GLA Carbon Emission Reporting Spreadsheet

BACKGROUND AND PURPOSE

The GLA has decided that from **January 2019** and until central Government updates Part L with the latest carbon emission factors, planning applicants are encouraged to use the SAP 10 emission factors for **referable applications** when estimating CO_2 emission performance against London Plan policies. This is a new approach being taken by the GLA to reflect the decarbonisation of the electricity grid, which is not currently taken into account by Part L of Building Regulations. This approach will remain in place until Government adopts new Building Regulations with updated emission factors.

This GLA Carbon Emission Reporting Spreadsheet facilitates the use of the SAP 10 emission factors and ensures a consistent and transparent process for updating Part L 2013 CO_2 emission performance. In particular, the approach has been developed to ensure that SAP 10 results can still be validated against supporting Part L 2013 BRUKL and SAP outputs.

From **January 2019** all GLA referable applications (including refurbishments) are expected to use this spreadsheet to report the anticipated carbon performance of a development. This includes planning applicants who are continuing to use SAP 2012 emission factors; although doing so will need to be supported by sufficient justification in line with the Energy Assessment Guidance. Applicants are required to submit this spreadsheet to the GLA alongside the energy assessment. It should be used for both domestic and non-domestic uses. The GLA will not accept the use of alternative methodologies or tools. This is to ensure consistency and to minimise the need for clarifications during the determination period.

Planning applicants should use Part L 2013 BRUKL and SAP outputs to fill in this spreadsheet which serves as a the final step in reporting the carbon emission performance of the proposed energy strategy. **It is solely for the purpose of reporting to the GLA and does not replace Part L calculations submitted for Building Regulations approval.**

The spreadsheet has been developed to fit as wide a range of policy compliant approaches for referable schemes as possible. Any planning applicants with a policy compliant approach that the spreadsheet does not serve should contact the GLA at: **environment@london.gov.uk.** Applicants must not amend or alter the spreadsheet to suit non-policy compliant strategies. Any unauthorised amendment to the spreadsheet will invalidate the CO_2 emission calculations.

Applicants should note that we will update the spreadsheet from time to time to ensure it remains fit for purpose. Applicants are expected to use the latest version at the time of the planning submission.

Any feedback on this spreadsheet should be sent to: environment@london.gov.uk.

METHODOLOGY

Applicants are required to complete all light blue input cells in the applicable tabs ('Carbon Factors', 'Baseline', 'Be Lean', 'Be Clean', 'Be Green' and 'GLA Summary Tables').

Input Data

For all applications, the input data required includes:

- Bespoke Carbon Factors (if applicable)
- Type of units modelled
- Area of units modelled (m^2)
- Number of units modelled
- Total area represented by model (m^2)
- Regulated energy consumption by end use (kWh p.a. for residential and kWh/m^2 p.a. for non-residential)
- Regulated energy consumption by fuel type (kWh/m2 p.a. for non-residential)
- TER, DER and BER figures (kgCO_2/m^2 p.a.)
- TFEE and DFEE figures for residential (kWh//m^2 p.a.)
- Regulated energy demand figures (kWh p.a. for both residential and non-residential)
- Unregulated gas and electricity consumption figures (kWh p.a. for both residential and non-residential) **[In the 'GLA Summary tables' tab only]**
- Actual and notional building cooling demand (MJ/m^2) **[In the 'GLA Summary tables' tab only]**

Applicants should update the highlighted cells with the type, area and number of modelled units. The consumption figures (kWh p.a. for domestic and kWh/m^2 p.a. for non-domestic) from the Part L modelling output reports should be reported and used to estimate the CO_2 emissions for each stage of the Energy Hierarchy. The TER, DER and BER figures from the Part L 2013 modelling output sheets should also be reported for cross-reference purposes. The applicant should ensure that the manually calculated TER, DER and BER figures are equal to the figures reported within the output sheets. TFEE and DFEE information should also be provided as well as unregulated uses consumption, energy demand figures and cooling demand performance.

The total carbon emissions figures in the 'GLA Summary tables' tab are now calculated based on the area input for 'Total area represented by model (m^2)'. This input requirement has been added to ensure that the carbon emission figures align with the development area schedule (included within the DAS) rather than the number of representative models.

Required Part L Outputs for the GLA spreadsheet

Domestic Part L Outputs:

For the domestic conversion applicants are required to use the outputs from the SAP TER and DER worksheets. To assist in the conversion process the required SAP worksheet rows have been referenced in each input cell. For Space Heating and Hot Water applicants will be required to manually convert the SAP energy requirements to energy consumption by fuel type, the appropriate SAP rows for this calculation have also been listed. **Note.** The SAP worksheet rows are based on a communal heating system, which is an expectation for GLA referrable schemes. Applicants proposing individual systems must first seek confirmation from the GLA as to whether the approach will be acceptable.

Non-domestic Part L Outputs:

The required Part L outputs from non-domestic modelling will be energy consumption by **fuel type** (e.g. grid electricity, natural gas).The energy consumption by end use (e.g. heating, hot water, cooling etc.) included in the BRUKL documents are no longer used to estimate the CO_2 emission performance with SAP 10 emission factors in this spreadsheet. This decision has been taken as the consumption figures provided in the BRUKL may include a mixture of fuel types, for instance heating may include energy consumption from gas boilers and electrically driven heat pumps. The required data can be found in:

- SBEM software: the required data is included in the output file ending "*sim.csv"
- Government approved software (such as IES and TAS): the required data is included in the output file ending in "*BRUKL.inp"

The above output files should be appended to the energy assessment document.

Regarding the non-domestic uses, the applicant can determine whether each individual unit will be modelled independently and apportioned to the entire scheme or whether a single model will be generated for the entire development. The applicant should, however, include the results from all BRUKL outputs generated for the proposed development under the "NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS" sections.

Note: GLA are aware that the Part L outputs for grid supplied electricity consumption does not account for power factor correction. Where power factor correction is present applicants may be required to amend the electricity consumption by the appropriate adjustment factor. The power factor correction is found in Table 1 of the Government's Approved Document L2A (ADL2A). Applicants should note in the appropriate cells where power factor correction has been applied.

Carbon Factors

The carbon factors for SAP 2012 and SAP 10 scenarios have been provided in the 'Carbon Factors' tab. The table has been pre-populated with grid electricity and gas factors. Additional space has been included for alternative fuel factors that are included in Table 12 of the SAP 2012 and SAP 10 methodology document. For applications with non-domestic buildings connecting to external heat networks a bespoke carbon factor needs to be introduced, the applicant should provide the full calculation behind the introduced bespoke carbon factor.

Validation Check

A validation check is required for each model entered to ensure that the conversion is robust. Applicants must ensure that the calculated TER/DER/BER in this spreadsheet matches the actual values from the Part L 2013 BRUKL and SAP worksheets.

Table 1. CARBON (CO_2) FACTORS			Notes
Fuel type	Fuel Carbon Factor ($kgCO_2/kWh$)		
	SAP 2012	SAP 10	
Natural Gas	0.216	0.210	SAP 2012 and SAP 10 carbon emission factors (Table 12).
Grid Electricity	0.519	0.233	
Enter Carbon Factor 1			These factors should be used where alternative fuel is used to grid gas and electricity. Carbon emission factors used here must be taken from Table 12 within the SAP 2012 and SAP 10 documents.
Enter Carbon Factor 2			
Enter Carbon Factor 3			
Enter Carbon Factor 4			Fuel type should be updated and referenced in Column A when additional carbon factor values have been added.
Bespoke DH Factor			This should only be used for non-domestic buildings that are connecting to District Heating (DH) networks. The network carbon factor should be calculated in line with Part L requirements and a seperate factors should be provided using SAP 2012 and SAP 10 fuel factors. Assumptions and workings should be shown below in Table 4.

Table 2. BESPOKE DH CARBON FACTOR CALCULATION METHODOLOGY
Please provide below details of the calculation methodology followed to establish the bespoke carbon factor, if applicable.

The applicant should complete all the light blue cells including information on the modelled units, the area per unit, the number of units, the baseline energy consumption figures, the TER and the TFEE.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO2 ANALYSIS

DEMAND

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated TER 2012 (kgCO2 / m2)	VALIDATION CHECK: TER Worksheet TER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - TER WORKSHEET: Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water	Lighting	Auxiliary	Cooling	REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.): Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS PER UNIT: Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated TER SAP10 (kgCO2 / m2)	Fabric Energy Efficiency (FEE) Target Fabric Energy Efficiency (TFEE) (kWh/m^2)
	TER Worksheet (Row 4)				TER Worksheet (Row 273)	TER Worksheet (Row 211)		TER Worksheet (Row 219)		TER Worksheet (Row 232)	TER Worksheet (Row 231)	N / A														
B1-A01-SW v2	101.94	23	2409.380814	14.6	14.6	3134.34	Natural Gas	2575.09	Natural Gas	408.45	75		677	556	212	39		1,484	658	541	95	17		1,312	12.9	41.11792414
B1-A02-W v2	93.86	17	1639.692664	14.1	14.1	2479.77	Natural Gas	2547.58	Natural Gas	390.96	75		536	550	203	39		1,328	521	535	91	17		1,164	12.4	35.58887234
B2-A01-N v2	81.01	73	6077.0733	16.5	16.5	2767.25	Natural Gas	2393.02	Natural Gas	348.8	75		598	517	181	39		1,335	581	503	81	17		1,182	14.6	45.42545224
B2-A02-W v2	50.58	49	2546.876507	17.5	17.5	1327.81	Natural Gas	2031.9	Natural Gas	234.18	75		287	439	122	39		886	279	427	55	17		778	15.4	38.50682019
B2-A04-S-R v2	86.33	10	887.1452331	16.8	16.8	3246.4	Natural Gas	2423.71	Natural Gas	367.96	75		701	524	191	39		1,455	682	509	86	17		1,294	15.0	48.02994775
B3-A01-SE v2	78.71	44	3558.898248	14.2	14.2	1793.17	Natural Gas	2397.78	Natural Gas	341.22	75		387	518	177	39		1,121	377	504	80	17		977	12.4	33.40277073
B4-A01-S v2	54.96	13	734.2146718	15.8	15.8	1103.44	Natural Gas	2098.06	Natural Gas	262.16	75		238	453	136	39		867	232	441	61	17		751	13.7	30.04878064
B4-A02-E v2	86.33	42	3726.009979	15.2	15.2	2557.38	Natural Gas	2438.83	Natural Gas	367.93	75		552	527	191	39		1,309	537	512	86	17		1,152	13.3	39.82976614
B4-A03-W v2	50.28	110	5683.56638	16.7	16.7	1110.95	Natural Gas	2034.66	Natural Gas	238.45	75		240	439	124	39		842	233	427	56	17		734	14.6	33.62871494
B4-T01-SE v2	135.42	3	417.4813187	13.9	13.9	4742.38	Natural Gas	2622.27	Natural Gas	478.85	75		1,024	566	249	39		1,878	996	551	112	17		1,676	12.4	44.96079335
Sum	26,936	384	27,680	16.2	-	750,868	N/A	867,914	N/A	118,198	28,800	0	162,187	187,469	61,345	14,947	0	437,714	157,682	182,262	27,540	6,710	0	384,530	14.3	38.78

NON-DOMESTIC ENERGY CONSUMPTION AND CO2 ANALYSIS

Building Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated TER 2012 (kgCO2 / m2)	VALIDATION CHECK: BRUKL TER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) TER - SOURCE: BRUKL OUTPUT: Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water	Lighting	Auxiliary	Cooling	REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) TER - SOURCE: BRUKL.INP or *SIM.CSV FILE: Natural Gas	Grid Electricity				2012 CO2 emissions (kgCO2 p.a.)	REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) - TER BRUKL: Natural Gas	Grid Electricity				REGULATED CO2 EMISSIONS: SAP10 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS: BRUKL TER SAP10 (kgCO2 / m2)
													0.216 kgCO2/kWh	0.519 kgCO2/kWh					0.210 kgCO2/kWh	0.233 kgCO2/kWh					
retail A1	434.5	1	480	44.9	43.8	13.15	Natural Gas	1.86	Natural Gas	53.7	17.66	8.82	15	80				19,490	15	80				9,487	21.8
Sum	435	1	480	49.6	-	5,714	5,714	0	0	0	0	0	15	80	N/A	N/A	N/A	21,531	15	80	N/A	N/A	N/A	10,480	24.1

SITE-WIDE ENERGY CONSUMPTION AND CO2 ANALYSIS

Use	Total Area (m^2)	Calculated TER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION: Space Heating (kWh p.a.)		Domestic Hot Water (kWh p.a.)		Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)	REGULATED CO2 EMISSIONS: 2012 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS PER UNIT: SAP10 CO2 emissions (kgCO2 p.a.)	Calculated TER SAP10 (kgCO2 / m2)
Sum	28,160	16.3	-	756,581	N/A	867,914	N/A	118,198	28,800	0	459,245	395,011	14.0

The applicant should complete all the light blue cells including information on the 'be lean' energy consumption figures, the 'be lean' DER, the DFEE and the regulated energy demand of the 'be lean' scenario.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

DOMESTIC ENERGY DEMAND DATA

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated DER 2012 (kgCO2 / m2)	VALIDATION CHECK: DER Worksheet DER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE LEAN' SAP DER WORKSHEET: Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water	Lighting	Auxiliary	Cooling
					DER Sheet (Row 384)	DER Sheet [(Row 307a) ÷ (Row 367a x 0.01)]	Select fuel type	DER Sheet [(Row 310a) ÷ (Row 367a x 0.01)]	Select fuel type	DER Sheet Row 332	DER Sheet (Row 313 + 331)	DER Sheet Row 315
B1-A01-SW v2	101.94	23	2409.380814	15.2	15.2	2826.77095	Natural Gas	2574.83026	Natural Gas	408.4486709	300.1952067	32.59
B1-A02-W v2	93.86	17	1639.692664	13.7	13.7	1755.977654	Natural Gas	2538.962008	Natural Gas	387.3139901	269.4508601	26.51
B2-A01-N v2	81.01	73	6077.0733	16.4	16.4	2290.52514	Natural Gas	2374.611669	Natural Gas	348.7967433	241.8950882	25.07
B2-A02-W v2	50.58	49	2546.876507	18.8	18.8	1427.318436	Natural Gas	1973.386403	Natural Gas	234.1810471	154.9289122	30.63
B2-A04-S-R v2	86.33	10	887.1452331	16.9	17.0	2801.407821	Natural Gas	2414.21501	Natural Gas	365.5221427	258.3468292	23.65
B3-A01-SE v2	78.71	44	3558.898248	14.7	14.7	1582.681564	Natural Gas	2355.402575	Natural Gas	341.2156521	227.4944524	22.34
B4-A01-S v2	54.96	13	734.2146718	14.0	14.1	468.7821229	Natural Gas	2029.939342	Natural Gas	254.491081	158.1453851	25.3
B4-A02-E v2	86.33	42	3726.009979	13.9	14.0	1610.882682	Natural Gas	2414.21501	Natural Gas	365.5465307	248.4978132	31.12
B4-A03-W v2	50.28	110	5683.56638	15.2	15.3	588.3351955	Natural Gas	1969.510813	Natural Gas	233.3495231	145.2235529	26.34
B4-T01-SE v2	135.42	3	417.4813187	15.4	15.4	4888.592179	Natural Gas	2641.042612	Natural Gas	478.8492789	397.5214632	20.45
Sum	26,936	384	27,680	15.9	-	582,800	N/A	852,561	N/A	117,351	78,988	10,345

Unit identifier	REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.): Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS PER UNIT: Space Heating CO2 emissions (kgCO2 p.a.)	Domestic Hot Water CO2 emissions (kgCO2 p.a.)	Lighting CO2 emissions (kgCO2 p.a.)	Auxiliary CO2 emissions (kgCO2 p.a.)	Cooling CO2 emissions (kgCO2 p.a.)	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated DER SAP10 (kgCO2 / m2)	Fabric Energy Efficiency (FEE) Dwelling Fabric Energy Efficiency (DFEE) (kWh/m²)	REGULATED ENERGY DEMAND PER UNIT PER ANNUM (kWh p.a.): Space Heating (kWh p.a.)	Domestic Hot Water (kWh p.a.)	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
B1-A01-SW v2	611	556	212	156	17	1,551	594	541	95	70	8	1,307	12.8	42.02956992	2409.49	2194.74	408.4486709	300.204415	131.99
B1-A02-W v2	379	548	201	140	14	1,282	369	533	90	63	6	1,061	11.3	33.75794832	1496.76	2164.16	387.3139901	269.44966	107.36
B2-A01-N v2	495	513	181	126	13	1,327	481	499	81	56	6	1,123	13.9	42.80600938	1952.4	2024.07	348.7967433	241.902935	101.51
B2-A02-W v2	308	426	122	80	16	952	300	414	55	36	7	812	16.1	43.72004566	1216.62	1682.08	234.1810471	154.92635	124.05
B2-A04-S-R v2	605	521	190	134	12	1,463	588	507	85	60	6	1,246	14.4	45.31609463	2387.86	2057.83	365.5221427	258.349745	95.77
B3-A01-SE v2	342	509	177	118	12	1,157	332	495	80	53	5	965	12.3	35.30357983	1349.04	2007.7	341.2156521	227.48577	90.47
B4-A01-S v2	101	438	132	82	13	767	98	426	59	37	6	627	11.4	25.19171887	399.58	1730.28	254.491081	158.15353	102.48
B4-A02-E v2	348	521	190	129	16	1,204	338	507	85	58	7	996	11.5	34.4618936	1373.09	2057.83	365.5465307	248.50466	126.03
B4-A03-W v2	127	425	121	75	14	763	124	414	54	34	6	631	12.6	29.18149547	501.49	1678.77	233.3495231	145.22273	106.68
B4-T01-SE v2	1,056	570	249	206	11	2,092	1,027	555	112	93	5	1,790	13.2	48.2258436	4166.94	2251.17	478.8492789	397.520155	82.8
Sum	125,885	184,153	60,905	40,995	5,369	428,834	122,388	179,038	27,343	18,404	2,410	359,239	13.3	37.10	496,768	726,707	117,351	78,989	41,897

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

NON-DOMESTIC ENERGY DEMAND

Building Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated BER 2012 (kgCO2 / m2)	VALIDATION CHECK: BRUKL BER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION BY END USE (kWh/m² p.a.) 'BE LEAN' BER - SOURCE: BRUKL OUTPUT: Space Heating (kWh/m² p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m² p.a.)	Fuel type Domestic Hot Water	Lighting (kWh/m² p.a.)	Auxiliary (kWh/m² p.a.)	Cooling (kWh/m² p.a.)
retail A1	434.5	1	480	34.4	33.6	11.55	Natural Gas	1.86	Natural Gas	37.77	16.97	5.88
Sum	435	1	480	38.0	-	5,018	N/A	808	N/A	16,411	7,373	2,555

Building Use	REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m² p.a.) 'BE LEAN' BER - SOURCE: BRUKL.INP or *SIM.CSV: Natural Gas	Grid Electricity	2012 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS PER UNIT: Natural Gas	Grid Electricity	SAP10 CO2 emissions (kgCO2 p.a.)	BRUKL BER SAP10 (kgCO2 / m2)	REGULATED ENERGY DEMAND PER UNIT PER ANNUM (kWh p.a.): Space Heating (kWh p.a.)	Domestic Hot Water (kWh p.a.)	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
retail A1	13	61	14,929	13	61	7,361	16.9					
Sum	13	61	16,492	13	61	8,131	18.7	0	0	0	0	0

N/A

SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Total Area (m^2)	Calculated BER 2012 (kgCO2 / m2)	-	REGULATED ENERGY CONSUMPTION: Space Heating (kWh p.a.)	Domestic Hot Water (kWh p.a.)	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)	REGULATED CO2 EMISSIONS: 2012 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS: SAP10 CO2 emissions (kgCO2 p.a.)	Calculated BER SAP10 (kgCO2 / m2)	REGULATED ENERGY DEMAND PER UNIT PER ANNUM (kWh p.a.): Space Heating (kWh p.a.)	Domestic Hot Water (kWh p.a.)	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
Sum	28,160	15.8	-	587,819	853,370	133,762	86,362	12,900	445,326	367,371	13.0	496,768	726,707	117,351	78,989	41,897

N/A

The applicant should complete all the light blue cells including information on the 'be clean' energy consumption figures and the 'be clean' DER.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE CLEAN' SAP DER WORKSHEET									REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.)								REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.)								
				Calculated DER 2012 (kgCO2 / m2)	DER Worksheet DER 2012 (kgCO2 / m2)	Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Space and Domestic Hot Water from CHP if applicable	Fuel type CHP if applicable	Total Electricity generated by CHP (-) if applicable	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Lighting	Auxiliary	Cooling	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated DER SAP10 (kgCO2 / m2)
					DER Sheet (Row 384)	DER Sheet [Row 307b × (Row 367b x 0.01)]	Select fuel type	DER Sheet [Row 310b × (Row 367b x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) × (Row 362 x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) × (Row 361 + 362)]	DER Sheet Row 332	DER Sheet (Row 333 + 331)	DER Sheet Row 315																
B1-A01-SW v2	*101.94*	*23*	*2409.380814*	**15.2**	**16.4**	*2826.77095*	*Natural Gas*	*2574.83026*	*Natural Gas*				*408.4486709*	*300.1952067*	*32.59*	**611**	**556**			**212**	**156**	**17**	**1,551**	**594**	**541**			**95**	**70**	**8**	**1,307**	**12.8**
B1-A02-W v2	*93.86*	*17*	*1639.692664*	**13.7**	**14.6**	*1753.977654*	*Natural Gas*	*2538.962008*	*Natural Gas*				*387.3139901*	*269.4508601*	*26.51*	**379**	**548**			**201**	**140**	**14**	**1,282**	**369**	**533**			**90**	**63**	**6**	**1,061**	**11.3**
B2-A01-N v2	*81.01*	*73*	*6077.0733*	**16.4**	**17.6**	*2290.52514*	*Natural Gas*	*2374.611669*	*Natural Gas*				*348.7967433*	*241.8950882*	*25.07*	**495**	**513**			**181**	**126**	**13**	**1,327**	**481**	**499**			**81**	**56**	**6**	**1,123**	**13.9**
B2-A02-W v2	*50.58*	*49*	*2546.876507*	**18.8**	**20.3**	*1427.318436*	*Natural Gas*	*1973.386403*	*Natural Gas*				*234.1810471*	*154.9289122*	*30.63*	**308**	**426**			**122**	**80**	**16**	**952**	**300**	**414**			**55**	**36**	**7**	**812**	**16.1**
B2-A04-S-R v2	*86.33*	*10*	*887.1452331*	**16.9**	**17.9**	*2801.407821*	*Natural Gas*	*2414.21501*	*Natural Gas*				*365.5221427*	*258.3468292*	*23.65*	**605**	**521**			**190**	**134**	**12**	**1,463**	**588**	**507**			**85**	**60**	**6**	**1,246**	**14.4**
B3-A01-SE v2	*78.71*	*44*	*3558.898248*	**14.7**	**15.7**	*1582.681564*	*Natural Gas*	*2355.402575*	*Natural Gas*				*341.2156521*	*227.4944524*	*22.34*	**342**	**509**			**177**	**118**	**12**	**1,157**	**332**	**495**			**80**	**53**	**5**	**965**	**12.3**
B4-A01-S v2	*54.96*	*13*	*734.2146718*	**14.0**	**14.7**	*468.7821229*	*Natural Gas*	*2029.939342*	*Natural Gas*				*254.491081*	*158.1453851*	*25.3*	**101**	**438**			**132**	**82**	**13**	**767**	**98**	**426**			**59**	**37**	**6**	**627**	**11.4**
B4-A02-E v2	*86.33*	*42*	*3726.009979*	**13.9**	**14.9**	*1610.882682*	*Natural Gas*	*2414.21501*	*Natural Gas*				*365.5465307*	*248.4978132*	*31.12*	**348**	**521**			**190**	**129**	**16**	**1,204**	**338**	**507**			**85**	**58**	**7**	**996**	**11.5**
B4-A03-W v2	*50.28*	*110*	*5683.56638*	**15.2**	**16.0**	*588.3351955*	*Natural Gas*	*1969.510813*	*Natural Gas*				*233.3495231*	*145.2235529*	*26.34*	**127**	**425**			**121**	**75**	**14**	**763**	**124**	**414**			**54**	**34**	**6**	**631**	**12.6**
B4-T01-SE v2	*135.42*	*3*	*417.4813187*	**15.4**	**16.6**	*4888.592179*	*Natural Gas*	*2641.042612*	*Natural Gas*				*478.8492789*	*397.5214632*	*20.45*	**1,056**	**570**			**249**	**206**	**11**	**2,092**	**1,027**	**555**			**112**	**93**	**5**	**1,790**	**13.2**
Sum	**26,936**	**384**	**27,680**	**15.9**	-	**582,800**	**N/A**	**852,561**	**N/A**	**0**	**N/A**	**0**	**117,351**	**78,988**	**10,345**	**125,885**	**184,153**	**0**	**0**	**60,905**	**40,995**	**5,369**	***428,834***	**122,388**	**179,038**	**0**	**0**	**27,343**	**18,404**	**2,410**	***359,239***	**13.3**

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Building Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) 'BE CLEAN' BER - SOURCE: BRUKL OUTPUT									REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) 'BE CLEAN' BER - SOURCE: BRUKL.INP or *SIM.CSV FILE						REGULATED CO2 EMISSIONS PER UNIT						
				Calculated BER 2012 (kgCO2 / m2)	BRUKL BER 2012 (kgCO2 / m2)	Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water			Total Electricity generated by CHP (-) if applicable	Lighting	Auxiliary	Cooling	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable			2012 CO2 emissions (kgCO2 p.a.)	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable			SAP 10 CO2 emissions (kgCO2 p.a.)	BRUKL BER SAP10 (kgCO2 / m2)
retail A1	*434.5*	*1*	*480*	**34.4**	**33.6**	*11.55*	*Natural Gas*	*1.86*	*Natural Gas*				*37.77*	*16.97*	*5.88*	**13**	**61**					**14,929**	**13**	**61**					**7,361**	**16.9**
Sum	**435**	**1**	**480**	**38.0**	-	**5,018**	**N/A**	**808**	**N/A**			**0**	**16,411**	**7,373**	**2,555**	**13**	**61**	**0**	**0**			***16,492***	**13**	**61**	**0**	**0**			***8,131***	**18.7**

SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Total Area (m^2)	Calculated BER 2012 (kgCO2 / m2)	-	REGULATED ENERGY CONSUMPTION									REGULATED CO2 EMISSIONS	REGULATED CO2 EMISSIONS PER UNIT	
				Space Heating (kWh p.a.)	N/A	Domestic Hot Water (kWh p.a.)	N/A	Space and Domestic Hot Water from CHP (kWh p.a.)	N/A	Electricity generated by CHP (kWh p.a.) if applicable	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)	2012 CO2 emissions (kgCO2 p.a.)	SAP 10 CO2 emissions (kgCO2 p.a.)	Calculated BER SAP10 (kgCO2 / m2)
Sum	**28,160**	**15.8**	-	**587,819**		**853,370**		**0**		**0**	**133,762**	**86,362**	**12,900**	***445,326***	***367,371***	**13.0**

The applicant should complete all the light blue cells including information on the 'be green' energy consumption figures and the 'be green' DER.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO2 ANALYSIS

VALIDATION CHECK

REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE GREEN' SAP DER WORKSHEET

REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.)

REGULATED CO2 EMISSIONS PER UNIT

Unit identifier (e.g. plot number, dwelling type etc.)	Modal total floor area (m²)	Number of units	Total area represented by model (m²)	Calculated DER 2012 (kgCO2 / m2)	DER Worksheet DER 2012 (kgCO2 / m2)	Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Space Heating (Heat source 2) if applicable	Fuel type Space Heating	Domestic Hot Water (Heat source 2) if applicable	Fuel type Domestic Hot Water	Space and Domestic Hot Water from CHP if applicable	Fuel type CHP if applicable	Total Electricity generated by CHP (-) if applicable	Electricity generated by renewable (-) if applicable	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Electricity generated by renewable if applicable	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Electricity generated by renewable if applicable	Lighting	Auxiliary	Cooling	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated DER SAP10 (kgCO2 / m2)
					DER Sheet (Row 384)	DER Sheet [Row 307b ÷ (Row 367b x 0.01)]	Select fuel type	DER Sheet [Row 310b ÷ (Row 367b x 0.01)]	Select fuel type	DER Sheet [Row 307c ÷ (Row 367c x 0.01)]	Select fuel type	DER Sheet [Row 310c ÷ (Row 367c x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) ÷ (Row 362 x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) × (Row 361 + 362)]	DER Sheet Row 380	DER Sheet Row 332	DER Sheet (Row 313 + 331)	DER Sheet Row 315																			
B1-A01-SW v2	101.94	23	2409.380814	20.1	21.8	1673.255556	Grid Electricity	1524.122409	Grid Electricity		Grid Electricity		Grid Electricity					408.45	309.412875	32.59012346	868	791				212	161	17	2,049	390	355				95	72	8	920	9.0
B1-A02-W v2	93.86	17	1639.692664	17.9	19.2	1039.416667	Grid Electricity	1502.890871	Grid Electricity		Grid Electricity		Grid Electricity					387.37	276.7715	26.55804198	539	780				201	146	14	1,678	242	350				90	64	6	753	8.0
B2-A01-N v2	81.01	73	6077.0733	21.7	23.3	1355.833333	Grid Electricity	1405.606775	Grid Electricity		Grid Electricity		Grid Electricity					348.8	249.855875	25.06419753	704	730				181	130	13	1,757	316	328				81	58	6	789	9.7
B2-A02-W v2	50.58	49	2546.876507	25.0	27.1	844.8722222	Grid Electricity	1168.109015	Grid Electricity		Grid Electricity		Grid Electricity					234.18	160.72375	30.62962963	438	606				122	83	16	1,266	197	272				55	37	7	568	11.2
B2-A04-S-R v2	86.33	10	887.3452331	22.5	23.8	1658.238889	Grid Electricity	1429.049229	Grid Electricity		Grid Electricity		Grid Electricity					365.82	267.241125	23.64693358	861	742				190	139	12	1,943	386	333				85	62	6	872	10.1
B3-A01-SE v2	78.71	44	3558.898248	19.3	20.8	936.8388889	Grid Electricity	1394.236313	Grid Electricity		Grid Electricity		Grid Electricity					341.22	234.39925	22.3382716	486	724				177	122	12	1,520	218	325				80	55	5	682	8.7
B4-A01-S v2	54.96	13	734.2146718	18.2	19.1	277.4888889	Grid Electricity	1201.584405	Grid Electricity		Grid Electricity		Grid Electricity					257	162.41325	25.3037037	144	624				133	84	13	998	65	280				60	38	6	448	8.2
B4-A02-E v2	86.33	42	3726.009979	18.2	19.6	953.5333333	Grid Electricity	1429.049229	Grid Electricity		Grid Electricity		Grid Electricity					365.55	255.3665	31.11851852	495	742				190	133	16	1,575	222	333				85	60	7	707	8.2
B4-A03-W v2	50.28	130	5683.56638	19.9	21.0	348.2555556	Grid Electricity	1165.814932	Grid Electricity		Grid Electricity		Grid Electricity					234.75	149.58325	26.34074074	181	605				122	78	14	999	81	272				55	35	6	448	8.9
B4-T01-SE v2	135.42	3	417.4813387	20.6	22.2	2893.711111	Grid Electricity	1563.315567	Grid Electricity		Grid Electricity		Grid Electricity					478.85	430.356375	20.44444444	1,502	811				249	213	11	2,785	674	364				112	96	5	1,250	9.2
Sum	26,936	384	27,680	21.0	-	344,978	N/A	504,658	N/A	0	N/A	0	N/A	0	N/A	0	0	117,542	81,436	10,345	179,043	261,917	0	0	0	61,004	42,265	5,369	364,780	80,380	117,585	0	0	0	27,387	18,975	2,410	253,552	9.4

NON-DOMESTIC ENERGY CONSUMPTION AND CO2 ANALYSIS

VALIDATION CHECK

REGULATED ENERGY CONSUMPTION BY END USE (kWh/m² p.a.) 'BE GREEN' BER - SOURCE: BRUKL OUTPUT

REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m² p.a.) 'BE GREEN' BER - SOURCE: BRUKL.INP or *SIM.CSV FILE

REGULATED CO2 EMISSIONS PER UNIT

Use	Area per unit (m²)	Number of units	Total area represented by model (m²)	Calculated BER 2012 (kgCO2 / m2)	BRUKL BER 2012 (kgCO2 / m2)	Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water							Electricity generated by CHP (-) if applicable	Electricity generated by renewable technology (-) if applicable	Lighting	Auxiliary	Cooling	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable	Electricity generated by renewable technology (-) if applicable	Enter Carbon Factor 1	Enter Carbon Factor 2	Enter Carbon Factor 3	2012 CO2 emissions (kgCO2 p.a.)	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable	Electricity generated by renewable technology (-) if applicable	Enter Carbon Factor 1	Enter Carbon Factor 2	Enter Carbon Factor 3	SAP10 CO2 emissions	BRUKL BER SAP10 (kgCO2 / m2)
retail A1	434.5	1	480	26.1	27.3	1.98	Grid Electricity	1.7	Grid Electricity	n/a	n/a	n/a	n/a	n/a	n/a	37.77	7.13	5.32	0	50								11,325		50							5,084	11.7
Sum	435	1	480	28.8	-	860	N/A	739	N/A							0	0	16,411	3,098	2,312	0	50	0	0	0	0	0	0	12,521	0	50	0	0	0	0	0	0	5,617	12.9

SITE-WIDE ENERGY CONSUMPTION AND CO2 ANALYSIS

REGULATED CO2 EMISSIONS

REGULATED CO2 EMISSIONS

REGULATED CO2 EMISSIONS PER UNIT

Use	Total Area (m²)	Calculated BER 2012 (kgCO2 / m2)	-	Space Heating (kWh p.a.)		Domestic Hot Water (kWh p.a.)		Space Heating (kWh p.a.)		Domestic Hot Water (kWh p.a.)		Space and Domestic Hot Water from CHP (kWh p.a.)		Electricity generated by CHP (kWh p.a.) if applicable	Electricity generated by renewable (kWh p.a.) if applicable	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)	Space Heating CO2 emissions	Domestic Hot Water CO2 emissions	Space Heating and DHW from CHP CO2 emissions if applicable	Electricity generated by CHP CO2 savings if applicable	Electricity generated by renewable CO2 savings if applicable	Lighting CO2 emissions	Auxiliary CO2 emissions	Cooling CO2 emissions	2012 CO2 emissions	Space Heating CO2 emissions	Domestic Hot Water CO2 emissions	Space Heating and DHW from CHP CO2 emissions if applicable	Electricity generated by CHP CO2 savings if applicable	Electricity generated by renewable CO2 savings if applicable	Lighting CO2 emissions	Auxiliary CO2 emissions	Cooling CO2 emissions	SAP10 CO2 emissions	Calculated BER SAP10 (kgCO2 / m2)
Sum	28,160	0.0	-	345,838	n/a	505,396	n/a	0	n/a	0	n/a	0	n/a	0	0	133,953	84,534	12,656	179,043	261,968	0	0	0	61,004	42,265	5,369	577,291	80,380	117,635	0	0	0	27,387	18,975	2,410	255,169	9.2

SAP 2012 PERFORMANCE

DOMESTIC

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	438	441
After energy demand reduction	429	441
After heat network / CHP	429	441
After renewable energy	565	441

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	9	2%
Savings from heat network / CHP	0	0%
Savings from renewable energy	-136	-31%
Cumulative on site savings	**-127**	**-29%**
Annual savings from off-set payment	565	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**16,943**	-
Cash in-lieu contribution (£)	**1,016,603**	

NON-DOMESTIC

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	22	12
After energy demand reduction	16	12
After heat network / CHP	16	12
After renewable energy	13	12

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	5	23%
Savings from heat network / CHP	0	0%
Savings from renewable energy	4	18%
Total Cumulative Savings	**9**	**42%**

Table 5: Shortfall in regulated carbon dioxide savings

	Annual Shortfall (Tonnes CO_2)	Cumulative Shortfall (Tonnes CO_2)
Total Target Savings	**8**	-
Shortfall	-1	-45
Cash in-lieu contribution (£)	**-2,671**	-

SITE-WIDE

	Total regulated emissions (Tonnes CO2 / year)	CO2 savings (Tonnes CO2 / year)	Percentage savings (%)
Part L 2013 baseline	459		
Be lean	445	14	3%
Be clean	445	0	0%
Be green	577	-132	-29%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**16,899**	-

Building use	Energy demand following energy efficiency measures (MWh/year)						
	Space Heating	Hot Water	Lighting	Auxilary	Cooling	Unregulated electricity	Unregulated gas
Domestic	497	727	117	79	42	850	0
Non-domestic	0	0	0	0	0	24	0

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	38.78	37.10	4%

	Area weighted average non-domestic cooling demand (MJ/m²)	Total area weighted non-domestic cooling demand (MJ/year)
Actual	93	44640
Notional	120.4	57792

SAP10 PERFORMANCE

DOMESTIC

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	385	198
After energy demand reduction	359	198
After heat network / CHP	359	198
After renewable energy	254	198

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	25	7%
Savings from heat network / CHP	0	0%
Savings from renewable energy	106	27%
Cumulative on site savings	**131**	**34%**
Annual savings from off-set payment	254	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**7,607**	-
Cash in-lieu contribution (£)	**456,394**	

NON-DOMESTIC

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	10	6
After energy demand reduction	8	6
After heat network / CHP	8	6
After renewable energy	6	6

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	2	22%
Savings from heat network / CHP	0	0%
Savings from renewable energy	3	24%
Total Cumulative Savings	**5**	**46%**

Table 5: Shortfall in regulated carbon dioxide savings

	Annual Shortfall (Tonnes CO_2)	Cumulative Shortfall (Tonnes CO_2)
Total Target Savings	4	-
Shortfall	-1	-36
Cash in-lieu contribution (£)	**-2,152**	-

SITE-WIDE

	Total regulated emissions (Tonnes CO2 / year)	CO2 savings (Tonnes CO2 / year)	Percentage savings (%)
Part L 2013 baseline	395		
Be lean	367	28	7%
Be clean	367	0	0%
Be green	259	108	27%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**7,571**	-

Issue	1.1
Date	10/01/2019
Author	Greater London Authority

Update Location	Description of changes made to GLA Carbon Emission Reporting Spreadsheet
Introduction / Version Control	Additional explanatory wording has been included in the 'Background and Purpose' and 'Methodology' sections to further assist applicants with the reporting process
	A version control tab has been added to list all changes made to the spreadsheet under separate versions
Baseline, be lean, be clean & be green tabs	**Domestic** SAP worksheet row reference numbers have been included in the input tabs
	Non-domestic Non-domestic calculation is now based on 'energy consumption by fuel type' instead of the consumption figures in the BRUKL tab to enable the accurate calculation of the TER/BER figures. This data is available in the output file ending in "*BRUKL.inp" for government approved software and output file ending "*sim.csv" for SBEM. Where these files are used they should be appended to the Energy Statement.
	Total calculation is now based on the 'total area represented by model (m^2)' rather than the 'number of units'. This is to ensure that the total model area aligns with the development area schedule.
	Rows with void formulas have now been fixed
	Formula for CHP/Renewable contribution now fixed in SAP 10 calculation
	Extra input rows have been added to account for larger schemes
	Columns used to calculate the carbon emissions using SAP10 carbon factors have been unhidden to allow for greater transparency in the calculation methodology
	Validation check moved to be more prominent
	Additional heat source has been added into the calculation
	Reporting of electricity generated by CHP or renewable technologies has been changed; this should now be inputted as a negative value (-)
Be Green tab	Additional heat source has been added into the calculation in the 'be green' tabs to account for multiple heating systems, if present
Carbon factors tab	The carbon emission factor table has been updated and clarification has been provided on how they should be used
	A typo in the carbon factor unit has been corrected ($kgCO_2/kWh$)