

Capabilities on project:
Energy
Environment

Section A

Identifies the Mechanisms for directing or persuading building owners and operators to utilise a piped energy network (ESCO)

The type of mechanism to employ to promote ESCO (District Heating and Cooling) network take-up depends upon the characteristics of the building customer and the stakeholders involved in the process.

The Stakeholders

There are numerous stakeholders in this process including Developers, Customers, Investors, Local Authorities, Land Owners, LDA and the supply Chain. The supply chain is either direct as part of the ESCo vehicle/concessionaire or as an interested third party external. Each stakeholder has their own particular interests and drivers involved in the ESCO network take-up. Some of these stakeholders and their drivers are highlighted below:

- **Developer Drivers**
Capital Saving, Revenue Opportunity, Price Assurance of Services, the order of priority changes according to developer nuances – the developer may not necessarily be owner of the land/asset but may take a commercial interest in return off the ESCo.
- **Customer Occupiers Drivers**
Customers drivers are a price, standard and quality of service which is better than or equivalent to alternative services provision.
- **Investor Drivers and Funding Institutions**
Assurance on Investment Return with the faster and higher the return the better or stability of return over defined period. It is affected by number of customers and period over which they are connecting. If the return is insufficient then the ESCo and/or employer will have to supplement the finances. Planning policy can help here by requiring new developments to connect thereby improving the business case.
- **Croydon Planning Authorities**
The various stakeholders from the Croydon planning authorities include from the corporate level through to planners, environmental, energy and regeneration teams.
- **LDA**
The London Development Agency (LDA) have identified that the implementation of decentralised energy in London has the potential to make significant reductions in CO₂. The LDA can offer support in a number of forms from funding to an LDA sink fund.
- **HCA**
The improved availability of housing grants from HCA can be linked to ESCO. Within the developers financial resources the HCA investment in the various schemes will have impact on the housing energy mix and phasing. The HCA can act as a delivery vehicle if requested by the LA.
- **Land Owner**
Improved return on leasing arrangement as landowners may or may choose not be integral to ESCo energy centre and/or infrastructure.
- **Public Sector**
The public sector can offer support to the business case. Croydon may have access to preferential grant funding and offer public sector commitment to take an energy load from the ESCo. Depending on the route to ESCo taken, the Councils access to prudential borrowing could play a significant part in the formation of the business case. It will heavily influence the access to capital and therefore the choice of ownership of the energy centre and infrastructure network.

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- **Others**

Other stakeholders include:

Residents of Croydon	Tramlink
Businesses of Croydon	LTA
Building Operators	TFL
CCURV Joint venture Company	

The extent of involvement of the stakeholders will vary depending on the scope of ESCo provision. The ESCo services provided needs to be well defined, the form of contract can be complex and tends to be bespoke. The complexity reflects the number of parties involved, the build-out programme, the price control mechanisms and most importantly revenue recovery and split. Other issues include asset ownership and transferral and tax and funding incentives and grants.

Mechanisms

Push Directing Mechanisms

Push mechanisms involve directing the potential ESCo network customer through processes such as planning, building regulations and compliance methodologies.

Pull Persuading Mechanisms

Pull mechanisms involve the persuasion of uptake by the ESCo network customer through strategies such as providing highly competitive energy consumption rates, offering easier procurement routes and highlighting the ESCO green credentials

Building Customer Categories

The main building customer categories within the Croydon Town Centre area are defined as follows:

1. **New Developments** on currently unoccupied sites
 - a. Mixed use (e.g. Ruskin Square)
 - b. Office (e.g. Croma, 100 George Street)
 - c. Residential (e.g. Berkley Homes developments in West Croydon)
2. **Redevelopments** on currently occupied sites
 - a. Mixed use (e.g. Cherry Orchard Road)
 - b. Office (e.g. Cherry Orchard Road)
 - c. Residential (e.g. West Croydon residential developments)
 - d. Retail
3. **Refurbishments**
 - a. Office (e.g. Dingwall Road)
 - b. Residential
 - c. Retail (e.g. Whitgift Centre)
4. **Existing Developments**
 - a. Office
 - b. Residential
5. **Public Sector Buildings**
 - a. Office
 - b. Residential
 - c. Other (e.g. Town Hall, Library, Law Courts)
6. **Semi-Public Sector Buildings**
 - a. College Green

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ESCo Connection Date

Understanding the timing of the following is crucial to the feasibility of the ESCo network. The date required are:

- Connection: contractual commitment date (definition of what is connected)
- Commitment to a Daily/ monthly and annual energy draw from the network
- An agreed peak energy draw and approximate energy demand profile

The understanding of the above is crucial to ensuring the following:

- The ESCO business model works
- The development is 'ESCO ready'
- The connection is made
- A reasonable energy profile is consumed
- The site is included on the piped energy network

Push Mechanisms Overview

The appropriateness of the mechanism depends on the characteristics of the building customer. For example some planning mandates to connect to an ESCO may not be enforceable on existing buildings that have not plans to change their systems or put in a planning application.

The Role of Planning: 'Planned' Developments

European

A number of European Directives support the development of low carbon energy supply, including the Energy Performance of Buildings Directive, the Cogeneration Directive and the recent Renewable Energy Agreement. These are being implemented through UK legislation in various ways, partly through Part L of the Building Regulations.

National

The Supplement to PPS1 on Planning and Climate Change defines a clear role for planning that goes beyond the promotion of carbon reduction measures. Croydon Council's Local Development Framework (LDF) should be seeking to create a strategic framework for CO₂ reduction including planning obligations and requirements.

The Role of LDA

Local Government's statutory planning powers are pivotal in establishing the spatial framework for the location, form and specification of new property developments as well as utility infrastructure and low carbon energy generation. Local authorities and other public authority departments have the opportunity, through the planning system, to request that developers consider community heating as part of the planning and design of their construction projects.

South London

The region London boroughs has collaborated on the Joint South London Waste plan initiatives like this may be utilised in the promotion of a decentralised energy scheme.

London Borough of Croydon

The role of planning is to look at the spatially mapping of the decentralised energy network opportunity areas, to support developers in meeting building regulations and identifying delivery mechanisms including designating local development orders.

Local Authorities have renewed powers under the Local Government Act 2000, the London Plan and draft new London Plan and numerous energy policies in support of district energy, such as the community infrastructure levy.

Croydon is part of the GLA family and Government guidance expressly includes participation in special purpose vehicles established to deliver low carbon energy services, but their remit extends much wider than this – encompassing their strategic role in coordinating investment in

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the regeneration of neighbourhoods and, increasingly, the establishment of public-private property investment portfolios.

Strategic heat planning will be required to facilitate the development of district heating networks, with district heating treated as essential utility infrastructure. In order for heat plans to have any status, they should be incorporated into Development Plan Documents and Area Action Plans.

Adoptable policies, with targets and requirements, supported by technical guidance that can be used when considering planning applications. The Supplement to PPS1 on Planning and Climate Change sets out the policy framework,

Planning alone is not enough to ensure connection. Complementary enabling mechanisms will need to support implementation. This section describes the key enabling mechanisms that can be brought into play in order to support the development of community energy.

London Plan Decentralised Energy Policies include:

Policy 4A.5 Provision of heating and cooling networks:

'Boroughs should ensure that all DPDs identify and safeguard existing heat and cooling networks and maximise the opportunities for providing new networks that are supplied by decentralised energy.'

'The Mayor will and boroughs should work in partnership to identify and establish network opportunities, to ensure the delivery of these networks and to maximise the potential for existing developments to connect to them.' (Policy 4A.5 Provision of heating and cooling networks)

Planning Policy Statement (PPS): Planning & Climate Change issued as a supplement to PPS1: Delivering Sustainable Development.

'It also expects councils to think about the potential for local low carbon energy generation and cutting carbon emissions when identifying the best sites for development. Croydon will be expected to look at the potential for connecting developments to neighbouring community heating and power schemes that can serve an entire local community. The PPS builds on the Merton rule which requires all new non-residential developments above a certain size to generate at least 10 per cent of their energy on-site from renewable sources. The Mayor of London also plans to double renewable electricity supply from the 2010 target of 10 per cent to 20 per cent by 2020.'

The Role of Building Regulations

Part L of the Building Regulations plays a role in the decision as to whether to connect to a District Heating network. The decentralised energy network can offer many benefits including, CO₂ credits, assisting with Part L2A compliance and contributing to consequential improvements.

Pull Mechanisms Overview

The appropriateness of the mechanisms to employ to promote ESCO network take-up depends on the characteristics of the customer and their understanding of the product.

The product: Hot Water

Before discussing sales, it is important to clarify the actual product that is being sold. The current proposal is to produce and sell hot water at 95°C at a point of connection at the customer's site boundary. Customers will then consume a quantum of energy from that hot water and return the same water at a lower temperature 65°C back to the same point of connection. Flow and return pipework will transport the hot water, which will be pumped from energy centres around a mainly subterranean insulated pipework network.

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Uses of Hot water Energy

The customer can use this primary high temperature hot water at 95°C for the following uses:

1. Heating: once passed through a heat exchanger the customer can produce medium or low temperature hot water for the developments heating circuits
2. Domestic hot water: once passed through a calorifier the customer can produce hot water for the developments domestic hot water circuits
3. Chilled Water: once passed through an absorption chiller the customer can produce chilled water for the developments chilled water cooling circuits (note the use of this primary hot water to produce cooling does not exclude the need for onsite heat rejection)

The use of local chilled water production facilities nodes serving groupings of energy clusters is addressed later in this section.

Customer: New Developments Building Owners

For a developer customer planning a new development within Croydon Town Centre there are a number of incentives to connecting onto the Croydon Decentralised energy network. It is assumed that the new development is to be on a sterile site which does contain existing buildings and doesn't have existing infrastructure within its boundary.

Customer: Redevelopments Building Owners

For a developer customer planning a redevelopment within Croydon Town Centre there are a number of incentives to connecting onto the Croydon Decentralised energy network.

Customer: Refurbishments Building Owners & Operators

For a developer customer planning to refurbish an existing development within Croydon Town Centre there are a number of incentives to connecting onto the Croydon Decentralised energy network.

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New Developments/Redevelopments/Refurbishments: Positive Mechanism Table	
Persuasive Mechanisms	Description
Promote reduction in capital expenditure	Remove boiler CAPEX. Boilers are no longer required, replaced by cheaper smaller heat exchangers.
Promote floor area saving	A boiler plantroom is no longer required with its associated plant and access space. With biomass boilers the additional area savings are realised on storage and delivery space
Highlight boiler flue removal	With no boilers there is no need for unsightly boiler flues and their associated air quality issues
Offer resilience to fluctuation in energy prices	Offer resilience to fluctuation in energy prices
Highlight fuel feed benefits	A gas connection is no longer required for the boilers and compared to a biomass boilers no deliveries are required
Remove air quality issues	Air quality leverage over developments! Remove all their planning air quality issues in one go! Pollution Nox reduction
Show improvements in DEC & EPC ratings	An improved Energy Performance in Buildings Directive rating
Deliver low & Zero carbon technologies contribution	The ESCo should deliver the 20% renewables contribution for LZC technologies.
Enhance code for sustainable homes rating	Improved Code for Sustainable Homes scoring
Offer competitive utilities cost to site occupants	Offer competitive utilities cost to site occupants
Reduce ongoing risk of asset maintenance	Reduced risk to the developer as operation and maintenance is now the responsibility of ESCo
Access preferential energy deals with utilities	Get preferential bulk buying deals
Lead negotiations with energy suppliers	Have a lot better understanding and bargaining position with utility companies
Offer to manage billing process	Manage the process of billing the occupants
Absorb cost of plant replacement	Plant now responsibility of ESCo
Promote increased marketability	Increased marketability of the site to potential tenants
Reduced fuel poverty	Offer the option of discounted energy to help reduced fuel poverty
Offer reliable supply	With the reliability of infrastructure and interlinked energy centres supply is very reliable
Price assurance of services	The ESCo can offer a consistent financial spread
Offer revenue opportunity	Potential revenue could be generated from useless land for housing the energy centre or accommodating infrastructure.
Offer ESCo partner opportunity	Opportunities to partner in an ESCo team and to be part of the revenue stream.

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Customer: Existing Developments Building Owners & Operators

For a building owner customer planning a redevelopment within Croydon Town Centre there are a number of incentives to connecting onto the Croydon Decentralised energy network.

Existing Developments: Positive Mechanism Table	
Persuasive Mechanisms	Description
Promote reduction in capital expenditure	This is dependent on remaining life on existing plant. May be difficult to justify, on capital cost, the replacement of boilers with life remaining with heat exchangers
Promote floor area saving	The boiler plantroom is no longer required with its associated plant and access space.
Highlight boiler flue removal	Removal of unsightly boiler flues and their associated air quality issues + stack riser area gained on each floor.
Offer resilience to fluctuation in energy prices	Offer resilience to fluctuation in energy prices
Highlight fuel feed benefits	A gas connection is no longer required for the boilers.
Remove air quality issues	Air quality leverage over developments. Remove all their planning air quality issues in one go. Pollution Nox reduction
Show improvements in DEC rating	An improved Energy Performance in Buildings Directive rating (energy performance certificate and display energy certificate for public buildings)
Contribution to CRC Energy Efficiency Scheme	This low carbon connection will make significant contribution to reducing CO ₂ emissions to generate income from this scheme.
Deliver low & Zero carbon technologies contribution	The ESCo should deliver a renewables contribution for LZC technologies.
Enhance code for sustainable homes rating	Improved Code for Sustainable Homes scoring
Offer competitive utilities cost to site occupants	Offer competitive utilities cost to site occupants
Reduce ongoing risk of asset maintenance	Reduced risk to the developer as operation and maintenance is now the responsibility of ESCo
Access preferential energy deals with utilities	Get preferential bulk buying deals
Lead negotiations with energy suppliers	Have a lot better understanding and bargaining position with utility companies
Offer to manage billing process	Manage the process of billing the occupants
Absorb cost of plant replacement	Rather than replacing old boilers, the energy network would offer a lower cost solution using heat exchangers
Promote increased marketability	Increased marketability of the site to potential tenants
Reduced fuel poverty	Offer the option of discounted energy to help reduced fuel poverty
Offer reliable supply	With the reliability of infrastructure and interlinked energy centres supply is very reliable
Price assurance of services	The ESCo can offer a consistent financial spread
Offer revenue opportunity	Potential revenue could be generated from useless land for housing the energy centre or accommodating infrastructure.
Offer ESCo partner opportunity	Opportunities to partner in an ESCo team and to be part of the revenue stream.

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Refurbishments: Barriers Table	
Barriers	Description
Existing Energy Ties	Occupier already has corporate rates agreed with energy providers
Commitment to energy consumption	Building owners may have to sign-up to buy energy from anything from a 15 to 40 year period
Connection Charge	Building owners may have to contribute to the capital cost of the energy centre and the infrastructure
Phased connection commitment	The building owner will have to provide a prediction of the phased connection of the development (kW & kWh)
Energy profile commitment	Over the life of the development a demand profile need to be agreed. Unoccupied properties, not consuming energy, will effect this prediction
Fuel price exposure	Tied in to wholesale energy prices through the ESCo purchasing agreements. Can't go out to get other tariffs from alternative utility companies

Complementary Product: Electricity

With the use of combined heat and power units in the ESCO business model, electricity is produced as well as heating hot water in the energy centres. It is our understanding that existing power distribution network in Croydon town centre is reaching capacity. With new developments coming online network reinforcement is required in the town centre to support those developments.

The host distribution network operator (DNO) is obligated under the terms of its license to provide the developers with a network connection agreement to supply additional load. The distribution licence holder for the Croydon town centre area has suggested that any significant network capacity increase will require an additional primary sub-station in the area. One proposed location for a potential primary sub-station is under Queen's Gardens. The cost of this substation would be apportioned across any new developments demanding the load increase. Within a definitive timeframe the ESCO centre could help offset or remove this burden by supplying that additional load or by providing a stronger negotiating position with the host network provider.

Complementary Product: Chilled Water

This strategy proposes the production and distribution of high temperature hot water to points of connection of the energy clusters. In the summer this can be used for heating. In the winter, there is obviously less demand for heating. The hot water can be fed into absorption chillers to produce cooling. The use of hot water for the purposes of converting into chilled water is not as effective as displacing boiler heat and therefore the business case for chilled water production in summer is less viable.

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Other Issues to consider

Point of Connection Definition

When connecting to a customer, where does the ESCO owned energy network infrastructure stop and the site internal infrastructure start? Where does responsibility for the infrastructure asset end? Does the ESCo manage the infrastructure up to the heat meter on the individual residential units, or stop at a 'capped off' point of connection at the site boundary?

Preferential Rates

Can customers be penalised for either not connecting or connecting late to the energy network? Can preferential rates be offered for early sign up encouraging customers to sign up now with discounted connection costs and consumption charges, on a first come first serve basis? Do regulations prevent this kind of penalty clauses or preferential treatment?

Subsidised Pricing

Could subsidised pricing be introduced to help address issues such as fuel poverty?

Phased Pricing

With the network infrastructure distributed over a considerable distance, the first customer may be at the far end of the proposed infrastructure. This would mean that the whole cost of the infrastructure would need to be put in at the beginning to serve just this one development. The phased connection onto this network over time would be very difficult to justify financially. Should this first development be charged more?

Unoccupied property

Landowners will have to consider residential apartments where owners are not necessarily occupiers and buy the property as investment or second home and only spend one month a year there in the summer. The landowner may have signed up to consume energy against an energy profile for that unit which has no energy demand for heating.

Pneumatic Waste Distribution System

A pneumatic waste distribution system should be considered for areas of high density. An interesting idea is the use of the green spine along Wellesley Road to collect waste to feed down into a collection centre housed within the current location of the Wellesley Road/ Park Lane underpass

IT

There is a great opportunity as pipework infrastructure is being installed to lay data and fibre optics in the roads, trench, along structures etc. at the same time. The green spine along Wellesley Road could also form the Croydon data connectivity spine.

Legal Issues

Legal issues of ownership and energy consumption and load commitment and will have to be resolved.

Connection Charges

On day one of the customer connection a connection charge will have to be paid to contribute to the capital cost of energy centres, infrastructure etc.

Reliability of Heating

What about heating/ power resilience? Who are the users? Data centres, dealer floors, doubling up? Fail safe connections?

Existing offices

What is my incentive to connect? Equipment connection costs? Stepdown heat exchangers, connection charge, controls etc., but freed up space in basement where boilers, chillers were and potential roof space freed from heat rejection equipment. Remove all the external split units on the façade and rooftop to improve visual amenity. Zero carbon, green roof gardens.

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Existing old boilers that need replacing, free life cycle analysis for potential customers. Part L2B, Encouragement, the spirit of the ESCO, incremental expansion, CAPEX in ground heat sales over time.

Load Matching

Offer Croydon strategic design advice to get their loads down and profiles matching the Croydon delivery profiles. Can we affect the building mix through energy policy to match the optimum output profiles? Can it start to influence where we put housing and when?

Who Owns the Network

Does Croydon own the network infrastructure with 25-30 years life on it? Do developers trust Croydon more than an ESCO company?

Catalyst Connections

When does the network reach critical mass? If we can get commitment from the large public sector groupings and/or from some of the high density large developments proposed, then with these on board, and with the scheme successfully operation, then the others will follow suit.

Exit strategy/ Exit Mechanism

Does Croydon Council require an exit strategy? When to exit and what does Croydon Council want to come away from the deal with?

Operational Risk

Is this low carbon energy solution economically viable? What is the worst case scenario?

Reputational risk

Croydon Council may suffer if the ESCO fails to deliver projects of sufficient impact.

ESCO's

There are a number of companies offering ESCo capability these are listed below:

- Dalkia PLC
- LondonESCO
- Scottish and Southern Energy (SSE)
- E.On Sustainable Energy Solutions
- Ener-g Combined Power
- RWE Energy
- ABB
- Inexus/ Metropolitan
- Morgan EST
- Thamesway Energy
- United Utilities
- Utilicom
- Thames Energy (Less Energy)
- Elyo
- Ecocentrogen
- Cogenco
- EnviroEnergy
- Centrax
- Vital Energi