Barking Town Centre District Energy Scheme

Information for Developers and Carbon Factors

Version 1
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Revisions from previous version

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1	First Version

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1. Overview

Barking and Dagenham has ambitions to become London's Energy Capital. The development of Decentralised Energy Networks (DEN's) across the borough utilising low or zero carbon fuel sources is a critical component of this objective. To confirm this intent, approval was given by Council Cabinet in July 2016 to create a wholly owned energy services company to deliver district energy schemes across the borough. This energy services company which was formed in 2016 is B&D Energy Limited.

Prior to the Cabinet approval process, detailed heat mapping and energy master planning of the entire borough was undertaken which identified seven potential district energy opportunity areas. The largest of these is Barking Town Centre, centred initially around the Gascoigne East Estate regeneration scheme as the catalyst core consumer.

2. Gascoigne East District Energy Project

The Gascoigne East Estate regeneration scheme was awarded Outline Planning Permission in October 2014 for 1,575 residential units plus other ancillary buildings. The original plan was for circa 1,000 of these units (in the higher density section of the estate) to be connected to a district heating scheme fed with LZC heat from a central energy centre containing CHP's, thermal stores and boilers. This regeneration scheme is now proceeding with full build expected over a period of circa 7 years.

Currently the first Phase is nearing completion which will deliver over 400 homes. Of these around 100 are already fully constructed and occupied, with B&D Energy in contract with each of these occupiers to supply both heat and electricity. Electricity supplies for residential supplies are specific to this scheme because the Gascoigne East project will also contain the UK's largest private residential electricity network, receiving electricity from a combination on site PV and CHP.

In the first Phase the Energy Centre structure for the entire development was constructed and fitted out with 60 m3 of thermal stores and two of the three planned boilers. In accordance with the planning permission awarded for the development, at a date no later than 60% of occupancy of the 1,000 units the CHP units have to be installed which is expected to be completed during 2019.

When the B&D Energy business was formed the B&D Energy team reviewed what plant and systems were to be provided by the regeneration scheme. As they were simply set to meet planning requirements and not optimised for long term operation it was agreed, following detailed modelling, that the thermal stores could be increased to the current 60 m3 and the CHP size would be doubled from 1 x 400 kWe unit to 2 x 400 kWe units. This also allows the potential from the outset to commence with significant expansion of the scheme into further developments in Barking Town Centre delivering low carbon supplies of heat. As set out above these CHP units will be installed over the next year as further units are built out and hence loads increase as well as to comply with planning requirements.

The photographs below illustrate the Gascoigne East energy centre which was handed over to B&D Energy in early 2018 and into which the CHP units will be added in 2019.

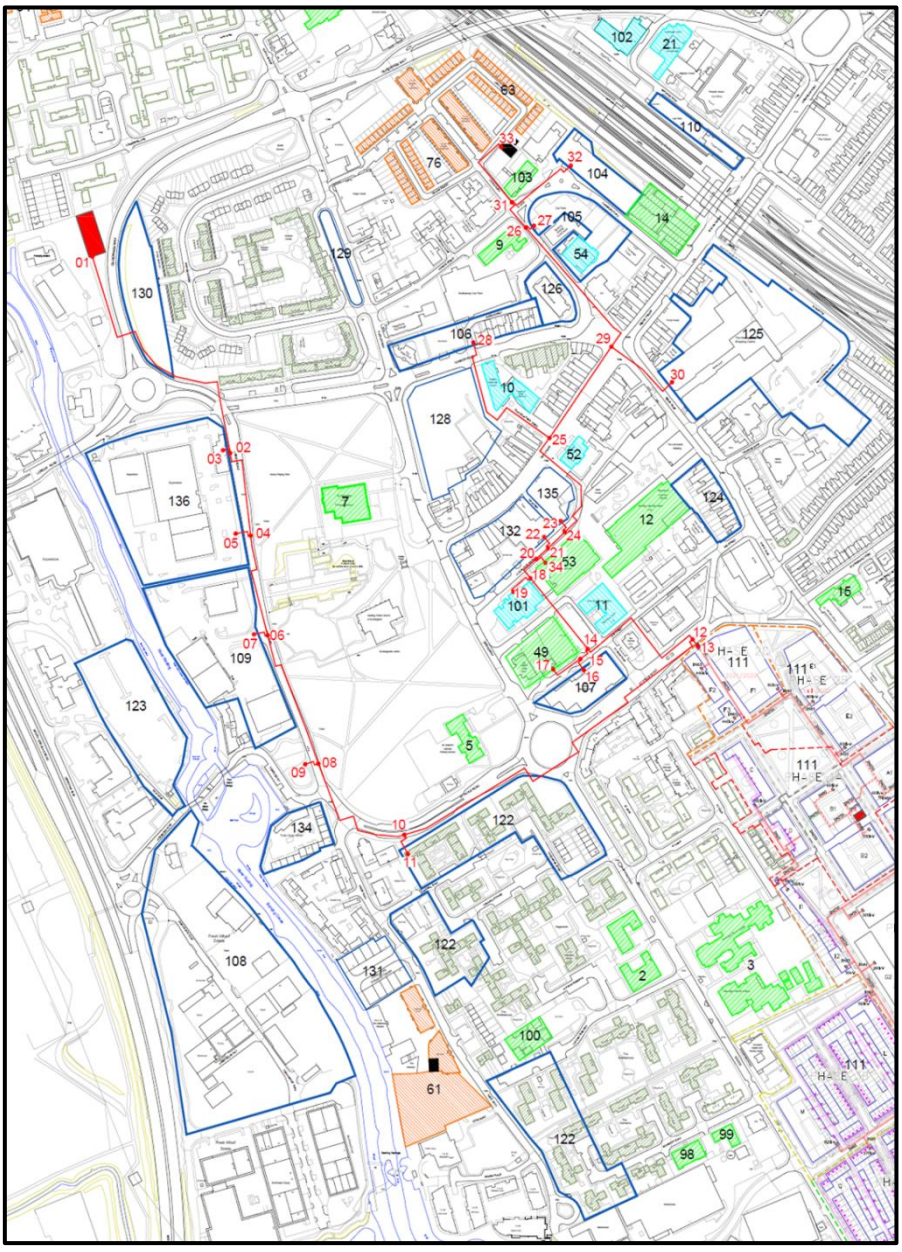
Gascoigne East Estate Energy Centre

(One of the three final Boilers and 60 m3 of thermal stores)

3. Gascoigne East and Wider Barking Town Centre District Energy Scheme

To create a Barking Town Centre ("**BTC**") wide district energy scheme B&D Energy is planning to develop a second larger energy centre to supplement the existing one on the Gascoigne East regeneration scheme as set out in Section 2. The plan below shows the existing Gascoigne East Energy Centre (red box on site 111) and the second larger energy planned centre to the left of Site 130 (red box). This is the current working location for this second energy centre which is subject to planning and further development but is a site owned by the borough and therefore available to B&D Energy. In conjunction with the existing Gascoigne East energy centre this second energy centre will be able meet the heat supplies of all major developments planned in BTC.

The further sites identified on the plan are all potential connections that B&D Energy intends to make to its network to expand the district energy scheme across Barking Town Centre. Indeed B&D Energy are already at an advanced stage with a number of these.



4. GLA Guidance, Strategic Significance of the BTC District Energy Scheme and Plans to Decarbonise the Scheme

The GLA's October 2018 version of the guidance document on preparing energy assessments encourages planning applications referable to the Mayor to use SAP 10 carbon emission factors when calculating carbon emission performance against London Plan targets.

https://www.london.gov.uk/what-we-do/planning/planning-applications-and-decisions/pre-planning-application-meeting-service-0

The guidance document also confirms that the continued use of SAP 2012 emission factors will require justification to be included in energy assessments supporting planning applications. Based on these requirements B&D Energy have held a number of discussions with GLA to agree a consistent approach for reporting carbon emission performance through connection to the BTC District Scheme.

GLA have confirmed to B&D Energy that the use of SAP 2012 will be considered acceptable where development proposals provide a commitment to connect to the BTC District Energy Scheme. This decision reflects B&D Energy's long term commitment to incorporate waste heat as the primary source of heat for the wider BTC district network, with the existing and short term investments in CHP being used only as an enabling technology as set out in B&D Energy's business plan to facilitate the initial phases of the network development.

. B&D Energy's updated business plan for the expansion of the wider network which is expected to be finalised in Q1 2019 will include targets for carbon intensity of the heat supplied that B&D Energy is seeking to work towards. It will also set out plans for the future decarbonisation of the network to work towards achieving these. To start this process B&D Energy has already held commercially confidential discussions with potential providers of waste heat for the scheme, to start exploring this potential. It is planned that working with the GLA's Decentralised Energy Enabling Program over the next two years these options will be explored in detail and crystallised into firm proposals setting out how this commitment to decarbonise the scheme can be realised

The decision also reflects the strategic significance of the wider BTC district energy network, which will deliver on the Mayor's ambitions to implement large scale district heating and low carbon energy projects, as set out in the London Environment Strategy Objective 6.2.

Therefore the following fuel conversion factors set out below are used in Section 5 to calculate the carbon content of heat from B&D Energy's BTC Scheme. These are based on Part L 2013 which uses figures from SAP2012. The use of SAP 2012 carbon emission factors for developments connecting to the B&D Energy Scheme will be reviewed following the next update to Part L of the Building Regulations, expected in 2020.

Natural Gas	0.2160 kg CO_2/kWh
Grid Supplied Electricity	0.5190 kg CO_2/kWh
Grid Displaced Electricity	0.5190 kg CO_2/kWh

5. Current Carbon Factor for Heat Supplies from B&D Energy's Barking Town Centre District Energy Scheme

Using the fuel conversion factors set out in Section 4 and data for the Gascoigne Scheme produced from detailed techno-economic modelling the table below sets out the current carbon content of heat for the scheme with the assumptions also set out below.

		Heat Delivered to Development	Heat Delivered to Development Site including Residential Secondary Network Losses	Units
Heat Split	Proportion of heat from gas boilers	17.40%	17.40%	
	Proportion of heat from gas fired CHP	82.60%	82.60%	
Delivered Heat	gas boilers	0.174	0.174	kWh
	gas fired CHP	0.826	0.826	kWh
	Total	1.000	1.000	kWh
Losses	Primary Heat Losses for BTC area network % of heat generated	3.4%	3.4%	
	Secondary Network Losses % of heat supplied to secondary network	0.0%	15.0%	
	Total Heat Loss % of heat generated	3.44%	17.93%	
	SAP Distribution Loss Factor	1.036	1.218	
Heat Generated	gas boilers	0.180	0.212	kWh
	gas fired CHP	0.855	1.006	kWh
	Total	1.036	1.218	kWh
Efficiencies	gas boilers	91.4%	91.4%	
	thermal for gas fired CHP	38.6%	38.6%	
	electrical for gas fired CHP	33.2%	33.2%	
	Parasitic electricity factor	1%	1%	
Delivered Fuel	gas for boilers	0.197	0.232	kWh
	gas for CHP	2.216	2.607	kWh
	electricity generated from CHP	0.736	0.866	kWh
	electrical energy for heat distribution	0.010	0.012	kWh
Carbon Emission Factors	natural gas	0.216	0.216	kg CO_2/kWh
	grid supplied electricity	0.519	0.519	kg CO_2/kWh
	grid displaced electricity	0.519	0.519	kg CO_2/kWh
Carbon Emissions	gas boilers	0.043	0.050	
	gas fired CHP	0.479	0.563	
	emissions for heat distribution	0.005	0.006	
	gas CHP electricity credit emissions	- 0.382	- 0.449	
	Total Emissions Factor kg CO_2/kWh	**0.145**	**0.170**	

Notes/Assumptions

1. Proportion of heat from gas fired CHP is derived from detailed techno economic modelling of the Gascoigne East Scheme
2. Primary heat losses are calculated for the full BTC heat network
3. Secondary network heat losses are in accordance with B&D Energy Technical Specification to which Developers connecting to B&D Energy's BTC network will have to comply. When submitting a planning application, which includes a connection to the B&D Energy Network and hence building a secondary network in accordance with the B&D Energy Technical Specification, the Developer shall demonstrate that their designs can comply with this secondary network heat loss requirement. This is because the planning authority/GLA will expect to see evidence, by way of an estimate based on the proposed building design, that this 15% can be complied with.
4. Plant efficiencies are taken from data sheets for existing and proposed plant

6. Contact Details

Any questions on this document or in relation to a connection to the Barking Town Centre scheme or any other district energy project in the Borough should be directed to:

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