	0.2890	0.3019	(22b)
Effective ac	0.5536	0.5516	0.5495	0.5399	0.5381	0.5298	0.5298	0.5282	0.5330	0.5381	0.5418	0.5456	(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	
TER Opaque door			2.8800	1.0000	2.8800			(26)
TER Opening Type (Uw = 1.20)			33.8200	1.1450	38.7252			(27)
GF RL			1.6000	2.0221	3.2353			(27a)
1F RL			3.8900	2.0221	7.8658			(27a)
Basement Floor			77.2700	0.1300	10.0451			(28)
Basement Floor 2			21.8700	0.1300	2.8431			(28)
Retaining Wall	92.3800		92.3800	0.1800	16.6284			(29a)
External Wall	57.9400		57.9400	0.1800	10.4292			(29a)
New External Wall	108.5300	36.7000	71.8300	0.1800	12.9294			(29a)
Flat Roof GF	30.4900	1.6000	28.8900	0.1100	3.1779			(30)
Flat Roof First Floor	69.6600	3.8900	65.7700	0.1100	7.2347			(30)
Total net area of external elements Aum(A, m2)			458.1400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		115.9941			(33)
Party Wall 1			52.9900	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.9427	(35)
Thermal bridges (User defined value 0.050 * total exposed area)							22.9070	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		138.9011	(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	89.6858	89.3484	89.0176	87.4641	87.1734	85.8203	85.8203	85.5697	86.3415	87.1734	87.7614	88.3762	(38)
Heat transfer coeff	228.5869	228.2495	227.9187	226.3652	226.0745	224.7214	224.7214	224.4708	225.2426	226.0745	226.6625	227.2772	(39)
Average = Sum(39)m / 12 =												226.3638	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3545	1.3525	1.3505	1.3413	1.3396	1.3316	1.3316	1.3301	1.3347	1.3396	1.3431	1.3467	(40)
HLP (average)												1.3413	
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												2.9609	(42)
Hot water usage for mixer showers	73.8646	72.7545	71.1370	68.0421	65.7582	63.2111	61.7634	63.3687	65.1284	67.8631	71.0245	73.5816	(42a)
Hot water usage for baths	31.8874	31.4138	30.7469	29.5173	28.5966	27.5756	27.0242	27.6864	28.4075	29.4999	30.7548	31.7796	(42b)
Hot water usage for other uses	44.9527	43.3180	41.6834	40.0488	38.4141	36.7795	36.7795	38.4141	40.0488	41.6834	43.3180	44.9527	(42c)
Average daily hot water use (litres/day)												138.5314	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	150.7047	147.4864	143.5673	137.6082	132.7689	127.5662	125.5670	129.4692	133.5846	139.0464	145.0974	150.3139	(44)
Energy conte	238.6793	210.0187	220.6576	188.3787	178.7324	156.8576	151.8624	160.3099	164.7232	188.6847	206.7178	235.3552	(45)
Energy content (annual)										Total = Sum(45)m =		2300.9776	
Distribution loss (46)m = 0.15 x (45)m	35.8019	31.5028	33.0986	28.2568	26.8099	23.5286	22.7794	24.0465	24.7085	28.3027	31.0077	35.3033	(46)
Water storage loss:													
Store volume												300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1127	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.1409	(55)
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(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	297.3082	262.9737	279.2864	245.1163	237.3612	213.5951	210.4913	218.9387	221.4607	247.3135	263.4554	293.9840	(62)
WWHRS	-33.7678	-29.8645	-31.2724	-25.8948	-24.1330	-20.6508	-19.3568	-20.5840	-21.3661	-25.1883	-28.5353	-33.1425	(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	263.5404	233.1092	248.0140	219.2215	213.2282	192.9443	191.1344	198.3547	200.0946	222.1252	234.9201	260.8415	(64)
										Total per year (kWh/year) = Sum(64)m =		2677.5283	(64)
12Total per year (kWh/year)												2678	(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	126.2639	112.1953	120.2717	108.0260	106.3316	97.5452	97.3973	100.2061	100.1605	109.6407	114.1237	125.1586	(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	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	148.0455	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	172.7571	191.2668	172.7571	178.5157	172.7571	178.5157	172.7571	172.7571	178.5157	172.7571	178.5157	172.7571	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	340.2829	343.8140	334.9158	315.9726	292.0603	269.5860	254.5718	251.0407	259.9389	278.8821	302.7945	325.2687	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	37.8046	(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)													
	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	-118.4364	(71)
Water heating gains (Table 5)													
	169.7096	166.9572	161.6555	150.0361	142.9188	135.4794	130.9104	134.6856	139.1118	147.3666	158.5052	168.2240	(72)
Total internal gains													
	753.1633	772.4517	739.7421	714.9381	678.1498	650.9948	625.6530	625.8972	644.9801	669.4195	710.2290	736.6635	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	18.5100	10.6334	0.6300	0.7000	0.5400	42.1845	(74)
East	9.4400	19.6403	0.6300	0.7000	0.5400	39.7369	(76)
West	5.8700	19.6403	0.6300	0.7000	0.5400	24.7093	(80)
East	3.8900	26.0000	0.6300	0.7000	1.0000	40.1425	(82)
West	1.6000	26.0000	0.6300	0.7000	1.0000	16.5110	(82)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	163.2842	324.3522	553.7899	849.6859	1085.8692	1132.9936	1069.7450	887.8034	656.7571	389.3697	204.3033	133.9231	(83)
Total gains	916.4475	1096.8039	1293.5320	1564.6239	1764.0191	1783.9884	1695.3980	1513.7005	1301.7372	1058.7892	914.5323	870.5866	(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	54.7436	54.8246	54.9041	55.2809	55.3520	55.6853	55.6853	55.7475	55.5565	55.3520	55.2084	55.0591	
alpha	4.6496	4.6550	4.6603	4.6854	4.6901	4.7124	4.7124	4.7165	4.7038	4.6901	4.6806	4.6706	
util living area	0.9990	0.9975	0.9923	0.9676	0.8881	0.7262	0.5631	0.6419	0.8891	0.9868	0.9978	0.9992	(86)
MIT	19.3102	19.4967	19.8222	20.2850	20.6872	20.9166	20.9801	20.9644	20.7682	20.2374	19.6943	19.2809	(87)
Th 2	19.7984	19.7999	19.8014	19.8086	19.8099	19.8162	19.8162	19.8173	19.8138	19.8099	19.8072	19.8044	(88)
util rest of house	0.9986	0.9965	0.9891	0.9533	0.8398	0.6228	0.4219	0.4964	0.8199	0.9789	0.9968	0.9989	(89)
MIT 2	17.8350	18.0748	18.4913	19.0764	19.5462	19.7703	19.8105	19.8056	19.6491	19.0267	18.3334	17.8016	(90)
Living area fraction									fLA = Living area / (4) =			0.1647	(91)
MIT	18.0780	18.3090	18.7105	19.2755	19.7342	19.9592	20.0032	19.9965	19.8334	19.2261	18.5576	18.0453	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0780	18.3090	18.7105	19.2755	19.7342	19.9592	20.0032	19.9965	19.8334	19.2261	18.5576	18.0453	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9977	0.9946	0.9847	0.9447	0.8361	0.6366	0.4452	0.5201	0.8214	0.9731	0.9951	0.9982	(94)
Useful gains	914.3564	1090.8595	1273.7911	1478.1649	1474.8580	1135.6089	754.8058	787.3249	1069.2191	1030.3213	910.0422	869.0270	(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	3149.4788	3060.6073	2783.0063	2348.6490	1816.3192	1204.3173	764.7692	807.3022	1291.4156	1950.1431	2597.0062	3146.7176	(97)
Space heating kWh	1662.9311	1323.6705	1122.8561	626.7486	254.0471	0.0000	0.0000	0.0000	0.0000	684.3475	1214.6141	1694.6018	(98a)
Space heating requirement - total per year (kWh/year)												8583.8168	
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	1662.9311	1323.6705	1122.8561	626.7486	254.0471	0.0000	0.0000	0.0000	0.0000	684.3475	1214.6141	1694.6018	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8583.8168	
Space heating per m2											(98c) / (4) =	50.8640	(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	1662.9311	1323.6705	1122.8561	626.7486	254.0471	0.0000	0.0000	0.0000	0.0000	684.3475	1214.6141	1694.6018	(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)	1801.6588	1434.0959	1216.5288	679.0342	275.2407	0.0000	0.0000	0.0000	0.0000	741.4382	1315.9416	1835.9717	(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													
	263.5404	233.1092	248.0140	219.2215	213.2282	192.9443	191.1344	198.3547	200.0946	222.1252	234.9201	260.8415	(64)
Efficiency of water heater												79.8000	(216)
(217)m	87.4508	87.3253	87.0243	86.2784	84.4536	79.8000	79.8000	79.8000	79.8000	86.4119	87.2060	87.4839	(217)
Fuel for water heating, kWh/month													
	301.3586	266.9436	284.9939	254.0861	252.4797	241.7849	239.5168	248.5648	250.7452	257.0540	269.3852	298.1596	(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	35.8955	28.7967	25.9283	18.9962	14.6732	11.9881	13.3854	17.3988	22.5993	29.6515	33.4913	36.8932	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-81.0123	-108.7272	-148.8139	-158.9738	-164.5703	-151.0368	-148.9311	-143.7018	-133.8299	-119.9718	-86.9823	-70.6797	(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	-64.0896	-132.1894	-258.1294	-381.3224	-498.3437	-498.7948	-493.1267	-420.3537	-311.7816	-187.1070	-84.8924	-50.9041	(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	9299.9099	(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	3165.0722	(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)	289.6974	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-4898.2658	(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	7942.4138	(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	9299.9099	0.2100	1952.9811	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3165.0722	0.2100	664.6652	(264)
Space and water heating			2617.6463	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	289.6974	0.1443	41.8123	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1517.2309	0.1357	-205.8753	
PV Unit electricity exported	-3381.0349	0.1264	-427.3033	
Total			-633.1787	(269)
Total CO2, kg/year			2038.2092	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0800	(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	9299.9099	1.1300	10508.8982	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3165.0722	1.1300	3576.5316	(278)
Space and water heating			14085.4298	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	289.6974	1.5338	444.3476	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1517.2309	1.5016	-2278.2035	
PV Unit electricity exported	-3381.0349	0.4639	-1568.5681	
Total			-3846.7716	(283)
Total Primary energy kWh/year			10813.1066	(286)
Target Primary Energy Rate (TPER)			64.0700	(287)