Section L – Business Case, Energy Services Contracts and Risk Analysis

Estimates the costings together with potential incomes streams for each scenario

1. Business Case

This section describes the business case models that have been set up to establish the commercial viability of the various CHP options.

A number of assumptions have been made to develop the business case.

The two business case models consider CHP power output differently. The prudent model views CHP power output as meeting base heat load matched to the demand and has an utilisation factor of 2.5. (Electrical power output 42 GWhe p.a. total). The optimistic model assumes CHP output delivers 70% of heat consumption regardless of the power network demand and has an utilisation factor of 8.0. (Electrical power output 134 GWhe p.a. total). The supporting documentation relates to the electrical power output of 42 GWhe at Utilisation Factor 2.5.

The Energy Centre business case models can stand alone as three separate EC or be interconnected to provide resilience or to defer future energy equipment capex and improve plant utilisation. The models take a prudent view. The optimistic view would need a value engineering exercise applied to identify deferred capex to improve IRR toward that shown in table 1. There has been no phasing of capital spend.

The initial economic models showed that the schemes would not be attractive enough to proceed with private sector finance. The model therefore assumes that the projects will attract a grant and the balance is an equity / loan mix. The numbers are bases on a 70:30 split, i.e. 30% grant funding. The loan period is set at 15 years at a nominal 3.5% interest rate.

The district heating main infrastructure spine is sized to be flexible on where heat is input into the system.

The EC plant is modular based on $2MW_e$ CHP engines delivering $2.1MW_{th}$ with a total efficiency of 77%; 2MW gas fired boilers with 88% efficiency; 4 x $50m^3$ thermal store.

CHP is sized to meet base load which is taken as 20% of peak demand.

All electrical power is sold at the EC boundary under a Power Purchase Contract (PPC) negotiated with a licensed supplier. There has been no electrical network design provided to consider separation of private wire to commercial premises and licensed network to other premises. The electrical capex includes 2 x 33kV primary substations but excludes any off site works and connections to the existing distribution system. The Capex associated with the electricity network is excluded from the business models to reflect that electricity distribution revenues are never linked to generation and / or supply underpinned by legislation. (Utilities Act 2000).

The onsite distribution network is operated by a Licensed Distribution Network Operator. Customers contract supplies with their choice of supplier.

Heat selling price has been set at 5.1p/kWh which reflects both fuels, maintenance and avoided capital costs. Gas purchase price for the primary fuel CHP and boilers is £21 / MWh. Heat unit sales price would need to link to gas purchase. The power purchase price is set at 5.9p / kWh and will be dependent upon market demand and consistency of power output.

Cooling would need to be sold for 1.38 p / kWh to be competitive with electric chillers due to the lower COP of absorption chillers taking heat at 95°C. As a result the supply of cooling was not found to be economic.

It should be noted that the models take no account of phasing within each cluster zone and the bulk of the connections within each zone occur on the first 3 years of commencement. The capex is front loaded which impacts significantly on the IRR for each of the two scenarios.

The appendices show some further detail on the cashflows.

Appendix L1 - Energy Centre Zone 1 Summary

Appendix L2 - Energy Centre Zone 2 Summary

Appendix L3 - Energy Centre Zone 3 Summary

Appendix L4 - Single Energy Centre Summary

Appendix L5 - Cost breakdown for the proposed decentralised energy scheme

The option of heat from the Rolls Royce power station has not been analysed in detail due to the uncertainties on the costs that would result from extended operating hours. However, there is the potential for this option to deliver a limited amount of heat to the scheme for a modest capital cost of £2.1m (less than 5% of the cost for the full build-out of the scheme). The heat purchase price would be similar to the heat supplied by gas-engine CHP but the capital cost per MW of heat capacity is much less. Hence it is recommended that this option is pursued further through discussions with Rolls Royce Power Ventures Ltd.

Business Model Summary Table 1

Business Model Croydon Decentralised Energy Scheme

	Capex	Grant	Steady state income	Steady State Cost	IRR over 25 year term
EC Zone 1	-£17,784,145	£5,000,000	£4,142,442	-£2,613,678	7.19%
EC Zone 2	-£8,219,865	£2,500,000	£2,028,145	-£1,351,872	3.98%
EC Zone 3	-£15,742,004	£5,000,000	£3,513,547	-£2,313,633	7.02%
Single Energy Centre	-£41,746,013	£15,000,000	£5,541,693	-£3,665,504	7.82%
RR Heat connection	-£2,126,832	-	-	-	-

Table 1 - Data is based on a CHP Utilisation Factor of 2.5

Business Model Croydon Decentralised Energy Scheme

	Capex	Grant	Steady state income	Steady State Cost	IRR over 25 year term
EC Zone 1	-£17,784,145	£5,000,000	£6,547,191	-£3,774,106	16.24%
EC Zone 2	-£8,219,865	£2,500,000	£3,259,392	-£1,946,018	11.03%
EC Zone 3	-£15,742,004	£5,000,000	£5,695,304	-£3,412,893	15.65%
Single Energy Centre	-£41,746,013	£15,000,000	£8,954,696	-£5,358,911	16.52%
RR Heat connection	-£2,126,832	-	-	-	-

Table 2 - Data is based on a CHP Utilisation Factor of 8

CAPEX summary

Capex Summary

	Electric	Plant	District Pipework	Sub Total	Contingency	Prelims	Total
Zone 1	£4,704,100	£11,783,200	£1,503,296	£17,990,596	£1,799,060	£2,698,589	£22,488,245
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	£2,665,835	£41,118,315	£4,111,831	£6,167,747	£51,397,893
Lnk 1 - 2			£250,800	included in 1 - 2 in costs			
Lnk 1 - 3				included in 1 - 2 costs			
Lnk 2-3			£113,160	included in Zone 3 costs			
RR				£2,126,832			£2,126,832
total	£9,651,880	£28,800,600	£3,029,795	£43,245,147	£4,111,831	£6,167,747	£53,524,725

2. Types of Contracts

The feasibility of an energy services company (ESCO) entering into a public private partnership (PPP) to deliver a decentralised energy network to buildings in the town centre and any viable outlying residential areas, in particular considering an estimation of public sector funding and development intervention by the LDA that would be required to deliver a commercially attractive scheme.

This section looks at the feasibility of an Energy Services Company (ESCo) entering into a Public Private Partnership (PPP) to deliver a decentralised energy Network

There are 5 levels of activity to consider Design, Build, Own, Operate and Maintain. The ESCo label is applied to all of these but can mean different things to different clients. It is important that the client considers his preferences. At its minimum it is taken that an ESCO will operate and maintain a decentralised energy scheme at Croydon.

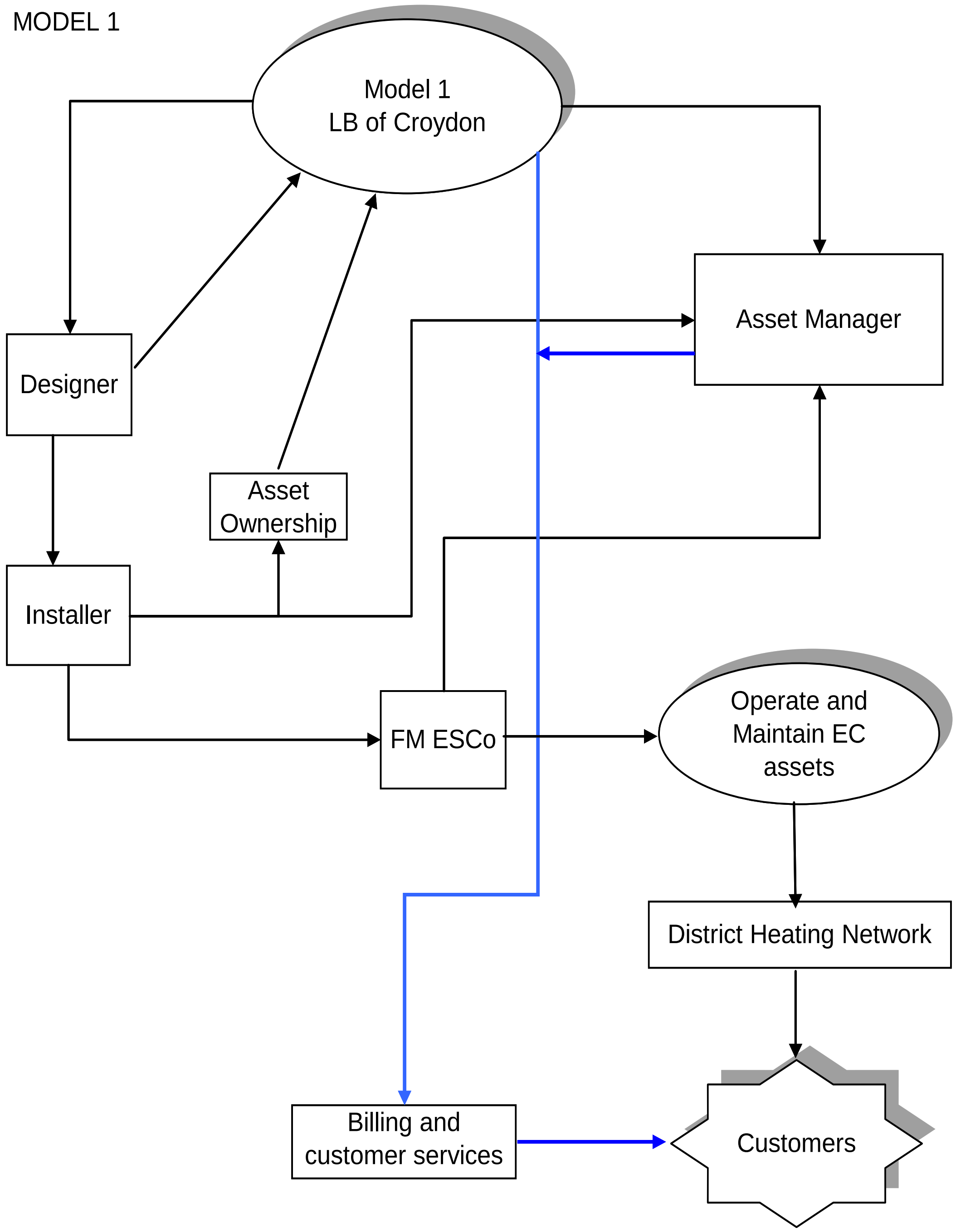
There are a number of models that can be considered. In the recent past, there was an appetite for capital funding schemes by the ESCO and this has been met with mixed approaches in the way that ESCo and the Client are prepared to manage the risk. Now, ESCos are not as prepared to fund schemes without security over the risk and investment periods that extend beyond 40 years. This has resulted in clients taking a different view over capital funding and the risk of tie in with an ESCo for this length of time.

There remains at a high level two possible models. In the first model the Client makes all the capital investment and contracts an ESCo to operate and maintain the energy centre and expects little or no return. The second is where the client makes an active investment expecting to see a return over time. The principle difference is that the former allows the client to enter into shorter term contracts (typically 3 – 5 years plus, say 1) with an ESCo who has no claim on or duty to the assets employed. The latter are longer term contracts where on going revenues fund capital replacement and fully support operating costs. Within the two structures there is an Asset Manager (AM) role which either acts directly for the client (in the first case) or on behalf of the ESCo.

Whichever model is employed there are benefits and disadvantages. When considering the AM function, under model 1 the client needs to decide whether to appoint the AM to procure the installer, procure the operator, manage the billing and customer interface, distributing revenues and passing surpluses to the client for a management fee or in model 2 vests the AM role in the ESCO. Model 2 aligns itself more closely to a public private partnership (PPP) where an investment is made into the PPP from a Developer Consortium, London Borough of Croydon (LBC), public sector funding from the LDA and investment from other bodies including the ESCo itself. The capital funding can be equity or debt supported by a suitable structure that manages the areas of identified risk. If a de centralised scheme is viable it is assumed that LB of Croydon would be a major backer of any scheme.

The diagram below of Model 1 shows the relationship between LBC and other parties to perform the functions described above.

MODEL 1


Model 1
LB of Croydon
Asset Manager
Designer
Asset
Ownership
Installer
FM ESCo
Operate and
Maintain EC
assets
District Heating Network
Billing and
customer services
Customers

The next level to consider is design and build. If model 2 is adopted then it is highly likely (and preferable) that the ESCo partners (for the purpose of reference a working name of Croydon JV – CJV is now used) undertakes design or at a minimum approves any design with modifications if appropriate. This is important if CJV are expected to guarantee performance and delivery of heat to end users. CJV could also operate any district heating network for the delivery of heat from the EC to the customer. Under model 1 guarantees of performance remain with the client and the liabilities with their appointed designer (who may or may not be the asset manager). LBC will have a closer if not direct relationship to the end user customers as it would not be desirable for the FM ESCo operator to have access to the commercial arrangements that LBC will have in place. The likelihood is that the timing of the asset manager appointment is later in the process in model 1 as focus would need to be on the design and related network modelling.

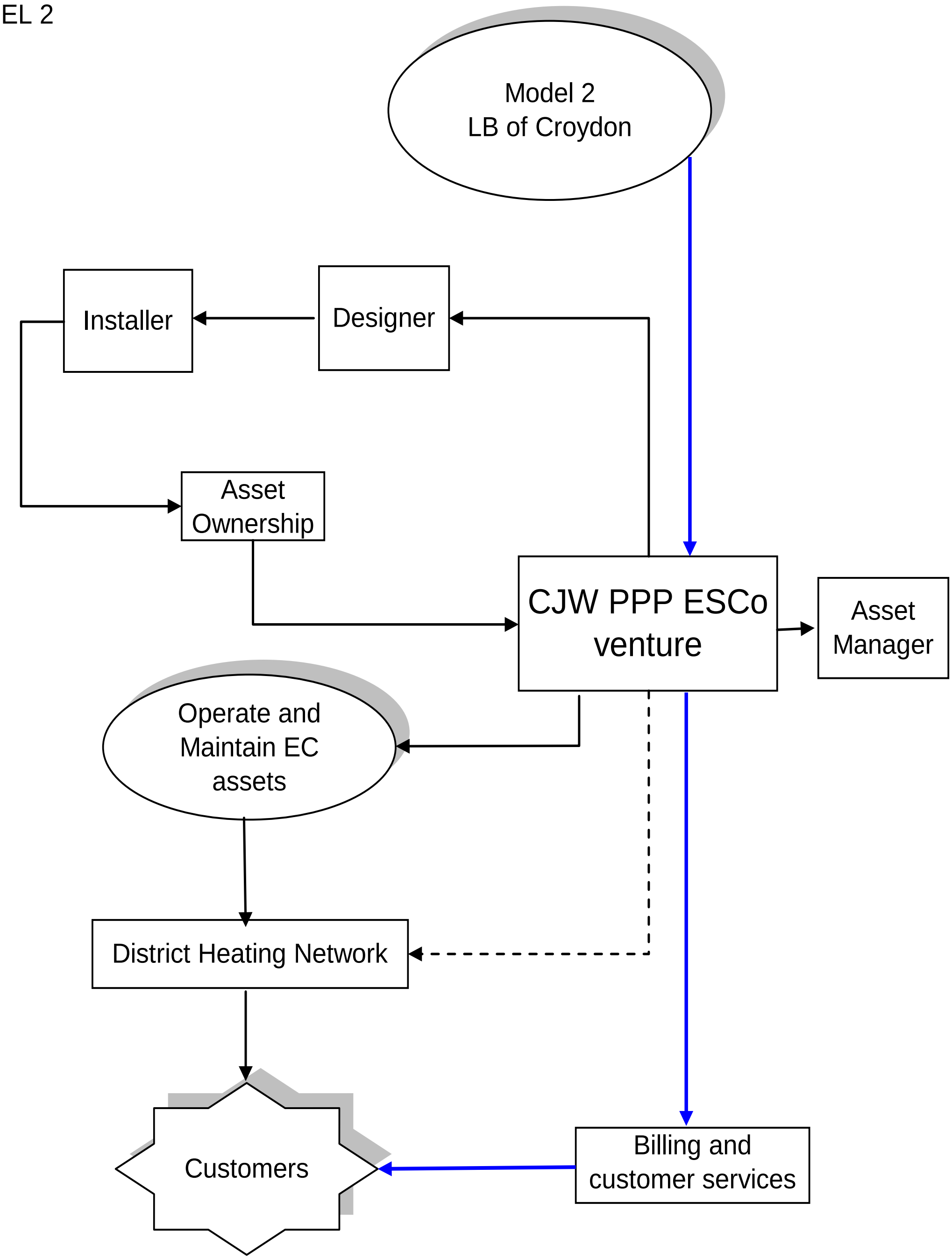
Combining the ESCo and AM role is an option but moves the solution toward Model 2 without addressing LBC funding aspirations and the relationship with end user customers.

Separating heat distribution from heat production and operating as a different facility is viable providing that heat sales remains with the heat producer. Heat network distribution, unlike power or gas networks, is an unlicensed activity but the costs of distribution can be structured in a way that reflects a licensing regime and provides protection for customers.

A customer should be protected from monopoly pricing and maintain a relationship with the energy producer. Gas and electric customers generally are protected by a competitive market so similar protection is needed here but without a choice of supplier. This is another reason why the PPP CJV model is preferred as it creates distance between LBC and any dissatisfied customers. It also allows LBC to create an exit strategy and recover any debt or loan and liquidate any equity.

Model 2 shown below places LBC away from the direct customer interface. Customers will always deal with the party to whom they pay their bills. The model aims to reflect as closely as possible the arrangements in the power and gas industry. It is not really conceivable that the FM ESCo becomes responsible for all the billing transactions and has visibility of the overall profitability.

MODEL 2


Model 2
LB of Croydon
Installer
Designer
Asset
Ownership
CJW PPP ESCo
venture
Asset
Manager
Operate and
Maintain EC
assets
District Heating Network
Customers
Billing and
customer services

Building the EC plant can be contracted to any suitably skilled M&E contractor. The ESCo specialist skill is not building the plant although it may be a prerequisite from LBC that the installation contractor is appointed early. Logically this suggests that a scheme design is needed which leads toward a model 1 option which is not conducive to the PPP solution. The client needs to be comfortable that selection of who to build the energy centre is addressed as a part of a second stage procurement strategy.

Experience tells us that a model 2 solution allows for a more flexible funding option. The design allows in a higher transfer of risk to the CJV away from LBC. In those cases where the ESCo avoids a higher proportion of risk, he is likely to secure recovery of his investment ahead of the longer term CJV interest. The ESCo AM fees form a large proportion of his income so the JV starts to reflect model 1 where operating the asset becomes separated from managing the asset.

Model 1 would be funded entirely by LBC with a high up front capital contribution for any of the four options discussed in section 3F.

Model 2 allows for funding to be a mix of debt and equity between CJV, LBC, LDA and third party funders. Some equity should be held back to allow for either future funding as the development builds out or for debt to equity swap. The ESCo partner may be prepared to fund a proportion of the initial capital but should be incentivised with an equity stake (whether gifted or bought) to deliver CJV into profitability. The model we develop in the next phase will show capital costs attributable to the different works, but there should be no expectation that the future revenues from heat and power sales will fund the construction of the energy distribution networks.

As it has been pointed out previously the high capital investment required at the front end does not start to deliver reliable revenue streams for some years. The aspiration for a decentralised energy scheme providing distributed heat, cooling and potentially power rests with LBC and the planning authorities. Developers will buy into a scheme if it is a condition rather than optional and are prepared to fund distribution assets required on any development phase. A developer may provide funding through a S106 obligation for the Energy Centre(s).

3. Comparison between ESCo and Facilities Management Type Contracts

There are a number of contract possibilities that can be considered. Section 2 above makes reference to two high level models each with its own risks to consider.

This section attempts to highlight some of the key risks and guide LBC to select one or the other business model based upon their preferred risk profile. The paper does not attempt to detail any risk management strategies.

Model 1 – FM role	**Model 2 – CJV PPP**
• Client owns equipment the FM operates and maintains energy supply plant and associated distribution networks only.	• ESCo owns, operates and maintains energy supply plant and associated distribution networks.
• FM does not guarantee energy supplies. It provides the agreed services to meet KPIs set by Client.	• ESCo guarantees energy supplies in accordance with contract terms including pricing and performance SLAs.

• Client bears all initial capital cost. FM recovers its operational costs and profit from service charges set by Client.	• ESCo recovers return on its capital investment and ongoing operational costs through the Client's contribution and tariff charges (standing and metered) over an agreed concession period.
• Client responsible for energy supply asset replacement strategy. FM to deliver its service irrespective of replacement strategy.	• ESCo chooses optimal replacement strategy for energy supply assets to meet the SLA requirements and deliver a return on investment.
• Client bears risk of early asset replacement.	• ESCo will bear all, or majority of, risk of early asset replacement depending on contractual terms.
• Client receives all tariff income and responsibility for associated debt. FM undertake billing but not bad debt liability.	• ESCo receives all tariff income revenue a proportion of which can be shared with Client. ESCo manages bad debt liability.
• Client bears risk in fluctuation of wholesale fuel costs.	• ESCo manages risk in fluctuation of wholesale fuel costs.
• FM has no requirement for capital investment.	• ESCo tends to have easier access to financial resources (off balance sheet).
• FM can exploit economies of scale in market place to deliver more efficient operational costs only.	• ESCo can exploit economies of scale in market place to deliver more efficient capital and operational costs.

The above table charts comparisons in key areas. However model 1 clearly places anumber of the risks upon the Client (LBC).

A number of further considerations need to be made which apply across both models.

- Price control, charging methodology and structure of charges; who sets these?
- Duration of the concession period, period extension and exit strategy at the end of the concession period
- Different financial models exist for each option as model 1 over shorter period would not include plant replacement and whole lifecycle cost
- Level of capital contribution available or required
- Completion of valuation schedules
- Proposed ESCo structure and financial security
- Proposed financing arrangements and capital funding
- Proposals to fulfil Section 106 obligations
- Delivery plan and programme
- Proposed operating arrangements

These can be summarised into

1. <u>Tenant Risks</u>
   - Increases in fixed charges (funding of asset replacement costs/ non realisation of anticipated revenue)
   - Tariffs
   - Comparison with market rates
   - Quality and reliability of service provided
   - Where do I go when things go wrong?

2. <u>Landlord Risks</u>
   - Absorbing or passing on increases in fixed charges costs (funding of asset replacement costs/ non realisation of anticipated revenue)
   - Setting market reflective tariffs
   - Maintaining Quality of service
   - Costs associated with non occupancy
   - Funding of replacement of plant failure before the end of it life cycle
   - Ownership of assets on termination
   - CRC Energy Efficiency Scheme Liabilities

There are 5 key questions

1. What risk does LBC want to carry in regard to design, programme and funding?
2. What is LBC preferred option in regard to capital contributions and fixed / standing charges for tenants?
3. Are LBC seeking any tax benefits (from ECA for example)?
4. Are LBC prepared to take on the risk of tariff management?
5. Do LBC want a long term stake or an exit strategy to suit them?

In addition to this LBC will have to consider what procurement strategies the wish to adopt.

In summary these are the risk exposures and where they might reside.

	LBC	**Model 2 CJV PPP**
1	Maintains supply equipment	Owns and maintains supply equipment
2	Provides the agreed services to meet KPIs	Guarantees supply in accordance with contract terms
3	Recovers ongoing costs from service charges. Client bears all initial capital cost.	Recovers costs through clients contribution to initial capital investment and tariff charges
4	Assets replaced at landlord's instigation	Assets replaced at their discretion
5	<u>Client</u> bears risk of early asset replacement	Bears risk of early asset replacement
6	<u>Client</u> receives all tariff income	Receives all tariff income
7	<u>Client</u> bears variation in tariff income	Bears variation in tariff income
8	Client provides billing and customers services and has the contract relationship the tenants	Acts as an energy supplier for heat (and possibly power)

Section L Addendum

Addendum 1

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.

Addendum 2

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.

Addendum 3

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.

Addendum 4

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

Response:

Yes.

Addendum 5

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.

Addendum 6

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.

Addendum 7

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 L1
Energy Centre Zone 1 Summary

District Heating yr	0	2012	2013	2014	2015	2016	2017	2018	2019	2020
annual consumption MWh EC zone 1		0	19254	36854	42244	44246	54281	54281	54281	54281
income (£)		0	1,078,204	2,055,816	2,354,351	2,467,541	3,049,374	3,049,374	3,049,374	3,049,374
expenditure(£)		0	-620,408	-1,189,316	-1,363,783	-1,428,021	-1,746,961	-1,746,961	-1,746,961	-1,746,961
Cooling yr		2012	2013	2014	2015	2016	2017	2018	2019	2020
Power yr		2012	2013	2014	2015	2016	2017	2018	2019	2020
annual consumption MWh EC zone 1		0	6283	12567	14559	15132	17097	17097	17097	17097
income (£)		0	401,690	803,450	930,839	967,490	1,093,068	1,093,068	1,093,068	1,093,068
expenditure(£)		£0	-£571,796	-£743,175	-£797,515	-£813,149	-£866,717	-£866,717	-£866,717	-£866,717
interest charges (£)			-£134,234	-£134,234	-£134,234	-£134,234	-£134,234	-£134,234	-£134,234	-£134,234
total income (£)		0	1,479,894	2,859,266	3,285,189	3,435,030	4,142,442	4,142,442	4,142,442	4,142,442
total costs (£)		0	-1,326,438	-2,066,724	-2,295,532	-2,375,403	-2,747,911	-2,747,911	-2,747,911	-2,747,911
margin		£0	£153,456	£792,542	£989,658	£1,059,627	£1,394,530	£1,394,530	£1,394,530	£1,394,530
CAPEX		-£17,784,145								
Grant Funding		£5,000,000								
Loan repayment			-	-	-	-	-	-	-	-
CASHFLOW		-£12,784,145	-£12,630,689	-£11,838,147	-£10,848,490	-£9,788,863	-£8,394,332	-£6,999,802	-£5,605,272	-£4,210,741
IRR 7.186%										

District Heating yr	2021	2022	2023	2024	2025	2026	2027	2028	2029
annual consumption MWh EC zone 1	54281	54281	54281	54281	54281	54281	54281	54281	54281
income (£)	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374
expenditure(£)	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961
Cooling yr	2021	2022	2023	2024	2025	2026	2027	2028	2029
Power yr	2021	2022	2023	2024	2025	2026	2027	2028	2029
annual consumption MWh EC zone 1	17097	17097	17097	17097	17097	17097	17097	17097	17097
income (£)	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068
expenditure(£)	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717
interest charges (£)	-£134,234	-£134,234	-£134,234	-£134,234	-£134,234	-£134,234	-£134,234		
total income (£)	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442
total costs (£)	-2,747,911	-2,747,911	-2,747,911	-2,747,911	-2,747,911	-2,747,911	-2,747,911	-2,613,678	-2,613,678
margin	£1,394,530	£1,394,530	£1,394,530	£1,394,530	£1,394,530	£1,394,530	£1,394,530	£1,528,764	£1,528,764
CAPEX									
Grant Funding									
Loan repayment	-	-	-	-	-	-	-	-£3,835,244	-
CASHFLOW	-£2,816,211	-£1,421,681	-£27,150	£1,367,380	£2,761,911	£4,156,441	£5,550,971	£7,079,735	£8,608,499
IRR **7.186%**									

District Heating yr	2030	2031	2032	2033	2034	2035	2036	2037
annual consumption MWh EC zone 1	54281	54281	54281	54281	54281	54281	54281	54281
income (£)	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374	3,049,374
expenditure(£)	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961	-1,746,961
Cooling yr	2030	2031	2032	2033	2034	2035	2036	2037
Power yr	2030	2031	2032	2033	2034	2035	2036	2037
annual consumption MWh EC zone 1	17097	17097	17097	17097	17097	17097	17097	17097
income (£)	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068	1,093,068
expenditure(£)	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717	-£866,717
interest charges (£)								
total income (£)	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442	4,142,442
total costs (£)	-2,613,678	-2,613,678	-2,613,678	-2,613,678	-2,613,678	-2,613,678	-2,613,678	-2,613,678
margin	£1,528,764	£1,528,764	£1,528,764	£1,528,764	£1,528,764	£1,528,764	£1,528,764	£1,528,764
CAPEX								
Grant Funding								
Loan repayment	-	-	-	-	-	-	-	-
CASHFLOW	£10,137,263	£11,666,027	£13,194,791	£14,723,555	£16,252,318	£17,781,082	£19,309,846	£20,838,610
IRR 7.186%								

Appendix L2
Energy Centre Zone 2 Summary

District Heating	yr	0	2012	2013	2014	2015	2016	2017	2018	2019	2020
	annual consumption MWh EC zone 2		2938	5106	6906	7133	7133	17362	26207	26207	26207
	income (£)		164,338	285,603	385,803	402,931	402,931	971,276	1,468,487	1,468,487	1,468,487
	expenditure(£)		-94,690	-164,579	-222,713	-229,993	-229,993	-560,635	-845,164	-845,164	-845,164
Cooling	yr		2012	2013	2014	2015	2016	2017	2018	2019	2020
Power	yr		2012	2013	2014	2015	2016	2017	2018	2019	2020
	annual consumption MWh EC zone 2		969	1686	2313	2359	2359	6007	8754	8754	8754
	income (£)		61,966	107,788	147,912	150,809	150,809	384,052	559,658	559,658	559,658
	expenditure(£)		-£294,407	-£313,953	-£331,069	-£332,305	-£332,305	-£431,799	-£506,708	-£506,708	-£506,708
	interest charges (£)		-£60,059	-£60,059	-£60,059	-£60,059	-£60,059	-£60,059	-£60,059	-£60,059	-£60,059
	total income (£)		226,304	393,390	533,715	553,741	553,741	1,355,328	2,028,145	2,028,145	2,028,145
	total costs (£)		-449,156	-538,591	-613,841	-622,357	-622,357	-1,052,493	-1,411,930	-1,411,930	-1,411,930
	margin		-£222,852	-£145,200	-£80,125	-£68,616	-£68,616	£302,835	£616,215	£616,215	£616,215
CAPEX		-£8,219,865									
	Grant Funding	2,500,000									
	Loan repayment		-	-	-	-	-	-	-	-	-
CASHFLOW		-£5,719,865	-£5,942,717	-£6,087,917	-£6,168,042	-£6,236,658	-£6,305,274	-£6,002,438	-£5,386,223	-£4,770,008	-£4,153,794
	IRR 3.977%										

District Heating yr	2021	2022	2023	2024	2025	2026	2027	2028	2029
annual consumption MWh EC zone 2	26207	26207	26207	26207	26207	26207	26207	26207	26207
income (£)	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487
expenditure(£)	-845,164	-845,164	-845,164	-845,164	-845,164	-845,164	-845,164	-845,164	-845,164
Cooling yr	2021	2022	2023	2024	2025	2026	2027	2028	2029
Power yr	2021	2022	2023	2024	2025	2026	2027	2028	2029
annual consumption MWh EC zone 2	8754	8754	8754	8754	8754	8754	8754	8754	8754
income (£)	559,658	559,658	559,658	559,658	559,658	559,658	559,658	559,658	559,658
expenditure(£)	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708
interest charges (£)	-£60,059	-£60,059	-£60,059	-£60,059	-£60,059	-£60,059			
total income (£)	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145
total costs (£)	-1,411,930	-1,411,930	-1,411,930	-1,411,930	-1,411,930	-1,411,930	-1,351,872	-1,351,872	-1,351,872
margin	£616,215	£616,215	£616,215	£616,215	£616,215	£616,215	£676,273	£676,273	£676,273
CAPEX									
Grant Funding									
Loan repayment	-	-	-	-	-	-	-£1,715,959	-	-
CASHFLOW	-£3,537,579	-£2,921,364	-£2,305,149	-£1,688,934	-£1,072,719	-£456,504	£219,769	£896,043	£1,572,316
IRR 3.977%									

District Heating yr	2030	2031	2032	2033	2034	2035	2036	2037
annual consumption MWh EC zone 2	26207	26207	26207	26207	26207	26207	26207	26207
income (£)	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487	1,468,487
expenditure(£)	-845,164	-845,164	-845,164	-845,164	-845,164	-845,164	-845,164	-845,164
Cooling yr	2030	2031	2032	2033	2034	2035	2036	2037
Power yr	2030	2031	2032	2033	2034	2035	2036	2037
annual consumption MWh EC zone 2	8754	8754	8754	8754	8754	8754	8754	8754
income (£)	559,658	559,658	559,658	559,658	559,658	559,658	559,658	559,658
expenditure(£)	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708	-£506,708
interest charges (£)								
total income (£)	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145	2,028,145
total costs (£)	-1,351,872	-1,351,872	-1,351,872	-1,351,872	-1,351,872	-1,351,872	-1,351,872	-1,351,872
margin	£676,273	£676,273	£676,273	£676,273	£676,273	£676,273	£676,273	£676,273
CAPEX								
Grant Funding								
Loan repayment	-	-	-	-	-	-	-	-
CASHFLOW	£2,248,590	£2,924,863	£3,601,137	£4,277,410	£4,953,684	£5,629,957	£6,306,231	£6,982,504
IRR 3.977%								

Appendix L3

Energy Centre Zone 3 Summary

District Heating yr	0	2012	2013	2014	2015	2016	2017	2018	2019
annual consumption MWh EC zone 3		5388	18606	35832	45382	45382	45382	45382	45382
income (£)		291,829	1,030,734	1,990,259	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840
expenditure(£)		-177,109	-602,296	-1,158,509	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942
Cooling yr		2012	2013	2014	2015	2016	2017	2018	2019
Power yr		2012	2013	2014	2015	2016	2017	2018	2019
annual consumption MWh EC zone 3		2778	6898	12860	16195	16195	16195	16195	16195
income (£)		170,082	422,367	787,482	991,707	991,707	991,707	991,707	991,707
expenditure(£)		-£480,751	-£593,115	-£755,732	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691
interest charges (£)		-£112,791	-£112,791	-£112,791	-£112,791	-£112,791	-£112,791	-£112,791	-£112,791
total income (£)		461,911	1,453,101	2,777,741	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547
total costs (£)		-770,651	-1,308,202	-2,027,032	-2,426,424	-2,426,424	-2,426,424	-2,426,424	-2,426,424
margin		-£308,740	£144,899	£750,709	£1,087,124	£1,087,124	£1,087,124	£1,087,124	£1,087,124
CAPEX	-£15,742,004								
Grant Funding	5,000,000								
Laon Repayment		-	-	-	-	-	-	-	-
CASHFLOW	-£10,742,004	-£11,050,744	-£10,905,845	-£10,155,136	-£9,068,012	-£7,980,889	-£6,893,765	-£5,806,642	-£4,719,518
IRR 7.015%									

District Heating yr	2020	2021	2022	2023	2024	2025	2026	2027	2028
annual consumption MWh EC zone 3	45382	45382	45382	45382	45382	45382	45382	45382	45382
income (£)	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840
expenditure(£)	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942
Cooling yr	2020	2021	2022	2023	2024	2025	2026	2027	2028
Power yr	2020	2021	2022	2023	2024	2025	2026	2027	2028
annual consumption MWh EC zone 3	16195	16195	16195	16195	16195	16195	16195	16195	16195
income (£)	991,707	991,707	991,707	991,707	991,707	991,707	991,707	991,707	991,707
expenditure(£)	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691
interest charges (£)	-£112,791	-£112,791	-£112,791	-£112,791	-£112,791	-£112,791	-£112,791		
total income (£)	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547
total costs (£)	-2,426,424	-2,426,424	-2,426,424	-2,426,424	-2,426,424	-2,426,424	-2,426,424	-2,313,633	-2,313,633
margin	£1,087,124	£1,087,124	£1,087,124	£1,087,124	£1,087,124	£1,087,124	£1,087,124	£1,199,915	£1,199,915
CAPEX									
Grant Funding									
Laon Repayment	-	-	-	-	-	-	-	-£3,222,601	-
CASHFLOW	-£3,632,395	-£2,545,271	-£1,458,147	-£371,024	£716,100	£1,803,223	£2,890,347	£867,660	£2,067,575
IRR 7.015%									

District Heating yr	2029	2030	2031	2032	2033	2034	2035	2036	2037
annual consumption MWh EC zone 3	45382	45382	45382	45382	45382	45382	45382	45382	45382
income (£)	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840	2,521,840
expenditure(£)	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942	-1,466,942
Cooling yr	2029	2030	2031	2032	2033	2034	2035	2036	2037
Power yr	2029	2030	2031	2032	2033	2034	2035	2036	2037
annual consumption MWh EC zone 3	16195	16195	16195	16195	16195	16195	16195	16195	16195
income (£)	991,707	991,707	991,707	991,707	991,707	991,707	991,707	991,707	991,707
expenditure(£)	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691	-£846,691
interest charges (£)									
total income (£)	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547	3,513,547
total costs (£)	-2,313,633	-2,313,633	-2,313,633	-2,313,633	-2,313,633	-2,313,633	-2,313,633	-2,313,633	-2,313,633
margin	£1,199,915	£1,199,915	£1,199,915	£1,199,915	£1,199,915	£1,199,915	£1,199,915	£1,199,915	£1,199,915
CAPEX									
Grant Funding									
Laon Repayment	-	-	-	-	-	-	-	-	-
CASHFLOW	£3,267,490	£4,467,404	£5,667,319	£6,867,233	£8,067,148	£9,267,063	£10,466,977	£11,666,892	£12,866,806
IRR 7.015%									

Appendix L4
Single Energy Centre Summary

District Heating yr	0	2012	2013	2014	2015	2016	2017	2018	2019
annual consumption MWh									
EC all zones		27580	60565	84982	96761	106795	117024	125869	125869
income (£)		456,167	2,394,541	4,431,878	5,279,122	5,392,312	6,542,490	7,039,701	7,039,701
expenditure(£)		-271,799	-1,387,283	-2,570,538	-3,060,718	-3,124,956	-3,774,538	-4,059,067	-4,059,067
Cooling yr		2012	2013	2014	2015	2016	2017	2018	2019
Power yr		2012	2013	2014	2015	2016	2017	2018	2019
annual consumption MWh									
EC all zones		3,747	21,150	29,733	33,687	35,651	39,299	42,045	42,045
income (£)		232,048	931,844	1,738,845	2,073,355	2,110,006	2,468,827	2,644,433	2,644,433
expenditure(£)		-775,158	-1,478,864	-1,829,976	-1,976,511	-1,992,145	-2,145,207	-2,220,115	-2,220,115
interest charges (£)		-£280,833	-£280,833	-£280,833	-£280,833	-£280,833	-£280,833	-£280,833	-£280,833
total income (£)		688,215	3,326,385	6,170,723	7,352,478	7,502,319	9,011,317	9,684,134	9,684,134
total costs (£)		-1,219,807	-3,173,230	-4,707,597	-5,344,312	-5,424,184	-6,226,828	-6,586,265	-6,586,265
margin		-531,592	153,154	1,463,126	2,008,166	2,078,135	2,784,489	3,097,869	3,097,869
CAPEX	-£41,746,013								
Grant Funding	15,000,000								
Loan Repayment									
CASHFLOW	-£26,746,013	-£27,277,606	-£27,124,451	-£25,661,326	-£23,653,160	-£21,575,025	-£18,790,536	-£15,692,667	-£12,594,798
IRR 7.502%									

District Heating yr	2020	2021	2022	2023	2024	2025	2026	2027	2028
annual consumption MWh									
EC all zones	125869	125869	125869	125869	125869	125869	125869	125869	125869
income (£)	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701
expenditure(£)	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067
Cooling yr	2020	2021	2022	2023	2024	2025	2026	2027	2028
Power yr	2020	2021	2022	2023	2024	2025	2026	2027	2028
annual consumption MWh									
EC all zones	42,045	42,045	42,045	42,045	42,045	42,045	42,045	42,045	42,045
income (£)	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433
expenditure(£)	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115
interest charges (£)	-£280,833	-£280,833	-£280,833	-£280,833	-£280,833	-£280,833	-£280,833		
total income (£)	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134
total costs (£)	-6,586,265	-6,586,265	-6,586,265	-6,586,265	-6,586,265	-6,586,265	-6,586,265	-6,413,416	-6,279,182
margin	3,097,869	3,097,869	3,097,869	3,097,869	3,097,869	3,097,869	3,097,869	3,270,718	3,404,952
CAPEX									
Grant Funding									
Loan Repayment								-£8,023,804	
CASHFLOW	-£9,496,929	-£6,399,060	-£3,301,192	-£203,323	£2,894,546	£5,992,415	£9,090,284	£4,337,198	£7,742,150
IRR 7.502%									

District Heating	yr	2029	2030	2031	2032	2033	2034	2035	2036	2037
	annual consumption MWh EC all zones	125869	125869	125869	125869	125869	125869	125869	125869	125869
	income (£)	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701	7,039,701
	expenditure(£)	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067	-4,059,067
Cooling	yr	2029	2030	2031	2032	2033	2034	2035	2036	2037
Power	yr	2029	2030	2031	2032	2033	2034	2035	2036	2037
	annual consumption MWh EC all zones	42,045	42,045	42,045	42,045	42,045	42,045	42,045	42,045	42,045
	income (£)	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433	2,644,433
	expenditure(£)	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115	-2,220,115
	interest charges (£)									
	total income (£)	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134	9,684,134
	total costs (£)	-6,279,182	-6,279,182	-6,279,182	-6,279,182	-6,279,182	-6,279,182	-6,279,182	-6,279,182	-6,279,182
	margin	3,404,952	3,404,952	3,404,952	3,404,952	3,404,952	3,404,952	3,404,952	3,404,952	3,404,952
CAPEX										
	Grant Funding									
	Loan Repayment									
CASHFLOW		£11,147,102	£14,552,054	£17,957,006	£21,361,958	£24,766,910	£28,171,862	£31,576,814	£34,981,766	£38,386,718
IRR	7.502%									

Appendix L4

Cost breakdown for the proposed decentralised energy scheme

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

Summary

	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
Estimate
Price Date: Nov-09

Summary

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**

Energy Zone 1: 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	

Energy Zone 1: 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	

Energy Zone 1: 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**	

Energy Zone 1: 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**	

Energy Zone 2: Electrical

Project	**Croydon Development ZONE 2**					
Estimate			**Electrical**			
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	

Energy Zone 2: 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	

Energy Zone 2: District Pipework

Project	Croydon Development ZONE 2					
Estimate			District Pipework			
Price Date	Nov-09					

Ref	Description	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	

Energy Zone 3: 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	

Energy Zone 3: 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	

Energy Zone 3: District Pipework

Project	**Croydon Development ZONE 3**					
Estimate			**District Pipework**			
Price Date	**Nov-09**					
Ref	Description	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	