GLA Carbon Emission Reporting Spreadsheet

BACKGROUND AND PURPOSE

The GLA has decided that from <u>January 2019</u> and until central Government updates Part L with the latest carbon emission factors, planning applicants are encouraged to use the SAP 10.0 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

This GLA Carbon Emission Reporting Spreadsheet facilitates the use of the SAP 10.0 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 10.0 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

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 CO2 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').

For all applications, the input data required includes:
• Bespoke Carbon Factors (if applicable)

- Type of units modelled
- Area of units modelled (m²)
- · Number of units modelled
- Total area represented by model (m²)
- 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/m 2 p.a. for non-residential) TER, DER and BER figures (kgCO $_2$ /m 2 p.a.)
- TFEE and DFEE figures for residential (kWh//m² p.a.)
- Unregulated figures (tCO₂ p.a.) [In the 'GLA Summary tables' tab only]
- Actual and notional building cooling demand (MJ/m²) [In the 'GLA Summary tables' tab only]
- Distribution loss factor (if applicable) [In the 'Development information' tab, Table 4]

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/m² 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 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 (m²). 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

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

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 emission performance with SAP 10.0 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. Applicants are generally encouraged to model each individual typology independently

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.

The carbon factors for SAP 2012 and SAP 10.0 scenarios have been provided in the 'Development Information' tab. The table has been prepopulated 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 10.0 methodology documents. 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.

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 worksheet

TABLE 1. DEVELOPMEN	NT INFORMATION	NOTES
Date of Application	04/02/2022	Please provide the date the application was submitted to the Local Planning Authority.
Local Planning Authority	Richmond	Please indicate the Local Planning Authority determining the application.
Confirmed carbon offset price (£/tonne of carbon dioxide)	95	Please confirm the agreed carbon offset price for the Local Planning Authority. Evidence of communication on the price is expected to be included in the energy assessment. If no value is entered then the GLA's recommend price of £95 per tonne of carbon dioxide will be used.

TABLE 2. CARBON (CO ₂) FACTORS		NOTES
Fuel type	Fuel Carbon Fa	ctor (kgCO ₂ /kWh)	
	SAP 2012	SAP 10.0	
Natural Gas	0.216	0.210	SAP 2012 and SAP 10.0 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
Enter Carbon Factor 2			used here must be taken from Table 12 within the SAP 2012 and SAP 10.0 documents.
Enter Carbon Factor 3			Fuel type should be updated and referenced in Column A when additional carbon factor values have been added.
Enter Carbon Factor 4			
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 separate factors should be provided using SAP 2012 and SAP 10.0 fuel factors. Assumptions and workings should be shown below in Table 4.

TABLE 3. BESPOKE DH CAR	BON FACTOR CALCULATION METHODOLOGY
	Please provide below details of the calculation methodology followed to establish the bespoke carbon factor, if applicable.

TABLE 4. DISTRIBUTIO	N LOSSES	COMMENTS
Primary network (buried pipe)	Total pipe length (m)	
	Average heat loss rate (W/m)	
Secondary network (buried pipe)	Total pipe length (m)	
	Average heat loss rate (W/m)	
Total losses (MWh/year)	•	
Total heat supplied (MWh	n/year)	
Distribution Loss Factor (DLF)	
Calculation included in er	nergy statement (yes/no)	

DOMESTIC ENERGY CONSUMPTION AND CO.2 ANALYSIS Unit Identifier (e.g. plot multis (mr) units (mr) (mr) (mr) (mr) (mr) (mr) (mr) (mr)			
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		(kgCO ₂ p.a.)	(kgCO ₂ / m ²)
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				ncluding informa		an' energy consur	mption figures, the 1	'be lean' DER, the Di	FEE and the regula	sted energy demand of the	'be lean' scenario.					8	SAP 2012 CO ₂ PE	RFORMANCE				SAF	10.0 CO ₂ PERFORMANCI				FEES
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NON-DOME	STIC EN	IERGY CO		ON AND CO:	ANALYSIS		REGULA	ATED ENERGY CON	SUMPTION BY EN	D USE (kWh/m² p.a.) 'BE L	EAN' BER - SOURCE: B	RUKL OUTPUT		REGULATED ENE	RGY CONSUMPTION	BY FUEL TYPE (KW	h/m² p.a.) 'BE LE	:AN' BER - SOURCE: BRUKL.I	NP or "SIM.CSV FILE			REGULA	TED CO ₂ EMISSIONS PER	UNIT			
Building Use	Model An (m²)	a Number o units	Total area f represented by model (m²)	Calculated BER 2012 (kgCO ₂ / m ²)	BRUKL BER 2012 (kgCO ₂ / m²)	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.)	Natural Gas	Grid Electricity	Equipment			2012 CO ₂ emissions (kgCO ₂ p.a.)	s Natural Gas	Grid Electricity	Equipment			SAP 10.0 CO ₂ emissions (kgCO ₂ p.a.)	BRUKL BER SAP 10.0 (kgCO ₂ / m ²)	
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Use		Total Area (m ^a)	Calculated BER 2012				Domestic Hot	REGULAT	ED ENERGY CONSUMPTI									REGULATED CO ₂ EMISSIONS						REGULATED	CO ₂ EMISSIONS	
				(kgCO ₂ / m ²)		Space Heating (kWh p.a.)	HIF	Water (kWh p.a.)	H _b	Heating System (kWh p.a.)		Auxiliary (kWh p.a.)	Cooling (kWh p.a.)						2012 CO ₂ emissions (kgCO ₂ p.a.)						emissions (kgCO ₂ p.a.)	BER SAP 10.0 (kgCO ₂ / m ²)	MA
Sum		9,320		(kgCO ₂ 7 m)		(kWh p.a.)	HIP.	Water (kWh p.a.) 301,437	HIP	Heating System (kWh p.a.)	(kWh p.a.)	(kWh p.a.)	(kWh p.a.) 46,921												emissions (kgCO ₂ p.a.)		

applicant should o					an' energy consu	mption figures and	the 'be clean' DER.													SAP 2012 CO ₂ PERFO	DRMANCE							SAP 10.0 CO ₃	PERFORMANCE			_
JMESTIC ENE	ERGT CO	NSOMPTION	VALIDATI					REGULAT	TED ENERGY CONS	UMPTION PER U	NIT (KWh p.s.) - 'BE	CLEAN SAP DER	R WORKSHEET						REGULAT	ED CO, EMISSIONS PI	ER UNIT (kgCO ₂ p.s.)	,					RE	GULATED CO; EMISSI	ONS PER UNIT (kgCC	O ₂ p.s.)		
it identifier (e.g. plot Mode number, floor relling type (n	al total Numb rarea uni m*)	Total area per of represented its by model (m*)	Calculated DER 2012 (kgCO ₂ / m ²)	DER Worksheet DER 2012 (kgCO ₂ / m ²)	Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)		Space and Domestic Hot Water from CHP					Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP	Electricity generated by CHP	Lighting	Auxiliary	Cooling 2012	2 CO ₂ emissions (kgCO ₂ p.s.)	Space Heating D	Somestic Hot Water	r Space Heating and DHW from CHP	Electricity generated by CHP	Lighting	Auxiliary Cools	sg SAP 10.0 Co emissions (kgCO ₂ p.s	CO ₂ Calcula B DER SAI B.) (kgCO ₂
etc.)		(m-)		DER Sheet					if applicable	If applicable	if amplicable				DER Sheet				if applicable	if applicable							if applicable	if applicable				
				(Row 384)	[Row 307b + (Row 367b x 0.01)]	Select fuel type	[Row 310b + (Row 367b x 0.01)] 2647.442105		DER Sheet [(Row 307a + 310a) + (Row 362 x	Select fuel type	((Row 307a + 310a) + (Row 361 + 362))	[Row 309]	Select fuel type		(Row 313 + 331)	DER Sheet Row 315																
75 v806-TY4 10 76 v809-TY4 54 77 v809-TY4 11 78 v809-TY4 10	00.5 1 4.4 1 11.4 1 32.3 1	1 100.5 1 84.4 1 111.4 1 102.3	14.9 14.3 15.4 13.9	15.2 14.6 15.7 14.1	2921.631579 1921.694727 4020.705262 2896.2	Natural Gas Natural Gas Natural Gas Natural Gas	2262.589474 2201.073684 2020.178947	Natural Gas Natural Gas Natural Gas Natural Gas						401.8387 359.5847 430.6888 409.3412 340.1777	251.044 184.0552 278.2716 255.5402		633 417 871 626	529 511 475 447			210 187 224 212	130 96 144 133		1,502 1,210 1,714 1,418	616 405 846 603	514 496 462 435 487 424			34 84 100 35	50 43 65	1,282 1,029 1,474 1,198	12.0 12.0 13.0 11.0
79 v809-TY4 70 80 v810-TY4 50	8.4 f 1.63 f 19 f	78.4 1 50.63 1 29 1 117 1 50 1 60	14.6 18.7 13.9	14.1 14.9 19.1 14.2	2896.2 1757.673684 1555.694727 2486	Natural Gas Natural Gas Natural Gas	2218.462158 2019.789474 2641.652622	Natural Gas						234.3855	255.5402 170.9708 104.2889 207.5906		380 336 537	511 475 447 501 436 527			177 122 205	89 54 108		1,210 1,714 1,415 1,146 946 1,380 1,134	369 327 522				79 55 93	40 24 45	975 830 1,177	12.4 16.5 11.3 7.7 14.3 14.3 12.3 11.3 11.3 9.2 12.4
3 v808-TY4 5		1 117 1 50 1 60	14.6 18.7 13.9 9.7 17.2 16.4 14.4 13.3	9.8 17.5 16.7	970.5684211 1165.642105 1487.262158	Natural Gas Natural Gas Natural Gas Natural Gas	2091.568621 2012.126216 2122.536862	Natural Gas Natural Gas Natural Gas						499.5672 231.8095 272.2928 345.4927 334.2871	1763768 104.2889 207.5906 245.2344 99.125 118.95 158.6 148.8781		210 252 321	538 435 461			259 120 141	127 51 62		1,134 858 985	204 245 312 374	523 423 448			54 63	57 23 28	744 851	7. 14 14
v608-TY4 8 v608-TY4 7 v608-TY4 11 v608-TY4 11	04 1	80 71 1 102 1 104 1 88 1 103	13.3 13.8 13.1	14.5 14.1 12.3 11.5	1782.715789 1007.872684 2571.821052 2320.8 822.9472684	Natural Gas Natural Gas Natural Gas	2221.284211 2251.694727 2452.894727 2459.631579 2286.831579							214.2971 408.5977 412.5022 291.8952	148.8781 213.8812 218.075 184.525		385 218 556 503 178 589	504 486 530 531			163 212 215	77 111 113		253 985 1,159 944 1,403 1,363 293 1,445	212 540	423 446 490 473 515 517 501 516			73 95 96	35 50 51	975 830 1,177 901 744 851 901 792 1,200 1,153 809 1,235	1
608-TY-1 8	03 1	1 103	13.1 11.3 14.0	11.5	823.9472684 2726.610526	Natural Gas Natural Gas	2286.821579 2456.326216	Natural Gas Natural Gas						391.8852 411.0654	184.525 215.9781		178 589	531 516 531			203 213	96 112		993 1,445	489 173 573	501 516			91 96	43 50	1,235	1
		6 1,402 Y CONSUMP	TION AND C		SIS	N/A	36,837	NA			0		NA		3,055	٠	7,011	7,957	0	•	3,046	1,586		19,599	6,816	7,736	•	0	1,367	712 0	16,631	
a Use Mode	ol Area Numb	Total area per of represented	Calculated BER 2012 (kgCO ₂ / m ²)	ON CHECK BRUKL BER 2012 (kgCO ₂ / m ²)	Space Heating (kWh/m² p.s.)	Fuel type Space Heating	Domestic Hot Water (kWh/m² p.s.)	Fuel type Domestic Hot Water	ERGY CONSUMPTIO	ON BY END USE (Electricity generated by CHP	LEAN BER - SOUP	RCE: BRUKL OUTF	Lighting (kWhim' p.a.)	Auxiliary (kWh/m² p.a.)	Cooling (kWhim' p.s.)	REG Natural Gas	Grid Electricity	DISUMPTION BY FUEL Bespoke DH Factor	TYPE (kWhim*p.a.) 1 Electricity generated by CHP (-)	Equipment	OURCE: BRUKLINP	or "SIM.CSV FILE 2012	2 CO ₂ emissions (kgCO ₂ p.a.)	Natural Gas	Grid Electricity	REGU Bespoke DH Factor	Electricity generated by CHP	Equipment		SAP 10.0 C emissions (kgCO ₂ p.a	00, BE
		per of represented its by model (m*)									(-) If applicable						0.216 kgCO-kWh	0.519 kgCO-kWh	0.000 kgCO-kWh	if applicable	0.519 kgCOukWh				0.210 kgCO-kWh	9.233 kgCO-kWh	0.000 kgCO-kWh	If applicable 0.233 kgCO-kWh	0.233 kgCO+kWh			
285 174 116	90.73 1 90.51 1 99.64 1	1 4547 1 1606 1 1765	18.8 23.3 40.2	18.8 23.3 40.2	8.257063655 6.724340923 28.10521659	Natural Gas Natural Gas Natural Gas	1.83516 9.60755 126.465	Natural Gas Natural Gas Natural Gas						7.119411 12.4872725 4.812972	16.68281 18.97194 2.768562	8 194832362 5 599327167 0.27764786	10 16 165	32 38 9						53,558 40,519 46,998	10 16 165	32 38 9					27,296 21,404 42,853	
									N/P	M ₀		**	₩.									Mag.	Ma									
		3 7,918			97,950	NA	264,600	NA			0			62,527	112,946	45,921	362,546	222,400	٠	0	0			193,736	362,546	222,400	0	0	0		127,954	1
VIDE ENE	ERGY COM	NSUMPTION A	AND CO 2 A	NALYSIS						REGULATED EN	ERGY CONSUMPT)	ON											REGI	SULATED CO;							REGULAT	TED CO, I
	Total Ar	nea (m²)	Calculated BER 2012 (kgCO ₁ / m ²)		Space Heating		Domestic Hot		Space and		Electricity generated by CHP	Secondary		Linhtisa	Austine	Cooling							2012	2 CO- emissions							SAP 10.0 C	
			(g. 5] / m)		(kWh p.a.)	M.	Water (kWh p.s.)	4ª	Domestic Hot Water from CHP (kWh p.s.)	45	(kWh p.s.) #applicable	Secondary Heating System (kWh p.s.)	M.	(kWh p.s.)	Auxiliary (kWh p.s.)	(kWh p.s.)								(kgCO ₂ p.a.)							(kgCO ₁ p.a	a.) (kg/
	9,3	120	22.9		130,407		301,437				0	0		68,336	116,002	46,921								213,334							144,585	

The applicant should complete all the light blue cell DOMESTIC ENERGY CONSUMPTION			e green' energy consumption figu	ures and the 'be green' E	DER.															SAP 2012 CQ PE	RFORMANCE								SAP 10.0 C	Q PERFORMANCE				
	VALID	TOW CHECK					REGULATED ENERGY C	CONSUMPTION PER U	UNIT (KWIN p.a.) - Til	GREEN' SAP DER WO	RECHEST								REGUL	ATED CO, EMISSION	NS PER UNIT (NgCO)	, p.a.)							REGULATED CO), EMISSIONS PER UN	wit .			
Linit identifier (e.g. pilot Model total Number of represente number, filor area dwelling type (m') units by model etc.)	ed Calculated	DER Worksheet	Space Heating Fuel type (Heat Source 1) Space Heating	Domestic Hot II Water Do	Fuel type Space smeetic Hot (Heat e	Heating Fuel typ source 2) Space Heat	e Domestic Hot sing Water	Fuel type Domestic Hot II	Space and Fu Domestic Hot	type CHP Total Elec generate	tricity Secondary of by Heating syst	Fuel type em Secondary	Electricity Light generated by	ing Auditory	Cooling	Space Heating	Domestic Hot Wate	or Space Heating and DHW from CHP	Electricity generated by CHP	Electricity generated by	Lighting	Auxiliary C	oling	9912 CO, emission (KoCO, p.a.)	s Space Heating	Domestic Hot Water	r Space Heating and DHW from CHP	Electricity generated by CHP	Electricity generated by	Lighting	Auditory Co.	áng	SAP 16.6 CC emissions	O, Calculated DER SAP 10.0 (kgCO ₂ / n²)
dwelling type (m') units by model (m')	(kgCO ₂ / st	(kgCO ₄ / m ²)		(Heat Source 1)	Water		(Heat source 2)	Water W	Vater from CHP	CHP	н	Heating	renewable (-)							moewable									renewable				(kg00, p.s.) (kgCO _s /m²)
	-	DER Sheet	DER Sheet Select fuel type	DER Sheet Sele	ect fuel type DER	plicable I Sheet Select fuel	if applicable type DER Sheet	Select fuel type	l'applicable if DER Sheet Sel	pplicable If applic ct fuel type DER Sit	atio est DER Sheet	Select fuel type	o DER Sheet DER :	heat DER Sheet	DER Sheet			if applicable	l'applicable	if applicable			_	_			l'applicable	if applicable	if applicable			_		
		(Row 204)	(Row 307b + (Row 367b x 0.01() 838.55 Grid Electricity	[Row 310b + (Row 367b x 0.01]] 771.0233333 GG	(Row 36)	# 207c + #7c x 0.01()	[Row 310c + (Row 367c x 0.01)	a .	§Row 207a + 218a) + (Row 262 x	((Row 3) 218a) × (361 + 3	17a + Row 309 Row 62 j			332 (Row 313 + 331)	Row 315																			
\$227.00 (40-77) \$50.0 \$ 1 \$100.0	9.0	12.6 9.8 12.4	0.512	775.0213331 GG 705.07 GG	of Electricity of Electricity of Electricity								-210 401 -210 218	807 802.144 807 224.8653 808 884.0726		482 217 602	902 389 345 340			-192 -192 -192	210 167 224 212	157 117 172		1,049 828 1,162 1,064 774 599 968 791 528 634 776 611 992 967 661 1,021	216 143 271	191 174 195 193			42 42 42	94 94 100	70 52 78		400 372 522	44 47
10279 v809-TV 98.4 1 84.4 10277 v809-TV 111.4 1 111.4 10279 v809-TV 102.3 1 102.3 10279 v809-TV 78.4 1 78.4 10280 v819-TV 50.62 1 50.63	9.8 9.8 9.9 9.9 11.3 9.8 6.8 92.6 9.7 8.6 9.7 8.6 9.7 9.7	114 114 115 115 116 116 116 116 117 117 117 117 117 117	STT.15 Grid Electricity 116.1966687 Grid Electricity	#11.1166667 GG 794.18 GG	id Electricity id Electricity								-BIC 688BIC 689BIC 6	224,8803 888 814,778 888 814,778 812,728 813,777 201,4808 813 114,4808 813 124,4008 129,124 817 272,124 817 272,124 817 272,124 817 272,484 817 273,484 817 274,485 817 274,485 817 274,485 817 274,485 817 274,485		603 476 299 256 409 160 192 244 293 166 402 203 135 448	340 381 332 601			-192 -192	212 177 122	157		1,004 774	214 130 115 183	153 171 169 180			-82 -82	95 79	71 49		272 522 481 247 269 435 255 227 245 248 274 445 439 297	44 47 44 44 52 64 20 47 47 44 19 44 41 24
10291 v608-TR 99 1 99 10292 v608-TY 117 1 117	9.0	13	787.2313331 Grid Electricity 327.3464687 Grid Electricity	775.19 Gid 785.996.0027 Gid	of Electricity of Electricity								-200 4021 -200 4991	087 254.4008 672 278.2244		409 160	401 409			-182 -182	200	132		968 791	193 72	180			-82 -82	93 116	59 65		425 255	44
1001 1000 170 50 1 50 1 1001	10.6 10.6 9.7	12.6 5.7	AM 12 Grid Electricity EXC NAMES T Grid Electricity 164 324687 Grid Electricity	637.301333 GG 673.301333 GG	id Electricity id Electricity id Electricity								-100 212. -200 212. -200 200.	001 229.521 828 218.52 807 287.68		192 244 292	350 362 370			-182 -182 -182	120 141 179	67 80 103		528 634 776	110 122 74	168 157 172 166			-82 -82 -82	63 81	30 36 66		217 215 249	47 47
1028 VB08-TY 71 1 71 10287 VB08-TY 102 1 102	9.7	8.6 9.7	SSESS GIVE Electricity SSESS GIVE Electricity	733.000007 QG 776.75 GG	id Electricity id Electricity								-230 224. -230 408.	872 179.8481 877 281.6112		166 423	270 403 404			-192 -192	163 212 215	93 136		911 992	74 190 172	181			42 42	73 95	42 61		274 445	2.9 4.4
10289 VB08-TY 88 1 88 10290 VB08-TY 102 1 103	7.5 9.9	7.5 9.9	758.086887 Grid Electricity 250.936887 Grid Electricity 858.436887 Grid Electricity	775.8011111 GG 733.81 GG 777.888887 GG	id Electricity id Electricity id Electricity								-310 4351 -310 4131 -310 3101	003 262.003 802 233.023 604 263.2382		135 648	292 404			-182 -182 -182	203 213	112 112		961 1,021	61 201	176			42 42	91 96	60 62		297 458	2.4 4.5
Sum 1,402 16 1,402	9.5		10,164 N/A	11,632	NIA.	0 NA		N/A		NA 0		NA	-5,600 5,8	9 2,709	0	5,275	6,027			-2,996	2,046	1,925	0 NA	13,377	2,360	2,710			-1,205	1,367	864	NA.	6,005	43
NON-DOMESTIC ENERGY CONSUMI	IPTION AN	D COANALYS	IS .																									PERSON ATTO CO. TW						
NON-DOMESTIC ENERGY CONSUM Total area Use Area per Number of represente unit (m²) units by mote by mote (m²)	a Galculated BER 2012	BER 2012	Space Heating Fuel type (KWhini' p.a.) Space Heating	Domestic Hot II Water Do	Fuel type omestic Hot					Electri generate CHF (1)	oby ed by		Electricity Light generated by (kWhit recovable technology	ing Auxiliary I [*] P.B.) (White [*] P.B.)	Cooling (kWh/m² p.a.)	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP	Electricity generated by renewable technology	Enter Carbon Factor 1	Enter Carbon Ente Factor 2 Fi	Carbon Equipmen ctor 3	(kgCO, p.s.)	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP	Electricity generated by renewable technology	Enter Carbon Factor 1	Enter Carbon Enter Factor 2 Fac	Carbon Equipme tor 3	emissions	DER SAP 10.0
unit (m²) units by model (m²)	el (kgCO ₂ /at) (kgCO ₄ / m²)		(control p.a.)	Water					H			technology (1)						(1) Fapplicable	technology (-)		6.600 kgCO ₄ kWh						(-) if applicable	technology (1		0.000 kgCO ₂ 6Wh			(kgCO ₂ / m²)
Office 2950.72 1 4547 Cinema 1740.51 1 1606 Rotel 1169.64 1 1765	19.1 22.1 10.5	18.1 22.1 28.8	2.275892773 Grid Shirtonly 2.851342789 Grid Shirtonly 28.34428929 Grid Shirtonly	0.001788223 GV 2.60778273 GV	nd theorety of theorety					If applic	abis .		If applicable 7.11	2725 28.07294 2725 28.07294 1021 8.702947	8.190832362 3.199837267	8.216 kgCQ_AWh	6.519 kgCO,49811 85	0.000 kgCO_WMh	8.519 kgCO ₂ kWh	0.519 kgCO _a kWh	8.800 kgCO ₂ AWh	6.666 kgCO_AWA	gCQ_WM: 0.519 kgCQ_I	51,459 38,446 12,244		8.223 kgCO,4Wh 43	e.eee kgCO_kWh	0.233 kgCO ₂ KWh	8.232 kgCO ₂ 498h	e.eee kgcoykwh e	0.000 kgCO ₂ kWh	CO_AWIN 8.223 kgCO	23,192 17,260 6,305	9.9 5.4
Hotel 1169.64 1 1765	10.5	28.8	26.26.00009 Grid Electricity	129.693 01	of Electricity								7.84	021 2.70062	0.423796237		ii							12,264		16							4,305	5.4
						, ,		,	,	4																								
Sum 5,761 2 7,918	17.2		59,619 N/A	235,461	NA.					-			0 67/	14 112,946	44,968	18,792	257,611					0		136,029	10,792	257,611		0		0			62,200	7.9
SITE-WIDE ENERGY CONSUMPTION	N AND CO.	ANALYSIS																																
								REGULATED EN	NERGY CONSUMPT	ON			_											REGULATED CO. EMISSIONS									REGUL	LATED CO:
Use Total Area (m²)	Galculated BER 2012 (kgCO ₂ / m		Space Heating	Domestic Hot	Space	Heating	Domestic Hot		Space and	Electric generate	city of by Secondary		Electricity generated by	ina Austiany	0.000																		SAP 10.0 CC	O, Calculated
	(Agoo) / III		Space Heating (kWh p.s.)	Water (kWh p.s.)	F (cm	Heating source 2) th p.a.)	Domestic Hot Water (Heat source 2) (kWh p.a.)	A	Space and Domestic Hot Vater from CHP (kWh p.a.)	Electric generate Cod (con)	d by Secondary Heating syst La.) (kWh p.s.)		Electricity generated by Ligh renewable (kWh p.a.)	pa) (Whpa)	Cooling (kWh p.s.)									2012 CO, emission									emissions	O, Calculated BER SAP 10.0 (kgCO ₂ / m²)
Sum 9,320	16.0		49,983	247,892						* 4440		-	-5,600 72,	82 116,656	46,900																		4400	7.3
			44,463	247,892									-0,000 72,	** 179,656	49,911									769,605									88,292	7.3

SAP 2012 Performance

SAP 10.0 Performance

Domestic

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

		ns for domestic buildings 2 per annum)
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Developmen	21.2	659.3
After energy demand reduction (be lean)	19.6	659.3
After heat network connection (be clean)	19.6	659.3
After renewable energy (be green)	13.4	659.3

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

	Regulated domestic of	arbon dioxide savings
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	1.6	8%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	6.2	29%
Cumulative on site savings	7.8	37%
Annual savings from off- set payment	13.4	-
	(Tonne	s CO ₂)
Cumulative savings for off-set payment	401	-
Cash in-lieu contribution (£)	38,123	

**Carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the "Development Information" I Non-domestic

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

		s for non-domestic buildings
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Developmen	199.8	421.0
After energy demand reduction (be lean)	193.7	421.0
After heat network connection (be clean)	193.7	421.0
After renewable energy (be green)	136.0	421.0

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

Regulated non-domestic	c carbon dioxide savings
(Tonnes CO ₂ per annum)	(%)
6.0	3%
0.0	0%
57.7	29%
63.7	32%
136.0	-
(Tonne	s CO ₂)
4,081	-
387,684	
	(Tonnes CO, per annum) 6.0 0.0 57.7 63.7 136.0 (Tonnes 4,081

unless Local Planning Authority price is inputted in the 'Development Inform

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

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)	
Ī	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Developmen	18.7	296.0
After energy demand reduction (be lean)	16.6	296.0
After heat network connection (be clean)	16.6	296.0
After renewable energy (be green)	6.0	296.0

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

	Regulated domestic carbon dioxide savings		
	(Tonnes CO ₂ per annum)	(%)	
Be lean: Savings from energy demand reduction	2.1	11%	
Be clean: Savings from heat network	0.0	0%	
Be green: Savings from renewable energy	10.6	57%	
Cumulative on site savings	12.7	68%	
Annual savings from off- set payment	6.0	-	
	(Tonne	es CO ₂)	
Cumulative savings for off-set payment	180	=	
Cash in-lieu contribution (£)	17,115		

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

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Developmen	127.6	189.0
After energy demand reduction (be lean)	128.0	189.0
After heat network connection (be clean)	128.0	189.0
After renewable energy (be green)	62.3	189.0

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

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	-0.3	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	65.7	51%
Total Cumulative Savings	65.3	51%
Annual savings from off- set payment	62.3	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	1,869	-
Cash in-lieu contribution (£)*	177,520	

carbon price is based on GLA recommended price of £95 per tonne of carbon pless Local Planning Authority price is inputted in the 'Development Information'

Total regulated emissions (Tonnes CO₂ / year)

CO₂ savings (Tonnes CO₂ / year)

Total regula

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2013 baseline	221.0		
Be lean	213.3	7.6	3%
Be clean	213.3	0.0	0%
Be green	149.4	63.9	29%
Total Savings	-	71.6	32%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	4,482.2	-

221.0				Part L 2013 baseline	146.3		
213.3	7.6	3%		Be lean	144.6	1.7	1%
213.3	0.0	0%		Be clean	144.6	0.0	0%
149.4	63.9	29%		Be green	68.3	76.3	52%
-	71.6	32%		Total Savings	-	78.0	53%
-	CO ₂ savings off-set (Tonnes CO ₂)	-			-	CO ₂ savings off-set (Tonnes CO ₂)	-
-	4,482.2	-		Off-set	-	2,048.8	-

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	40.84	40.41	1%

	Area weighted non-domestic cooling demand (MJ/	Total area weighted non-domestic cooling demand (MJ/year)
Actual	288.1	2281175.8
Notional	267	2114106