CROYDON DECENTRALISED ENERGY STUDY

ADDENDUM TO ORIGINAL DEC 2009 ISSUED REPORT

INTRODUCTION

In response, to queries from LB Croydon and LDA regarding the Croydon Decentralised Energy study submitted by AECOM on December 2009, this addendum has been produced to complement and in some cases supersede elements of the original report.

The content of this document is laid out corresponding to the order in which the queries were raised by LB Croydon and LDA in:

1) the document "AECOM - Response to DE study queries" dated 9 March 2010, and

2) the email from Peter McDonald dated 12th January 2010.

1 | QUERIES FROM "AECOM-RESPONSE TO DE STUDY QUERIES DOCUMENT"

QUERY 1 REF: SECTION B PG.24

And finally, were you going to provide a note in respect of the Home Office?

RESPONSE:

The Home office consists of two buildings, Lunar House and Apollo House.

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.

QUERY 2 REF: SECTION B PG.25

We have already had some enquiries about the potential for connecting to new and existing residential and office developments around the Hogarth Crescent area. Were these ruled out for any particular reason (e.g. having to take pipework across the railway line?)

RESPONSE:

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.

QUERY 3 REF: SECTION B PG.26

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 is the assumed market share 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_2 savings to be achieved by some means we consider that the above assumptions are reasonable.

Further detail is given in Addendum Appendix 1 section 3.

QUERY 4 REF: SECTION F PG.55

What would be the capacity of the CHP engines?

RESPONSE:

We have based the analysis of costs and efficiencies on a spark-ignition gas-engine CHP module size of approximately 2MWe. The various Zones analysed have CHP capacities assumed as follows:

EC Zone 1 – 10,056 kWe
EC Zone 2 – 5,097 kWe
EC Zone 3 – 9,473 kWe

For this scale of CHP engines, there is relatively little variation in specific cost (£/kW) and efficiency for slightly larger or smaller capacities. The final plant selection will be carried out later when the heat demands are firmer. At this scale, there will be an advantage of having at least two CHP units in each scheme not necessarily of the same capacity as this improves operational flexibility.

QUERY 5 REF: SECTION G ADDENDUM PG.72

The report focuses on the viability of a complete scheme and does not take into account possible phasing of the scheme. In consequence it does not indicate what the first steps towards implementation might be. An indication of likely phasing and so of first steps would be valuable. Clearly we will have to establish the detailed programme from here but I had anticipated a more definite route map. I appreciate that the actual steps will depend on several factors that AECOM are not necessarily aware of, nonetheless having a recommended route makes it clearer in planning an actual one. If it's easier to suggest what the 3 most likely routes are rather than committing to one, that's fine. We can then take those away, probably have briefings with yourselves and LDA, then consider and instruct more detailed work for a business plan.

RESPONSE:

The phasing of the project is possible but generally will reduce the economic benefit as some capital expenditure needs to be taken in advance. For example, although the connection of building can be phased the district heating infrastructure needs to be sized for the final extent of the scheme. There are also considerable uncertainties in the rate of development of new build projects. As a result there is a need for considerable flexibility at this stage in the way the DH network could be developed. The report did envisage that Zone 1 would form the first phase being mainly existing public sector buildings, Zone 2 would be the next phase which is mainly associated with the new build Ruskin Square development and the third zone (Wellesley Rd) would be completed as a final phase in association of the redevelopment of the shopping centre.

Since completing the report, in conjunction with LBC, we have defined a new first phase that incorporates the Ruskin Square development and an initial financial appraisal of this scheme has been taken forward by Ernst and Young.

QUERY 6 REF: SECTION L AS ADDENDUM 1 PG.109

In the business model, annual consumption appears to have been derived as a multiple of the capacity of the CHP system, rather than built up from the detailed analysis of the consumption figures presented in Section 2.

Please clarify the methodology used to estimate consumption and hence assumptions on revenue by Zone

RESPONSE:

We can confirm that the energy sales and fuel consumption in the business models have been derived from the analysis of the consumption figures in Section C of the report. Although there are minor differences in the figures as a result of rounding errors, the data in Section C is compatible with the revenues given in the Appendices to Section L.

QUERY 7 REF: SECTION L AS ADDENDUM 2 PG.109

Please clarify the comparison of Options 1 and 2 in the business model and if £3million really is adequate for pipework

RESPONSE:

The comparison of Options 1 and 2 highlighted by the Client revealed that a different heat selling price had been assumed for the Option 2 (all zones combined) and Option 1 (three separate schemes). This was an error and Option 2 should have used the same heat selling price. The effect is to improve the economic case for Option 2 and a revised table now replaces Table L4 in the main body of the report.

A breakdown of the capital costs can be found in Appendix L5. The £3m capital cost estimate for the pipework takes account of the available routes through the existing car parks and basements which results in much lower costs than for pipework buried under roads as a result of the avoided costs of trenching and road reinstatement. In addition, the high heat density reduces the cost of the infrastructure. EC Zone 1 has the lowest cost in proportion to the heat sold because of the greater potential for using the car park routes.

QUERY 8 REF: SECTION M ADDENDUM PG.134

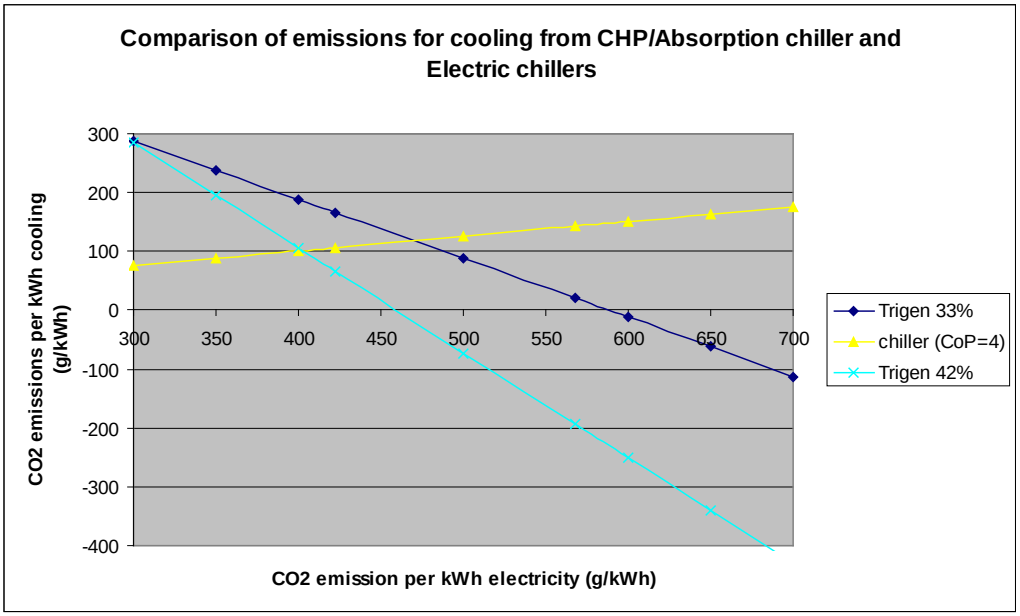
If power used for this purpose were to be priced at 5.9p per kWh – the estimated export price – then a cooling service would be economic. – i.e. there are still big questions being asked about:

a) Whether the key issue in the town centre is summer cooling, and if the best option might be to establish a pipe network (or indeed other system, such as ground heat exchange) to provide summer cooling
b) Whether a gas-CHP led system is the preferred approach when the grid itself could become lower carbon than the gas-CHP within say 20 years, i.e. within the lifetime of the project.
c) If Croydon is to commit to find and to spend £54m over the next 15 years is it clearly the best approach and one that stands a good chance of being seen as such by the end of those 15 years? Given the cost and disruption, that is an important question, and one which has to be balanced against the clear case made in favour of gas-CHP led DE

RESPONSE:

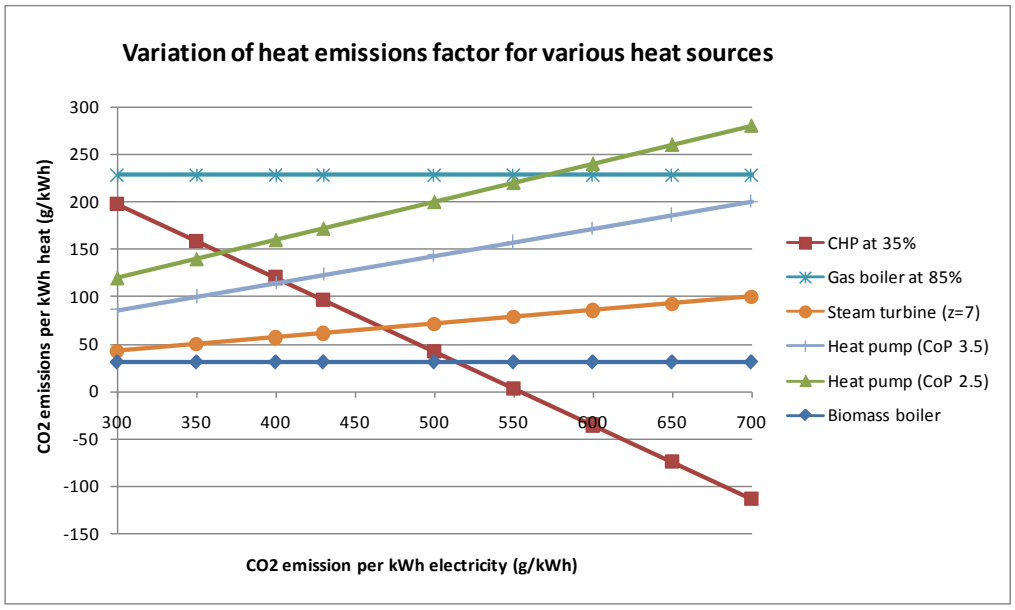
a) Summer cooling opportunities

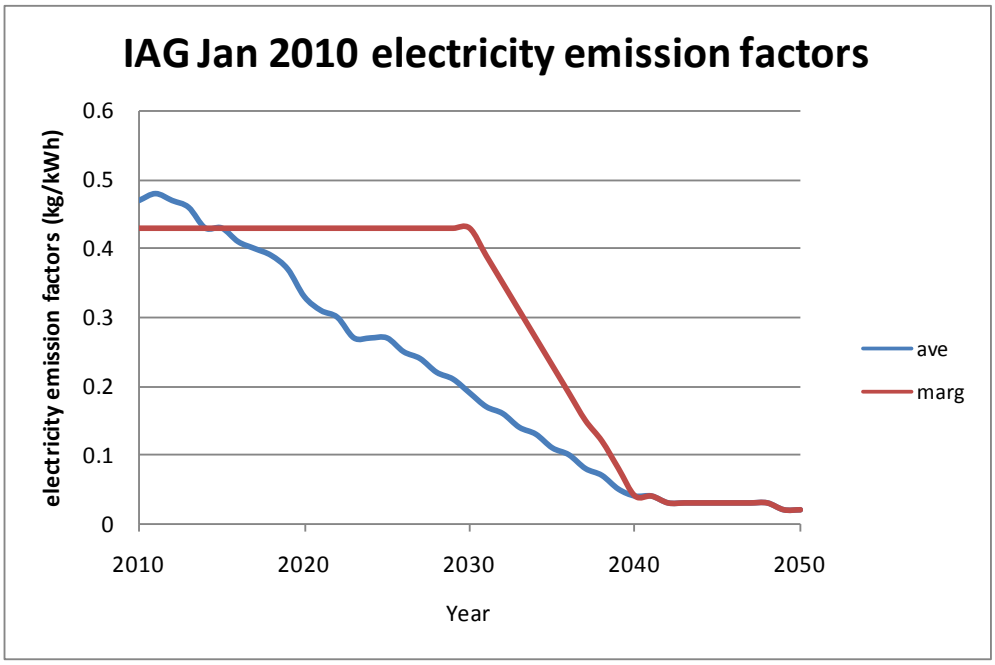
From the work carried out so far the cooling demand is not extensive enough to justify a district cooling network. The efficiency of chillers has improved significantly in recent years and the use of absorption chillers will offer a reduced saving in the future as the grid decarbonises (see Figure below). There may be a case in examining options for a district cooling system but we would expect these to be localised systems and mainly supplying new buildings where the avoided cost of installing chillers in the buildings would help to justify the cost of the district cooling network. Whilst it is true that the electricity from centralised electric chillers could be priced at the export electricity CHP price it is also necessary for the CHP to have sufficient heat demand to be operating to generate this electricity. This may be true for the parts of the system that are also supplying residential buildings where there will be a summer demand for hot water heating. The options for supplying cooling should be kept under review as more detailed information becomes available as to the heating and cooling demand patterns over the year. Combining loads from different building types in a larger scheme would tend to enhance the prospects of a centralised district cooling system being viable however the costs of the DC network are likely to be relatively high in general.



b) Impact of grid decarbonisation

The benefits of a CHP project compared to other options is indicated on the graph below. It can be seen that heat from a gas-engine CHP (35% electrical efficiency) remains lower carbon than heat from gas boilers above an electricity emissions factor of 300g/kWh (allowing for 10% losses in the district heating network). The Government guidance on assessing CO_2 benefits (IAG 2010) on public sector projects states that a marginal emission factor should be used and their projection indicates that this factor will not reach 300g/kWh until 2033. There is therefore 23 years before a gas-engine CHP system will not be saving carbon. However, the advantage of a district heating system is that the heat source can be changed relatively easily and the use of energy from waste or large-scale heat pumps could become more viable heat sources within this timescale.





c) Is it the best approach?

We have reported that the various district heating networks are not commercially viable as the rates of return are too low (assuming current energy prices). The investment can be phased incrementally so that experience can be gained with the early phases before committing the entire expenditure. The net annual savings would rise as electricity and gas prices rise faster than inflation but this has not been taken into account in the business case to date. The project has not been tested against alternative energy investments as this was not part of the brief for the study.

2 | QUERIES FROM EMAIL ON 12TH JANUARY 2010

QUERY 9 REF: SECTION L AS ADDENDUM 3 PG.109

Where you describe the capital costs for each Zone as approx:

Zone 1 – URV through to East Croydon: £18m
Zone 2 – Ruskin Square site through to Dingwall Road area and Wellesley Road (south east section): £8m
Zone 3 – Whitgift and Centrale Centres and Home Office area: £16m

Is this the additional cost of using CHP rather than standard boilers?

RESPONSE:

With regards to the plant in the zones 1-3 district energy centres the cost shown is for the cost for the optimum mix of CHP units and boiler units to serve the zonal load. It is not the extra over cost of CHP only compared to boilers only in the district energy centres and it is not the extra over cost of CHP only compared to the installation of new boilers in the old/new buildings within that zone.

In both new build and existing buildings there is the potential to offset the cost of the scheme by avoided expenditure on local boilers (both capital and maintenance). These savings are taken into account in developing a heat selling price that reflects these benefits.

QUERY 10 REF: SECTION L AS ADDENDUM 4 PG.110

And do these figures include the cost of standard piping including installation [assuming no major technical or physical obstacles?].

RESPONSE:

Yes.

QUERY 11 REF: SECTION L AS ADDENDUM 5 PG.110

What kind of annual and total amount of council funds would be needed?

RESPONSE:

In telephone conference on 28/01/10 we discussed a scenario of an initial upfront capital commitment from Croydon Council of £5m (day 1), no financial return on investment plus a grant funding of an additional of £5m (totalling £10m initial capex payment).

There will need to be a significant investment in procurement activities prior to actually placing contracts for construction of the scheme or for provision of energy services.

QUERY 12 REF: SECTION L AS ADDENDUM 6 PG.110

And how much might this be offset by Section 106 [/ C I Levy] contributions?

RESPONSE:

The heat sales price assumed recognises that developers will have avoided capital costs and this is reflected in a higher heat selling price as a result. The level of contribution will be a matter for negotiation. If a high contribution is received then the heat price would need to be lower to be attractive.

QUERY 13 REF: SECTION L AS ADDENDUM 7 PG.110

And the £2.5m for connecting to Rolls Royce – is that the cost of piping and heat recovery unit?

RESPONSE:

This includes the cost of piping and heat recovery unit, but excludes the cost of heat thermal storage units (to store hot water produced in the evening for distribution the next morning).

Although it would be ideal to have the thermal stores located within the town centre their significant volume means that it is unlikely that suitable space can be found and the visual impact and costs of land could be high. The available land within the Rolls Royce plant area is very limited. However it could be assumed that land might become available within the adjacent area as this has more industrial use and also accommodates the waste transfer station. There are therefore considerable uncertainties in developing this scheme associated with the need for large thermal stores.

APPENDIX 1 – INFORMATION ON HEAT LOADS CONNECTED AND MARKET PENETRATION REF: SECTION

Ref: Section C pg.30

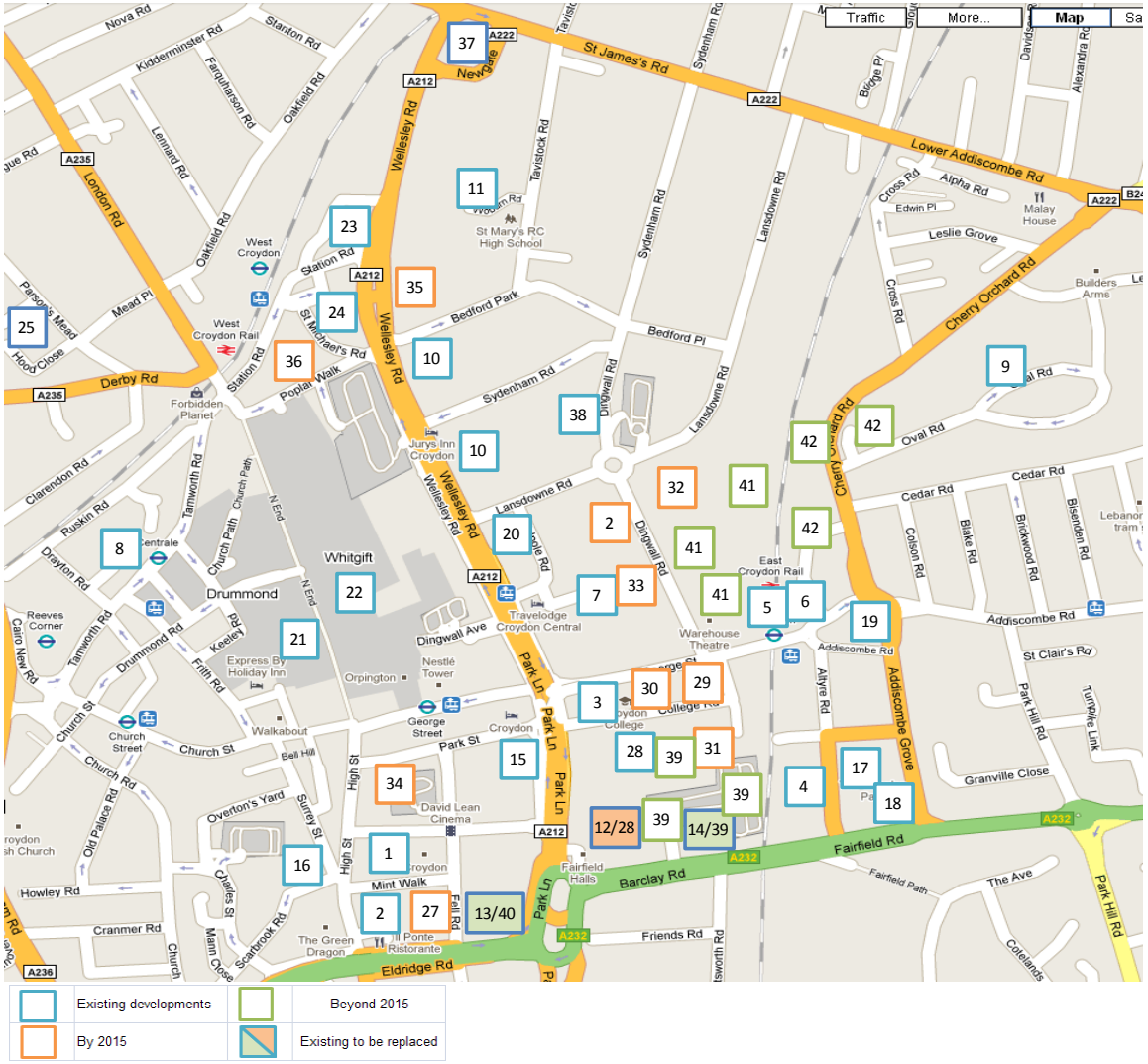
1) Below is updated list of buildings identified by the client as potential customers with indexes to locate them on the attached map.

	Existing Buildings	
	Council/Public Buildings	**Cluster**
1	Civic centre	C001
2	Davis House	C001
3	Suffolk House	C002
4	Law courts	C003
5	East croydon station	C004
6	Head post office	C004
7	Southern House	C007
8	Tamworth Rd Resource Centre	C011
9	Oval Primary & Nursery School	C017
10	Lunar house & Apollo house (Home Office)	C022
11	St Mary's High School	C024
12	Fairfield Halls & Ashcroft Theatre (t.b. replaced by 28)	C002
13	Taberner House (t.b. demolished & replaced by 40)	C001
14	The Law Courts (t.b. replaced by 39)	
	Private Buildings	**Cluster**
15	St George's House (also Nestle Tower)	C001
16	Bridge house, The Exchange	C001
17	Croydon Park Hotel	C003
18	Altitude 25	C003
19	No. 1 Croydon	C003
20	Landsdowne Road Hotel	C007
21	Centrale	C009
22	Whitgift Centre (t.b. refurbished)	C013
23	Prospect First	C025
24	Delta Point	C026
25	Hancroft Road Residential	C028

	Buildings to come online by 2015	
	Council/Public Buildings	**Cluster**
26	Croydon College (t.b. refurbished)	C002
27	CURV PSDH	C001
28	Croydon learning and cultural quarter - Phase 1	C002
	Private Buildings	**Cluster**
29	100 George Street (Chroma with Essex House)	C002
30	Essex House	C002
31	College Tower	C002
32	Croydon Gateway (Ruskin Sq) - Phase 1	C005
33	14-17 Dingwall Rd	C006
34	Park place	C008
35	Wellesey Square	C023
36	Berkeley Homes	C024
37	IYLO	C002
38	29-30 Dingwall Rd	C014
	Buildings to come online beyond 2015	
	Council/Public Buildings	**Cluster**
39	Croydon learning and cultural quarter - Phase 2, 3 & 4	C002
	Private Buildings	**Cluster**
40	Taberner House (residential)	C001
41	Croydon Gateway (Ruskin Sq) - Phase 2, 3 & 4	C005
42	Cherry Orchard Road	C017

Ref: Section C pg.31

2) This is an updated map with location of potential buildings to be connected marked



Ref: Section B pg.27

3) Newly added table on the cumulative proportion of buildings identified in each Energy Cluster that will connect to the DE scheme based on their energy demands for currently existing buildings, buildings existing by 2015 and buildings existing beyond 2015.

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.

		Existing buildings to connect to DE scheme						Buildings connected to DE scheme by 2015						Buildings connected to DE scheme beyond 2015					
Energy Centre	Energy Cluster	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	**11,278**	37%	**4,898**	30%	**7,982**	34%	**42,244**	64%	**17,367**	50%	**26,478**	56%	**54,281**	68%	**22,394**	54%	**36,183**	61%
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	**3,165**	20%	**1,560**	15%	**2,330**	16%	**7,133**	31%	**4,544**	25%	**6,227**	27%	**26,207**	52%	**13,375**	44%	**21,603**	48%
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	**41,331**	51%	**23,682**	27%	**29,568**	37%	**45,430**	57%	**24,369**	33%	**32,327**	43%	**45,430**	57%	**24,369**	33%	**32,327**	43%

Ref: Section C pg.37

4) Below is the updated list of buildings identified by the client for connection to the DE scheme. Also added is the sub-total of energy demands.

Potential customer identified by the client	Energy Cluster	Energy Centre	Floor area [m²]	Energy (MWh) Heating [MWh]	Cooling [MWh]	Electricity [MWh]	Peak (MW) Heating [kW]	Cooling [kW]	Electricity [kW]	Type	Note
existing buildings to connect to DE network				**55,774**	**30,140**	**39,880**	**43,109**	**64,375**	**28,363**		
Altitude 25	3	1	24,363	1,584	-	975	1,462	-	1,218	Residential	To connect to DE scheme
Bridge house, the exchange	1	1	9,165	596	-	367	550	-	458	Residential	To connect to DE scheme
Centrale	9	3	76,180	9,713	3,809	5,333	7,618	12,189	3,809	Retail	To connect to DE scheme
Civic centre	1	1	20,440	1,395	-	409	1,840	2,044	1,226	Council	To connect to DE scheme
Croydon Park Hotel	3	1	6,878	1,702	817	722	413	1,032	206	Hotel	To connect to DE scheme
Davis House	1	1	1,178	106	96	112	82	147	71	Council	To connect to DE scheme
Delta Point	26	3	25,104	2,259	2,040	2,385	1,757	3,138	1,506	Office	To connect to DE scheme
East Croydon Station	4	2	10,800	1,210	-	432	1,080	-	432	Public	To connect to DE scheme
Fairfield Halls and Ashcroft Theatre	2	NA	10,440	713	-	209	940	1,044	626	Public building (to be demolished)	Site to be replaced by Croydon College development
George Street (Suffolk House) rent office	2	1	14,000	1,260	1,138	1,330	980	1,500	720	Office, part council rented	To connect to DE scheme
Hancroft Road (residential park)	28	NA	20,160	1,310	-	806	1,210	-	1,008	Residential	Out of range of DE scheme unless RR energy centre is feasible
Head Post Office	4	2	19,200	1,728	1,560	1,824	1,344	2,400	1,152	Public	To connect to DE scheme
Landsdowne Road Hotel	7	3	10,188	2,522	1,210	1,070	611	1,528	306	Hotel	To connect to DE scheme
Law courts	3	1	7,884	538	-	158	710	788	473	Public building	To connect to DE scheme
Lunar House & Apollo House (Home Office)	22	3	81,000	7,290	6,581	7,695	5,670	10,130	4,860	Government	To connect to DE scheme
No. 1 Croydon	3	1	21,432	1,566	563	1,238	1,355	866	1,141	Residential	To connect to DE scheme
Oval Primary & Nursery School	17	1	2,597	227	-	74	260	-	104	Council: School	To connect to DE scheme
Prospect First	25	3	26,890	2,420	2,185	2,555	1,882	3,361	1,613	Office	To connect to DE scheme
Southern House	7	3	25,245	2,272	2,051	2,398	1,767	3,156	1,515	Government	To connect to DE scheme
St George's House (also Nestle Tower)	1	1	28,128	2,532	2,285	2,672	1,969	3,516	1,688	Office	To connect to DE scheme
St Mary's High School	24	3	1,467	49	-	4	147	-	59	Council: School	To connect to DE scheme
Taberner House	1	NA	30,800	2,772	2,503	7,650	2,156	3,850	1,848	Council	To be demolished for new residential, excluded from DE scheme
Tamworth Road Resource Centre	11	NA	2,072	340	-	195	145	259	124	Council: Corporate services	Out of range, exclude from DE scheme
The Law Courts	2	NA	11,750	802	-	235	1,058	1,175	705	Public	Site to be replaced by Croydon College development
Whitgift Centre (retail extension refurb)	13	3	116,129	14,806	5,806	8,129	11,613	18,581	5,806	Retail	To connect to DE scheme
by 2015 to connect to DE network				**40,475**	**16,740**	**26,570**	**31,574**	**36,691**	**21,245**		
100 George Street (aka Chroma w EssexHouse)	2	1	24,155	2,265	1,887	2,234	1,763	3,104	1,425	Office	To connect to DE scheme
14-17 Dingwall Rd	6	2	20,000	1,800	1,625	1,900	1,400	2,500	1,200	Office	To connect to DE scheme
29-30 Dingwall Rd	14	NA	6,604	594	537	627	462	826	396	Office	Out of range, exclude from DE scheme
Berkeley Homes	26	3	24,000	1,584	-	975	1,462	-	1,218	Residential	To connect to DE scheme
College Tower	2	1	54,000	3,510	-	2,160	3,240	-	2,700	Residential	To connect to DE scheme
Croydon College (refurbished)	2	1	32,695	5,885	2,248	2,616	3,270	3,270	1,962	Education	To connect to DE scheme
Croydon Gateway (Ruskin Sq) - phase 1	5	2	26,923	2,168	1,359	1,997	1,783	2,090	1,513	Office & Residential	To connect to DE scheme
Croydon learning and cultural quarter - phase 1	2	1	51,325	5,138	3,738	4,530	4,008	6,900	2,941	Education	To connect to DE scheme
CURV PSDH	1	1	21,770	2,776	1,089	1,524	2,177	3,483	1,089	Government	To connect to DE scheme
IYLO	2	NA	11,895	773	-	476	714	-	595	Residential	Out of range, exclude from DE scheme
Park place	8	1	92,903	11,845	4,645	6,503	9,290	14,864	4,645	Retail (cancelled)	Indicative, included in DE scheme
Wellesey Square	21	3	51,035	3,505	150	2,131	3,182	480	2,552	Residential & Retail	To connect to DE scheme
beyond 2015 to connect to DE network				**29,851**	**12,721**	**23,752**	**28,009**	**23,947**	**22,587**		
Cherry Orchard Road	17	2	122,000	8,845	2,974	6,893	7,686	4,575	6,466	Office & Residential	To connect to DE scheme
Croydon Gateway (Ruskin Sq) - phase 2, 3 & 4	5	2	114,340	10,229	5,857	8,484	7,777	9,730	6,509	Office & Residential	To connect to DE scheme
Croydon learning and cultural quarter - phase 2, 3 & 4	2	1	113,199	8,775	3,890	7,143	10,698	9,641	8,072	Education	To connect to DE scheme
Taberner House (residential)	1	1	30,800	2,002	-	1,232	1,848	-	1,540	Residential	To connect to DE scheme

APPENDIX 2 -COST BREAKDOWN FOR THE PROPOSED DECENTRALISED ENERGY SCHEME

Ref: Section L Appendix 4 pg.123 onwards

Project:	Croydon Development ZONE 1	Summary
Estimate	: Cost plan no.1	
Price Date	22/11/2009	

	Electric	Plant	District Pipework	Sub Total	Contingency	Prelims	Total
Zone 1	£ 4,704,100	£ 11,783,200	£ 3,630,128	£ 20,117,428	£ 2,011,743	£ 3,017,614	£ 25,146,785
Zone 2	£ 489,350	£ 5,893,300	£ 584,722	£ 6,967,372	£ 696,737	£ 1,045,106	£ 8,709,215
Zone 3	£ 4,458,430	£ 11,124,100	£ 577,817	£ 16,160,347	£ 1,616,035	£ 2,424,052	£ 20,200,434
							£ -
Total	£ 9,651,880	£ 28,800,600	£ 4,792,667	£ 43,245,147	£ 4,324,515	£ 6,486,772	£ 54,056,433

Issued in Draft For Discussion

Job Nr	
Prepared by	P Baxter
Checked by	
Reviewed by	C Trew
Authorised by (Partner)	
Filename Croydon	

BREAKDOWN OF COST FOR ENERGY ZONE 1

Project	Croydon Development ZONE 1	Summary
Estimate		
Price Date	Nov-09	

Electrical		4,704,100
Plant		11,783,200
District Pipework		1,605,356
RR to EC 1 Link		2,024,772
	Total	20,117,428

ELECTRICAL

Project	Croydon Development ZONE 1					
Estimate		Electrical				
Price Date	Nov-09					
Ref	Description	Quantity	Unit	Rate £	Total £	Notes
	33kV Primary s/s 30MVA	1	lot	3,850,000	3,850,000	
	Site 11kV distribution	900	m	69	62,100	
	Excavate and reinstate	900	m	130	117,000	
	11kV distribution s/s	15		45,000	675,000	
				£	4,704,100	

PLANT

Project	Croydon Development ZONE 1					
Estimate		Plant				
Price Date	Nov-09					
Ref	Description	Quantity	Unit	Rate £	Total £	Notes
	2MWe and 2.1MWt CHP	3	lot	1,184,500	3,553,500	20% of Peak
	2MWt Gas Boilers	19	lot	168,700	3,205,300	
	1.5 MW Single effect absorbtion chillers	6	lot	124,900	749,400	20% of Peak
	Auxilary and other supplies	19	lot	225,000	4,275,000	
				£	11,783,200	

DISTRICT PIPEWORK

Project	Croydon Development ZONE 1					
Estimate		District Pipework				
Price Date	Nov-09					
Ref		Quantity	Unit	Rate £	Total £	Notes
	Heating					
	Sub Link between EC1 to EC2 &EC3 500mm	285	m	880	250,800	
	Primary pipework 400mm Flow and return	880	m	790	695,200	
	Primary pipework 300mm Flow and return	339	m	492	166,788	
	Primary pipework 250mm Flow and return	403	m	162	65,334	increase from 146mts
	Primary pipework 100mm Flow and return	252	m	88	22,242	
	Primary pipework >80mm Flow and return	182	m	59	10,818	
	Cooling					
	Primary pipework 400mm Flow and return					
	Primary pipework 300mm Flow and return					
	Primary pipework 250mm Flow and return					
	Primary pipework 200mm Flow and return					
	Primary pipework 100mm Flow and return					
	Primary pipework 80mm Flow and return					
	Buried lenghts	939	m	336	315,504	
	Support lenghts	1402	m	235	329,470	
	Total Carried to Summary			£	1,605,356	

RR TO EC 1 LINK

Project	Croydon Development ZONE 1					
Estimate		RR to EC 1 Link				
Price Date	Nov-09					
Ref	Description	Quantity	Unit	Rate £	Total £	Notes
	Heating					
	Primary pipework 400mm Flow and return	1887	m	790	1,490,730	
	Buried lenghts	897	m	336	301,392	
	Support lenghts	990	m	235	232,650	includes 305 along tramline
				£	2,024,772	

BREAKDOWN OF COST FOR ENERGY ZONE 2

Project	Croydon Development ZONE 2				Summary	
Estimate						
Price Date	Nov-09					
	Electrical				489,350	
	Plant				5,893,300	
	District Pipework				584,722	
				Total	6,967,372	

ELECTRICAL

Project	Croydon Development ZONE 2			Electrical		
Estimate						
Price Date	Nov-09					
Ref	Description	Quantity	Unit	Rate £	Total £	Notes
	Site 11kV distribution	650	m	69	44,850	
	Excavate and reinstate	650	m	130	84,500	
	11kV distribution s/s	8		45,000	360,000	
				£	489,350	

PLANT

Project	Croydon Development ZONE 2					
Estimate		Plant				
Price Date	Nov-09					
Ref	Description	Quantity	Unit	Rate £	Total £	Notes
	2MWe and 2.1MWt CHP	2	lot	1,184,500	2,369,000	20% of Peak load
	2MWt Gas Boilers	8	lot	168,700	1,349,600	
	1.5 MW Single effect absorbtion chillers	3	lot	124,900	374,700	20% of Peak load
	Auxilary and other supplies	8	lot	225,000	1,800,000	
				£	5,893,300	

DISTRICT PIPEWORK

Project	Croydon Development ZONE 2					
Estimate		District Pipework				
Price Date	Nov-09					
Ref		Quantity	Unit	Rate £	Total £	Notes
	Heating					
	Primary pipework 400mm Flow and return	22	m	790	17,380	
	Sub Link From EC2 to EC3 350mm	230	m	492	113,160	
	Primary pipework 250mm Flow and return	613	m	162	99,380	
	Primary pipework 100mm Flow and return	62	m	88	5,472	
	Primary pipework >80mm Flow and return	307	m	59	18,248	
	Cooling					
	Primary pipework 400mm Flow and return					
	Primary pipework 300mm Flow and return					
	Primary pipework 250mm Flow and return					
	Primary pipework 200mm Flow and return					
	Primary pipework 100mm Flow and return					
	Primary pipework 80mm Flow and return					
	Buried lenghts	942	m	336	316,512	
	Support lenghts	62	m	235	14,570	
	Total Carried to Summary			£	584,722	

BREAKDOWN OF COST FOR ENERGY ZONE 3

Project	Croydon Development ZONE 3				Summary	
Estimate						
Price Date	Nov-09					
	Electrical				4,458,430	
	Plant				11,124,100	
	District Pipework				577,817	
				Total	16,160,347	

ELECTRICAL

Project	Croydon Development ZONE 3					
Estimate			Electrical			
Price Date	Nov-09					
Ref	Description	Quantity	Unit	Rate £	Total £	Notes
	33kV Primary s/s 30MVA	1	lot	3,850,000	3,850,000	
	Site 11kV distribution	570	m	69	39,330	
	Excavate and reinstate	570	m	130	74,100	
	11kV distribution s/s	11		45,000	495,000	
				£	4,458,430	

PLANT

Project	Croydon Development ZONE 3					
Estimate		Plant				
Price Date	Nov-09					
Ref	Description	Quantity	Unit	Rate £	Total £	Notes
	2MWe and 2.1MWt CHP	4	lot	1,184,500	4,738,000	20% of Peak
	2MWt Gas Boilers	14	lot	168,700	2,361,800	
	1.5 MW Single effect absorbtion chillers	7	lot	124,900	874,300	20% of Peak
	Auxilary and other supplies	14	lot	225,000	3,150,000	
				£	11,124,100	

DISTRICT PIPEWORK

Project	Croydon Development ZONE 3					
Estimate		District Pipework				
Price Date	Nov-09					
Ref		Quantity	Unit	Rate £	Total £	Notes
	Heating					
	Primary pipework 500mm Flow and return	10	m	880		
	Primary pipework 400mm Flow and return	100	m	790	79,000	
	Primary pipework 300mm Flow and return	64	m	492	31,488	
	Primary pipework 250mm Flow and return	614	m	162	99,542	
	Primary pipework 100mm Flow and return	166	m	88	14,651	
	Primary pipework >80mm Flow and return	97	m	59		
	Cooling					
	Primary pipework 400mm Flow and return					
	Primary pipework 300mm Flow and return					
	Primary pipework 250mm Flow and return					
	Primary pipework 200mm Flow and return					
	Primary pipework 100mm Flow and return					
	Primary pipework 80mm Flow and return					
	Buried lenghts	1051	m	336	353,136	
	Support lenghts		m	235		
	Total Carried to Summary			£	577,817	