

Capabilities on project:  
Energy  
Environment

## Section B

### **Identifies and locates potential customers who could be provided with thermal (heating cooling) and electrical energy within the town centre and nearby surrounding areas.**

Within the scope of this study we have identified approximately 50 potential energy customers. Some customers are existing Croydon Town centre energy consumers with existing relationships with energy providers, some potential customers are in the process of or considering developing in Croydon Town centre and, unless they already have corporate deals with energy providers, will be looking to obtain, easy and cheap access routes to reliable energy, some potential customers, like Croydon Council are looking not only to purchase energy, but also to play a role in the production of, and revenue streams from, that energy.

All these customers have various thermal and electric demand characteristics for their existing buildings or future buildings. This study has looked to identify those potential customers, predict the scale of their energy demand loads and energy profile characteristics. Using customer parameters such as information of location, peak demands and load profiles we have offered an example energy connection solution for Croydon Decentralised energy.

We have taken a number of practical opportunities and constraints of delivering energy around an energy distribution network around Croydon. We have looked at the potential energy centre locations and estimated when the potential 50# customers could in practice connect onto and start drawing energy from the network.

This approach has led to the identification of three clear energy network zones. These zones are:

1. Zone 1: South Croydon
2. Zone 2: East Croydon
3. Zone 3: West Croydon

Each of these zones has very different and very specific energy characteristics. These zones are then broken down into energy clusters. An energy cluster is single or group of buildings in the same geographical location, which are owned by the same customer or have very similar demand characteristics. The potential customer is therefore a sub-set of the energy clusters and for this study would be the address where a 'point of connection' is made onto the decentralised energy network.

The energy pathway would therefore be as follows:

1. Thermal and electrical energy is produced at the energy centre
2. Thermal and electrical energy is then passed through pipes and cables
3. The customer receives the energy at their site boundary at the point of connection (POC)

### **South Croydon Energy Zone (Zone 1)**

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#### **Potential Energy Centre Location**

The proposed location for Zone 1 energy centre is in the basement of Taberner House. The specifics of this energy centre will be addressed in a later section of this report. In order to identify the potential customers in Zone 1 is good to understand the precise location of the energy source. The main land owner within this zone is Croydon Council and can therefore exert influence over the potential customers within this zone.

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## 1 CCURV Energy Cluster

The potential customers in existing or proposed buildings, which make up the CCURV energy cluster, are:

- a. Taberner House
- b. CCURV PSDH (Croydon Council Urban Regeneration Vehicle, Public Service Delivery Hub)
- c. Davis House
- d. Town Hall and Library

### a. Taberner House

The current proposal is for Taberner House to be demolished and replaced by an 18 storey stepped residential development on the site. The proposal would be to retain the current hole in ground of Taberner House's existing basement, to house the Zone 1 energy centre

### b. CCURV PSDV

The Croydon Register office building and Crosfield House (the L-shaped building along Fell Road and Mint Walk) is being demolished to make way for CCURV PSDH. The proposal is for Croydon Council offices to be decanted from the current Taberner House into the new CCURV PSDH building.

### c. Davis House

It is our understanding that Davis House will be refurbished.

### d. Town Hall and Library

The Town Hall and Library fronting onto Katharine Street are currently supplied from the energy plant under Taberner House.

### Customer Likelihood

As these buildings fall under the Croydon Council's or CCURV authority it is thought highly likely that these customers would be able to justify signing up to the Croydon Decentralised energy scheme.

## 2 Bridge House Energy Cluster

Bridge House-The Exchange sits to the west side of the C-CURV Energy Cluster. We have been asked to consider this building as part of this study.

## 3 Mid-Croydon Energy Cluster

With regards to the progression of the Masterplan for Mid-Croydon we have been informed that 'the brief is in development'. The potential customers in existing or proposed buildings, which make up the Mid-Croydon energy cluster, are:

- St George's House (Nestle Tower)
- Park Place

The masterplan for Mid-Croydon is in its infancy and very little is known about the proposals for Mid-Croydon apart from Croydon Councils current preference for a mix use consisting of approximately 50% residential.

### Customer Likelihood

Little is known about the proposals for this area. Although, given the close proximity to the energy centre potential identified, by this study, at Taberner House and the extensive underground car park, and therefore relative ease of local energy distribution below the cluster, the opportunities for connection are very favourable.

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#### **4 College Green Energy Cluster**

The potential customers in existing or proposed buildings, which make up the College Green energy cluster, are:

- Fairfield Halls & Ashcroft Theatre
- Croydon College
- Fairfield Halls West New Residential
- College Tower
- College Green North Refurb Offices
- Croma (100 George Street)
- Law Courts

#### **Customer Likelihood**

- Given the relationship between the Council and the College, the close proximity to the energy centre potential identified, by this study, at Taberner House and the extensive underground car park, and therefore relative ease of local energy distribution below the cluster, the opportunities for connection are very favourable.

#### **5 Law Courts Energy Cluster**

The potential customers in existing or proposed buildings, which make up the Law Courts energy cluster, are:

- The Law Courts
- Croydon Park Hotel
- Altitude 25
- No. 1 Croydon

#### **Customer Likelihood**

- Given the public nature of these building and their relationship to Croydon Council the potential for their connection is very favourable. The main issue to address will be the crossing of the rail tracks from College Green in the West to the Law Courts energy cluster to the east and the feasibility of using the rail bridge along Hazledean Road as the structure to support this pipework crossing connection.

### **East Croydon Energy Zone (Zone 2)**

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#### **Potential Energy Centre Location**

The proposed location for Zone 2 energy centre has been given a rough location to the East of Landsdowne Road at its North end. As there is no clear energy centre site this approximate area has been designated in order to address the feasibility of pipework distribution and to measure the pipe distances from source to POC for the costing exercise. Also, in order to identify the potential customers in Zone 2 is good to understand the approximate location of the energy source.

#### **1 Ruskin Square Energy Cluster**

The potential customers in existing or proposed buildings, which make up the Ruskin Square energy cluster, are:

- Phase 1 (West)
- Phase 2 (North)
- Phase 3 (Mid)
- Phase 4 (South)

Based on discussion with Stanhope, the developer for this site, for all four phases, we are currently making an allowance of 12 MVA for power (3MVA per phase) and 12 MW for heating/ hot water (3MW per phase). Our energy profiling is based upon a typology split, for all phases of 50% commercial office and 50% residential.

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### **Customer Likelihood**

- There are many issues to be presented and discussed with potential new developers in relation to connection to an energy network. Given the size, nature and location of Ruskin Square there are significant mutual benefits for Stanhope and the ESCo provider. If an early collaborative approach is taken then there are some major win-win opportunities.

### **2 Cherry Orchard Energy Cluster**

The potential customers in existing or proposed buildings, which make up the Cherry Orchard Road energy cluster, are:

- Phase 1 (Mid)
- Phase 2 (North)
- Phase 3 (Post Office)

Menta are the developer of the Cherry Orchard Road site. With regards to the split of energy loads and use typologies please refer to the relevant energy data sheets.

- Oval Primary School

### **Customer Likelihood**

- There are many issues to be presented and discussed with potential new developers in relation to connection to an energy network. Given the size, nature and location of Cherry Orchard Road development there are significant mutual benefits for Menta and the ESCo provider. If an early collaborative approach is taken then there are some major win-win opportunities.

### **3 East Croydon Station Energy Cluster**

Some provision has been made to allow additional capacity on the network to support the energy loads of the current railway station and the potential expansion of this facility.

### **4 Dingwall Road Energy Cluster**

The potential customers in existing or proposed buildings, which make up the Dingwall Road energy cluster, are:

- 29-30 Dingwall Road
- 14-17 Dingwall Road
- Other existing office buildings along Dingwall Road

Existing private office buildings and office refurbishments offer a different customers profile and characteristic to developer new build and public office buildings.

### **Customer Likelihood**

- There are many issues to be presented and discussed with potential customers along Dingwall Road. The customer likelihood connection depends a lot on the timing. Potential customers will not be looking to buy energy from an outside source that would mean leaving their existing new boiler plant redundant whereas if they have old boilers reaching the end of their life the offer of replacing that energy source with a potentially cheaper, more sustainable one which also frees up net lettable space where boilers are removed could be very attractive.

## **West Croydon Energy Zone (Zone 3)**

### **Potential Energy Centre Location**

The proposed location for Zone 3 energy centre has been given a rough location in the loading bay area in the lowest level basement at the North end of the Whitgift Centre. As there is no clear energy centre site this approximate area has been designated in order to address the feasibility of pipework distribution and to measure the pipe distances from source to POC for the costing exercise. Also, in order to identify the potential customers in Zone 3 is good to understand the approximate location of the energy source.

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### **1 Whitgift Centre Energy Cluster**

With the current proposed location for the energy centre in its lower levels the Whitgift Centre would be an essential part of the West Croydon energy cluster. Given the huge demand for energy and the potential to balance its retail energy profiles with surrounding residential and office profiles having the Whitgift Centre as a customer would add significant strength to the decentralised energy scheme for Croydon.

#### **Customer Likelihood**

- Given the land ownership by the Whitgift Foundation, an educational trust and the leaseholder for the Whitgift Centre Howard Holdings. There are both significant opportunities offered as well as barriers to overcome before a customer deal could be struck.

### **2 Centrale Centre Energy Cluster**

With the huge demand for energy and the potential to balance its retail energy profiles with surrounding residential and office profiles having the Centrale Centre as a customer would add considerable strength to the decentralised energy scheme for Croydon.

### **3 Wellesley Road Energy Cluster**

The potential customers identified in existing or proposed buildings, which make up the Wellesley Road energy cluster, are:

- Lansdowne Road Hotel
- Southern House
- Lunar House & Apollo House (Home Office)
- Wellesley Square
- Delta Point
- Prospect First

Existing private office buildings and office refurbishments offer a different customers profile and characteristic to developer new build and public office buildings.

Given the very public role of the Home Office the Lunar House & Apollo House buildings could offer substantial support to any proposed energy network along Wellesley Road. Lunar House has dual fuel boilers installed in 2000. The basement plantroom floor to ceiling height is approx. 7m. Boiler flues rise to roof level. Capacity of boilers is 2x 750kW. Lunar House basement plantroom is bigger than Apollo House basement plantroom.

Apollo House has gas fired boilers installed in 1987. Basement plantroom floor to ceiling height is approx. 5m. Boiler flues rise to roof level. Capacity of boilers is 2x 350kW.

The Home Office has just negotiated a lease extension to 2023 for both buildings. If we can persuade the landlord, we could look at connecting both buildings onto the network. It would be possible to house an energy centre for the Wellesley Road zone in the Lunar House basement (making this phase 1 of the Wellesley Road zone). It would be hard to justify the costs of running dedicated pipework from Taberner House all the way up Wellesley Road just to serve the Home Office. The connection costs would need to be shared with the various customers along Wellesley Road.

#### **Customer Likelihood**

- There are many issues to be presented and discussed with potential customers along Wellesley Road. The customer likelihood connection depends a lot on the timing. Potential customers will not be looking to buy energy from an outside source that would mean leaving their existing new boiler plant redundant whereas if they have old boilers reaching the end of their life the offer of replacing that energy source with a potentially cheaper, more sustainable one which also frees up net lettable space where boilers are removed could be very attractive.

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#### **4 West Croydon Energy Cluster**

The potential customers in existing or proposed buildings, which make up the West Croydon energy cluster, are:

- Berkeley Homes 250-units new residential development
- Other 250-units new residential development
- Existing Bus Station facilities

The West Croydon Masterplan is in the early stages. Provision has been made for the above customers.

#### **5 Handcroft Road Estate Energy Cluster**

Handcroft Road Estate energy cluster is based upon an existing residential district heating scheme. Given its proximity to Factory Lane, there is potential to connect this mini district network onto the Croydon decentralised network if the Roll Royce power plant and its pipework connection to the town centre forms part of the network. It will be important to retain and upgrade this estate including installing local small-scale CHP if connection to the wider scheme is unfeasible. This is one of the few examples in the Borough of a significant district heating project and its reputation will influence the development of further District heating schemes.

#### **6 Hogarth Crescent**

Developments around the Hogarth Crescent area have been considered but have been deemed out of range for the district heating network given the distance they are located from any of the proposed energy centres. The cost of taking the pipework to this location was seen as relatively expensive compared to the higher density areas that the district energy could potentially be serving. Also, during the time of the study, AECOM was not aware of any additional developments in planning or in progress in this area apart from the IYLO development. The IYLO development was also left out of the network as a result of its location. However, if the DH project as defined is developed then these buildings could be connected at a later date. The opportunity to save capital costs on installing boiler plant would not be realised but there is no reasons why these buildings could not be connected later provided their heating systems are based around a central boiler system. It would be preferable for the heating system to be designed to operate at low temperatures with a maximum return temperature of 50C. The use of solar PV to meet renewable energy targets would be compatible with the DH proposals but solar thermal systems would be less compatible with a future DH system.

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## Section B Addendum

*It is reasonable to assume that the CHP system will achieve a market share in Croydon town centre of not more than 25%, since no scheme has ever achieved that much under UK operating conditions. The report says the CHP was sized assuming that it would meet base heat load, but it is not clear what the assumed market share is and what is the actual capacity of the CHP engines.*

*Please can you clarify the assumed market share (and reasons for that assumption) by Zone*

### Response:

We have not assumed that all building owners will want or will be able to connect to the district heating supply due to various constraints and marketing barriers. The most likely candidates will be those where the boilers need replacing or where there are strong drivers for carbon reductions e.g. any organisation that falls within the CRC Energy Efficiency Scheme or impacted by Government or corporate environmental policies. However the Council also provided AECOM a list of buildings they would like to see connected to the scheme and AECOM has gone on to evaluate the feasibility of the scheme based on including each building on the list.

Hence we did not make an overall assumption on market penetration as we have identified individual buildings which are likely to be connected. We have however also estimated the total heat demand for the area based on statistics of floor space.

The data is given in the table below which shows that at the end of the build-out phase the market penetration is estimated as:

EC Zone 1: 61%  
EC Zone 2: 48%  
EC Zone 3: 43%

EC Zone 1 is more dominated by public sector buildings. Given that there is a substantial element of public sector buildings and that building regulations and planning policies will require additional CO<sub>2</sub> savings to be achieved by some means we consider that the above assumptions are reasonable.

Further detail is given in Addendum Table 1

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**Addendum Table 1: Summary of market share**

Energy Centre	Energy Cluster	Existing buildings to connect to DE scheme						Buildings connected to DE scheme by 2015						Buildings connected to DE scheme beyond 2015					
		Heating [ MWh ]	% over stock	Cooling [ MWh ]	% over stock	Electricity [ MWh ]	% over stock	Heating [ MWh ]	% over stock	Cooling [ MWh ]	% over stock	Electricity [ MWh ]	% over stock	Heating [ MWh ]	% over stock	Cooling [ MWh ]	% over stock	Electricity [ MWh ]	% over stock
EC 01	1	4,628	16%	2,381	11%	3,559	11%	19,254	44%	8,115	30%	11,611	29%	21,256	47%	8,115	30%	12,843	31%
	2	1,260	11%	1,138	19%	1,330	18%	17,600	64%	7,873	61%	11,775	66%	27,634	74%	12,900	72%	20,248	77%
	3	5,390	84%	1,379	60%	3,093	74%	5,390	84%	1,379	60%	3,093	74%	5,390	84%	1,379	60%	3,093	74%
	sub-total	<b>11,278</b>	<b>37%</b>	<b>4,898</b>	<b>30%</b>	<b>7,982</b>	<b>34%</b>	<b>42,244</b>	<b>64%</b>	<b>17,367</b>	<b>50%</b>	<b>26,478</b>	<b>56%</b>	<b>54,281</b>	<b>68%</b>	<b>22,394</b>	<b>54%</b>	<b>36,183</b>	<b>61%</b>
EC 02	4	2,938	91%	1,560	75%	2,256	77%	2,938	91%	1,560	75%	2,256	77%	2,938	91%	1,560	75%	2,256	77%
	5	-	0%	-	0%	-	0%	2,168	44%	1,359	36%	1,997	41%	12,397	82%	7,216	75%	10,480	79%
	6	-	0%	-	0%	-	0%	1,800	11%	1,625	16%	1,900	14%	1,800	11%	1,625	16%	1,900	14%
	16	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
	17	227	7%	-	0%	74	3%	227	7%	-	0%	74	3%	9,072	76%	2,974	56%	6,967	71%
sub-total	<b>3,165</b>	<b>20%</b>	<b>1,560</b>	<b>15%</b>	<b>2,330</b>	<b>16%</b>	<b>7,133</b>	<b>31%</b>	<b>4,544</b>	<b>25%</b>	<b>6,227</b>	<b>27%</b>	<b>26,207</b>	<b>52%</b>	<b>13,375</b>	<b>44%</b>	<b>21,603</b>	<b>48%</b>	
EC 03	7	4,794	76%	3,261	63%	3,468	61%	4,794	76%	3,261	63%	3,468	61%	4,794	76%	3,261	63%	3,468	61%
	8	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
	9	9,713	77%	3,809	24%	5,333	26%	9,713	77%	3,809	24%	5,333	26%	9,713	77%	3,809	24%	5,333	26%
	13	14,806	73%	5,806	32%	8,129	36%	14,806	73%	5,806	32%	8,129	36%	14,806	73%	5,806	32%	8,129	36%
	14	-	0%	-	0%	-	0%	594	7%	537	7%	627	7%	594	7%	537	7%	627	7%
	22	7,290	62%	6,581	63%	7,695	63%	7,290	62%	6,581	63%	7,695	63%	7,290	62%	6,581	63%	7,695	63%
	23	-	0%	-	0%	-	0%	3,505	50%	150	50%	2,131	50%	3,505	50%	150	50%	2,131	50%
	24	49	100%	-	0%	4	100%	49	100%	-	0%	4	100%	49	100%	-	0%	4	100%
	25	2,420	45%	2,185	44%	2,555	43%	2,420	45%	2,185	44%	2,555	43%	2,420	45%	2,185	44%	2,555	43%
	26	2,259	82%	2,040	45%	2,385	44%	2,259	82%	2,040	45%	2,385	44%	2,259	82%	2,040	45%	2,385	44%
sub-total	<b>41,331</b>	<b>51%</b>	<b>23,682</b>	<b>27%</b>	<b>29,568</b>	<b>37%</b>	<b>45,430</b>	<b>57%</b>	<b>24,369</b>	<b>33%</b>	<b>32,327</b>	<b>43%</b>	<b>45,430</b>	<b>57%</b>	<b>24,369</b>	<b>33%</b>	<b>32,327</b>	<b>43%</b>	

**Note:**

The building stock identified in each Energy Cluster consists of commercial buildings and buildings that the client has identified (which include domestic, commercial and government/public buildings). Therefore, the proportions do not represent all buildings located within each Energy Cluster. Domestic buildings in general have not been included. Buildings are as identified by the client and by research at the time the report was produced.