Full SAP Calculation Printout

Property Reference	10 Pickett's Lock	**Issued on Date**	15/01/2024
Assessment Reference	01 Baseline	**Prop Type Ref**	New build
Property	New build at, 10, Pickett's Lock Lane, London, N9 0AY		

SAP Rating	85 B	**DER**	13.63	**TER**	10.05
Environmental	87 B	**% DER < TER**			-35.62
CO_2 Emissions (t/year)	1.59	**DFEE**	39.84	**TFEE**	39.45
Compliance Check	See BREL	**% DFEE < TFEE**			-0.99
% DPER < TPER	-43.52	**DPER**	75.29	**TPER**	52.46

Assessor Details	Mr. Thomas McMahon	**Assessor ID**	R863-0001
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	60.3400 (1b)	x	2.4000 (2b)	=	144.8160	(1b) - (3b)
First floor	44.0500 (1c)	x	2.6100 (2c)	=	114.9705	(1c) - (3c)
Second floor	32.5100 (1d)	x	2.2800 (2d)	=	74.1228	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	136.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	333.9093	(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	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) =	0.1198	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3698	(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) =	0.2866	(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	0.3654	0.3582	0.3511	0.3152	0.3081	0.2723	0.2723	0.2651	0.2866	0.3081	0.3224	0.3367	(22b)
Effective ac	0.5668	0.5642	0.5616	0.5497	0.5475	0.5371	0.5371	0.5351	0.5411	0.5475	0.5520	0.5567	(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	
Glazing (Uw = 1.20)			23.0000	1.1450	26.3359			(27)
Door			1.9000	1.2000	2.2800			(26a)
N RW			2.3100	1.1450	2.6450			(27a)
Ground Floor			60.3400	0.1300	7.8442	110.0000	6637.4000	(28a)
External Wall	169.0400	22.3700	146.6700	0.1800	26.4006	60.0000	8800.2000	(29a)
Dormer Walls	17.4900	2.5300	14.9600	0.1800	2.6928	9.0000	134.6400	(29a)
Dwarf Walls	10.1500		10.1500	0.1800	1.8270	9.0000	91.3500	(29a)
Joisted Roof	16.2900		16.2900	0.1300	2.1177	9.0000	146.6100	(30)
Rafter Roof	29.3500	2.3100	27.0400	0.1300	3.5152	9.0000	243.3600	(30)
Rafter Eaves	7.6200		7.6200	0.1300	0.9906	9.0000	68.5800	(30)
Flat Dormer Roof	12.0600		12.0600	0.1300	1.5678	9.0000	108.5400	(30)
Total net area of external elements Aum(A, m2)			322.3400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		78.2168			(33)
Internal Wall			171.7200			9.0000	1545.4800	(32c)
Internal Floor 1			44.0500			18.0000	792.9000	(32d)
Internal Floor 2			32.5100			18.0000	585.1800	(32d)
Internal Ceiling 1			44.0500			9.0000	396.4500	(32e)
Internal Ceiling 2			32.5100			9.0000	292.5900	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 19843.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 144.9473 (35)
List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
	E2 Other lintels (including other steel lintels)	14.5800	0.0700	1.0206
	E2 Other lintels (including other steel lintels)	2.3000	1.0000	2.3000
	E3 Sill	8.0900	0.0220	0.1780
	E3 Sill	2.3000	0.1000	0.2300
	E4 Jamb	22.6200	0.0180	0.4072
	E4 Jamb	4.4000	0.1000	0.4400
	E5 Ground floor (normal)	33.6200	0.0500	1.6810
	E6 Intermediate floor within a dwelling	27.3800	0.0010	0.0274
	E10 Eaves (insulation at ceiling level)	17.3600	0.0580	1.0069
	E24 Eaves (insulation at ceiling level - inverted)	15.4300	0.1500	2.3145
	E11 Eaves (insulation at rafter level)	10.2800	0.0210	0.2159
	E12 Gable (insulation at ceiling level)	4.3400	0.0350	0.1519
	E13 Gable (insulation at rafter level)	22.3600	0.0280	0.6261
	E16 Corner (normal)	23.6000	0.0350	0.8260
	E17 Corner (inverted - internal area greater than external area)	4.8000	-0.0660	-0.3168
	R1 Head of roof window	2.1000	0.2400	0.5040
	R2 Sill of roof window	2.1000	0.2400	0.5040
	R3 Jamb of roof window	6.6000	0.2400	1.5840
	R6 Flat ceiling	16.4900	0.1200	1.9788
	R7 Flat ceiling (inverted)	7.7400	0.1200	0.9288
	R9 Roof to wall (flat ceiling)	10.0000	0.3200	3.2000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.8082 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 98.0250 (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	62.4512	62.1656	61.8856	60.5705	60.3244	59.1790	59.1790	58.9669	59.6202	60.3244	60.8222	61.3426	(38)
Heat transfer coeff	160.4762	160.1906	159.9106	158.5954	158.3494	157.2040	157.2040	156.9918	157.6452	158.3494	158.8472	159.3675	(39)

Average = Sum(39)m / 12 = 158.5943

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1722	1.1701	1.1681	1.1585	1.1567	1.1483	1.1483	1.1468	1.1515	1.1567	1.1603	1.1641	(40)
HLP (average)												1.1585	
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 2.9109 (42)
Hot water usage for mixer showers

73.0267	71.9292	70.3300	67.2703	65.0122	62.4941	61.0628	62.6499	64.3896	67.0933	70.2188	72.7469	(42a)

Hot water usage for baths

31.5271	31.0589	30.3995	29.1838	28.2735	27.2641	26.7188	27.3736	28.0865	29.1666	30.4073	31.4205	(42b)

Hot water usage for other uses

44.4409	42.8249	41.2088	39.5928	37.9768	36.3607	36.3607	37.9768	39.5928	41.2088	42.8249	44.4409	(42c)

Average daily hot water use (litres/day) 136.9596 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	148.9947	145.8130	141.9384	136.0469	131.2625	126.1189	124.1423	128.0002	132.0689	137.4687	143.4510	148.6083	(44)
Energy conte	235.9712	207.6357	218.1540	186.2413	176.7045	155.0779	150.1394	158.4910	162.8541	186.5438	204.3723	232.6847	(45)
Energy content (annual)										Total = Sum(45)m =		2274.8699	
Distribution loss (46)m = 0.15 x (45)m	35.3957	31.1454	32.7231	27.9362	26.5057	23.2617	22.5209	23.7736	24.4281	27.9816	30.6558	34.9027	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	32.0314	28.9261	32.0136	30.9560	31.9722	30.9249	31.9456	31.9540	30.9327	31.9820	30.9742	32.0281	(61)
Total heat required for water heating calculated for each month	268.0026	236.5619	250.1676	217.1974	208.6767	186.0027	182.0850	190.4449	193.7868	218.5258	235.3465	264.7128	(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	268.0026	236.5619	250.1676	217.1974	208.6767	186.0027	182.0850	190.4449	193.7868	218.5258	235.3465	264.7128	(64)
										Total per year (kWh/year) = Sum(64)m =		2651.5107	(64)
12Total per year (kWh/year)												2652	(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	86.4683	76.2704	80.5396	69.6643	66.7473	59.2946	57.9077	60.6867	61.8822	70.0213	75.6973	85.3747	(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	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.5024	173.2705	156.5024	161.7191	156.5024	161.7191	156.5024	156.5024	161.7191	156.5024	161.7191	156.5024	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	305.8589	309.0328	301.0348	284.0079	262.5146	242.3139	228.8186	225.6447	233.6428	250.6696	272.1629	292.3636	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	(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)	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	(71)
Water heating gains (Table 5)	116.2208	113.4976	108.2522	96.7559	89.7141	82.3536	77.8330	81.5682	85.9475	94.1147	105.1352	114.7509	(72)
Total internal gains	648.2462	665.4650	635.4534	612.1470	578.3951	553.0507	529.8180	530.3794	547.9734	570.9507	608.6813	633.2810	(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	
North	5.9000	10.6334	0.6300	0.7000	0.7700	19.1732	(74)
South	16.0200	46.7521	0.6300	0.7000	0.7700	228.8944	(78)
West	1.0800	19.6403	0.6300	0.7000	0.7700	6.4825	(80)
North	2.3100	15.6897	0.6300	0.7000	1.0000	14.3849	(82)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	268.9351	451.1743	609.0365	757.2554	862.5378	865.8025	830.5365	748.4278	658.6948	495.4351	320.6168	231.2591	(83)
Total gains	917.1812	1116.6392	1244.4898	1369.4024	1440.9329	1418.8532	1360.3545	1278.8072	1206.6681	1066.3858	929.2981	864.5401	(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	34.3479	34.4092	34.4694	34.7552	34.8092	35.0629	35.0629	35.1102	34.9647	34.8092	34.7002	34.5869	
alpha	3.2899	3.2939	3.2980	3.3170	3.3206	3.3375	3.3375	3.3407	3.3310	3.3206	3.3133	3.3058	
util living area	0.9805	0.9630	0.9361	0.8781	0.7768	0.6246	0.4808	0.5249	0.7277	0.9017	0.9663	0.9837	(86)
MIT	19.3500	19.5914	19.8971	20.2785	20.5972	20.8023	20.8747	20.8631	20.7233	20.3058	19.7583	19.3065	(87)
Th 2	19.9423	19.9440	19.9456	19.9534	19.9548	19.9616	19.9616	19.9628	19.9590	19.9548	19.9519	19.9488	(88)
util rest of house	0.9766	0.9558	0.9233	0.8529	0.7298	0.5467	0.3782	0.4214	0.6580	0.8760	0.9584	0.9805	(89)
MIT 2	18.0114	18.3173	18.7018	19.1756	19.5481	19.7674	19.8274	19.8215	19.6941	19.2195	18.5377	17.9609	(90)
Living area fraction										fLA = Living area / (4) =		0.1490	(91)
MIT	18.2108	18.5072	18.8799	19.3400	19.7044	19.9216	19.9835	19.9768	19.8475	19.3814	18.7196	18.1614	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.2108	18.5072	18.8799	19.3400	19.7044	19.9216	19.9835	19.9768	19.8475	19.3814	18.7196	18.1614	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9677	0.9429	0.9070	0.8353	0.7171	0.5434	0.3805	0.4229	0.6496	0.8585	0.9461	0.9727	(94)
Useful gains	887.5709	1052.8845	1128.7725	1143.9006	1033.2422	771.0757	517.5531	540.7939	783.7991	915.4733	879.2058	840.9110	(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	2232.3586	2179.7407	1979.6790	1655.7330	1267.4909	836.5795	531.9011	561.5208	906.0670	1390.5303	1845.7451	2224.9933	(97)
Space heating kWh	1000.5220	757.2474	633.0744	368.5193	174.2810	0.0000	0.0000	0.0000	0.0000	353.4424	695.9083	1029.7572	(98a)
Space heating requirement - total per year (kWh/year)												5012.7522	
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	1000.5220	757.2474	633.0744	368.5193	174.2810	0.0000	0.0000	0.0000	0.0000	353.4424	695.9083	1029.7572	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5012.7522	
Space heating per m2										(98c) / (4) =		36.6162	(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 %) 88.8000 (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	1000.5220	757.2474	633.0744	368.5193	174.2810	0.0000	0.0000	0.0000	0.0000	353.4424	695.9083	1029.7572	(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)	1126.7140	852.7561	712.9217	414.9993	196.2624	0.0000	0.0000	0.0000	0.0000	398.0207	783.6806	1159.6365	(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	268.0026	236.5619	250.1676	217.1974	208.6767	186.0027	182.0850	190.4449	193.7868	218.5258	235.3465	264.7128	(64)
Efficiency of water heater												88.2000	(216)
(217)m	88.6726	88.6564	88.6292	88.5766	88.4720	88.2000	88.2000	88.2000	88.2000	88.5698	88.6476	88.6766	(217)
Fuel for water heating, kWh/month	302.2385	266.8299	282.2631	245.2087	235.8673	210.8875	206.4456	215.9240	219.7129	246.7272	265.4854	298.5147	(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	33.3268	26.7360	24.0728	17.6368	13.6231	11.1302	12.4275	16.1537	20.9821	27.5296	31.0947	34.2531	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	5644.9912	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	88.2000	
Water heating fuel used	2996.1048	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	268.9664	(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	8996.0623	(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	5644.9912	0.2100	1185.4481	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2996.1048	0.2100	629.1820	(264)
Space and water heating			1814.6301	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	268.9664	0.1443	38.8202	(268)
Total CO2, kg/year			1865.3796	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.6300	(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	5644.9912	1.1300	6378.8400	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2996.1048	1.1300	3385.5984	(278)
Space and water heating			9764.4384	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	268.9664	1.5338	412.5496	(282)
Total Primary energy kWh/year			10307.0888	(286)
Dwelling Primary energy Rate (DPER)			75.2900	(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)	
Ground floor	60.3400 (1b)	x	2.4000 (2b)	=	144.8160	(1b) - (3b)
First floor	44.0500 (1c)	x	2.6100 (2c)	=	114.9705	(1c) - (3c)
Second floor	32.5100 (1d)	x	2.2800 (2d)	=	74.1228	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	136.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	333.9093	(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) =	0.1198	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3698	(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) =	0.2866	(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	0.3654	0.3582	0.3511	0.3152	0.3081	0.2723	0.2723	0.2651	0.2866	0.3081	0.3224	0.3367	(22b)
Effective ac	0.5668	0.5642	0.5616	0.5497	0.5475	0.5371	0.5371	0.5351	0.5411	0.5475	0.5520	0.5567	(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 Semi-glazed door			1.9000	1.0000	1.9000			(26a)
TER Opening Type (Uw = 1.20)			23.0000	1.1450	26.3359			(27)
N RW			2.3100	1.5038	3.4737			(27a)
Ground Floor			60.3400	0.1300	7.8442			(28a)
External Wall	169.0400	22.3700	146.6700	0.1800	26.4006			(29a)
Dormer Walls	17.4900	2.5300	14.9600	0.1800	2.6928			(29a)
Dwarf Walls	10.1500		10.1500	0.1800	1.8270			(29a)
Joisted Roof	16.2900		16.2900	0.1100	1.7919			(30)
Rafter Roof	29.3500	2.3100	27.0400	0.1100	2.9744			(30)
Rafter Eaves	7.6200		7.6200	0.1100	0.8382			(30)
Flat Dormer Roof	12.0600		12.0600	0.1100	1.3266			(30)
Total net area of external elements Aum(A, m2)			322.3400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		77.4053			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 144.9473 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	14.5800	0.0500	0.7290
E2	Other lintels (including other steel lintels)	2.3000	0.0500	0.1150
E3	Sill	8.0900	0.0500	0.4045
E3	Sill	2.3000	0.0500	0.1150
E4	Jamb	22.6200	0.0500	1.1310
E4	Jamb	4.4000	0.0500	0.2200
E5	Ground floor (normal)	33.6200	0.1600	5.3792
E6	Intermediate floor within a dwelling	27.3800	0.0000	0.0000
E10	Eaves (insulation at ceiling level)	17.3600	0.0600	1.0416
E24	Eaves (insulation at ceiling level - inverted)	15.4300	0.2400	3.7032
E11	Eaves (insulation at rafter level)	10.2800	0.0400	0.4112
E12	Gable (insulation at ceiling level)	4.3400	0.0600	0.2604
E13	Gable (insulation at rafter level)	22.3600	0.0800	1.7888
E16	Corner (normal)	23.6000	0.0900	2.1240
E17	Corner (inverted - internal area greater than external area)	4.8000	-0.0900	-0.4320
R1	Head of roof window	2.1000	0.0800	0.1680
R2	Sill of roof window	2.1000	0.0600	0.1260
R3	Jamb of roof window	6.6000	0.0800	0.5280
R6	Flat ceiling	16.4900	0.0600	0.9894
R7	Flat ceiling (inverted)	7.7400	0.0400	0.3096
R9	Roof to wall (flat ceiling)	10.0000	0.0400	0.4000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.5119 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 96.9172 (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	62.4512	62.1656	61.8856	60.5705	60.3244	59.1790	59.1790	58.9669	59.6202	60.3244	60.8222	61.3426	(38)
Heat transfer coeff	159.3684	159.0827	158.8028	157.4876	157.2416	156.0961	156.0961	155.8840	156.5373	157.2416	157.7393	158.2597	(39)
Average = Sum(39)m / 12 =												157.4865	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1641	1.1620	1.1600	1.1504	1.1486	1.1402	1.1402	1.1387	1.1434	1.1486	1.1522	1.1560	(40)
HLP (average)												1.1504	
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 2.9109 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	73.0267	71.9292	70.3300	67.2703	65.0122	62.4941	61.0628	62.6499	64.3896	67.0933	70.2188	72.7469	(42a)
Hot water usage for baths	31.5271	31.0589	30.3995	29.1838	28.2735	27.2641	26.7188	27.3736	28.0865	29.1666	30.4073	31.4205	(42b)
Hot water usage for other uses	44.4409	42.8249	41.2088	39.5928	37.9768	36.3607	36.3607	37.9768	39.5928	41.2088	42.8249	44.4409	(42c)
Average daily hot water use (litres/day)												136.9596	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	148.9947	145.8130	141.9384	136.0469	131.2625	126.1189	124.1423	128.0002	132.0689	137.4687	143.4510	148.6083	(44)
Energy conte	235.9712	207.6357	218.1540	186.2413	176.7045	155.0779	150.1394	158.4910	162.8541	186.5438	204.3723	232.6847	(45)
Energy content (annual)										Total = Sum(45)m =		2274.8699	
Distribution loss (46)m = 0.15 x (45)m	35.3957	31.1454	32.7231	27.9362	26.5057	23.2617	22.5209	23.7736	24.4281	27.9816	30.6558	34.9027	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	286.9301	253.6631	269.1129	235.5564	227.6634	204.3929	201.0983	209.4499	212.1692	237.5027	253.6874	283.6436	(62)
WWHRS	-33.3848	-29.5257	-30.9177	-25.6010	-23.8593	-20.4165	-19.1372	-20.3505	-21.1237	-24.9026	-28.2116	-32.7665	(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	253.5453	224.1374	238.1953	209.9554	203.8041	183.9764	181.9610	189.0993	191.0455	212.6001	225.4758	250.8771	(64)
										Total per year (kWh/year) = Sum(64)m =		2564.6728	(64)
12Total per year (kWh/year)												2565	(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
91.2001 80.5457 85.2759 74.2540 71.4940 63.8922 62.6611 65.4380 66.4778 74.7655 80.2826 90.1074 (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	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	145.5469	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	156.5024	173.2705	156.5024	161.7191	156.5024	161.7191	156.5024	156.5024	161.7191	156.5024	161.7191	156.5024	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	305.8589	309.0328	301.0348	284.0079	262.5146	242.3139	228.8186	225.6447	233.6428	250.6696	272.1629	292.3636	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	37.5547	(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)

	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	-116.4375	(71)

Water heating gains (Table 5)

	122.5808	119.8597	114.6182	103.1306	96.0940	88.7391	84.2219	87.9543	92.3302	100.4913	111.5036	121.1121	(72)

Total internal gains

	654.6062	671.8271	641.8194	618.5217	584.7751	559.4362	536.2069	536.7654	554.3562	577.3273	615.0497	639.6421	(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	
North	5.9000	10.6334	0.6300	0.7000	0.7700	19.1732	(74)
South	16.0200	46.7521	0.6300	0.7000	0.7700	228.8944	(78)
West	1.0800	19.6403	0.6300	0.7000	0.7700	6.4825	(80)
North	2.3100	15.6897	0.6300	0.7000	1.0000	14.3849	(82)

Solar gains	268.9351	451.1743	609.0365	757.2554	862.5378	865.8025	830.5365	748.4278	658.6948	495.4351	320.6168	231.2591	(83)
Total gains	923.5413	1123.0013	1250.8559	1375.7771	1447.3129	1425.2387	1366.7434	1285.1933	1213.0509	1072.7624	935.6664	870.9012	(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	34.5867	34.6488	34.7099	34.9997	35.0545	35.3117	35.3117	35.3598	35.2122	35.0545	34.9439	34.8290	
alpha	3.3058	3.3099	3.3140	3.3333	3.3370	3.3541	3.3541	3.3573	3.3475	3.3370	3.3296	3.3219	
util living area	0.9800	0.9623	0.9349	0.8759	0.7734	0.6201	0.4764	0.5202	0.7234	0.8996	0.9655	0.9834	(86)
MIT	18.9485	19.2696	19.6748	20.1786	20.5976	20.8645	20.9579	20.9429	20.7621	20.2138	19.4893	18.8901	(87)
Th 2	19.9488	19.9505	19.9521	19.9599	19.9614	19.9681	19.9681	19.9694	19.9655	19.9614	19.9584	19.9553	(88)
util rest of house	0.9761	0.9549	0.9219	0.8505	0.7262	0.5427	0.3749	0.4178	0.6537	0.8736	0.9575	0.9800	(89)
MIT 2	17.5620	17.9681	18.4770	19.0998	19.5882	19.8708	19.9480	19.9400	19.7769	19.1563	18.2557	17.4920	(90)
Living area fraction									fLA = Living area / (4) =			0.1490	(91)
MIT	17.7686	18.1621	18.6555	19.2605	19.7386	20.0189	20.0985	20.0894	19.9237	19.3139	18.4395	17.7003	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.7686	18.1621	18.6555	19.2605	19.7386	20.0189	20.0985	20.0894	19.9237	19.3139	18.4395	17.7003	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9640	0.9379	0.9012	0.8300	0.7149	0.5467	0.3883	0.4304	0.6506	0.8533	0.9413	0.9693	(94)
Useful gains	890.2762	1053.2439	1127.2977	1141.9232	1034.6302	779.2357	530.7029	553.0942	789.2067	915.4052	880.7572	844.1750	(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	2146.4660	2109.7660	1930.3320	1631.6576	1263.9996	845.8617	546.1018	575.1212	911.6246	1370.1863	1788.6914	2136.5560	(97)
Space heating kWh	934.6052	709.9828	597.4575	352.6087	170.6508	0.0000	0.0000	0.0000	0.0000	338.3572	653.7126	961.5315	(98a)
Space heating requirement - total per year (kWh/year)												4718.9064	
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	934.6052	709.9828	597.4575	352.6087	170.6508	0.0000	0.0000	0.0000	0.0000	338.3572	653.7126	961.5315	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4718.9064	
Space heating per m2											(98c) / (4) =	34.4697	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	934.6052	709.9828	597.4575	352.6087	170.6508	0.0000	0.0000	0.0000	0.0000	338.3572	653.7126	961.5315	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	1011.4775	768.3797	646.5990	381.6112	184.6871	0.0000	0.0000	0.0000	0.0000	366.1874	707.4812	1040.6185	(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

253.5453	224.1374	238.1953	209.9554	203.8041	183.9764	181.9610	189.0993	191.0455	212.6001	225.4758	250.8771	(64)
Efficiency of water heater											80.3000	(216)
(217)m 86.9137	86.6727	86.2665	85.4832	84.0034	80.3000	80.3000	80.3000	80.3000	85.3719	86.5235	86.9726	(217)
Fuel for water heating, kWh/month												
291.7209	258.6020	276.1156	245.6101	242.6141	229.1113	226.6016	235.4911	237.9147	249.0283	260.5948	288.4554	(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 32.5181	26.0872	23.4887	17.2088	13.2926	10.8601	12.1259	15.7617	20.4729	26.8616	30.3401	33.4219	(232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m -54.8912	-76.5996	-108.9710	-121.1689	-129.4492	-120.2942	-118.6925	-112.5694	-101.6909	-86.8329	-60.0200	-47.5398	(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 -33.4584	-70.0896	-138.8086	-207.8065	-274.1858	-275.3753	-272.2436	-230.8727	-169.6330	-100.1412	-44.6311	-26.4902	(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	5107.0415	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	3041.8599	(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)	262.4397	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2982.4557	(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	5514.8854	(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	5107.0415	0.2100	1072.4787	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3041.8599	0.2100	638.7906	(264)
Space and water heating			1711.2693	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	262.4397	0.1443	37.8782	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1138.7197	0.1348	-153.5357	
PV Unit electricity exported	-1843.7360	0.1260	-232.2784	
Total			-385.8142	(269)
Total CO2, kg/year			1375.2625	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0500	(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	5107.0415	1.1300	5770.9569	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3041.8599	1.1300	3437.3017	(278)
Space and water heating			9208.2586	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	262.4397	1.5338	402.5388	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1138.7197	1.4983	-1706.1776	
PV Unit electricity exported	-1843.7360	0.4624	-852.6274	
Total			-2558.8050	(283)
Total Primary energy kWh/year			7182.0932	(286)
Target Primary Energy Rate (TPER)			52.4600	(287)