

# Barking Town Centre Energy Action Area Implementation Plan



London Energy  
Partnership

ENERGY ACTION AREA

The London Borough of

**Barking & Dagenham**

[www.barking-dagenham.gov.uk](http://www.barking-dagenham.gov.uk)

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This report was adopted by Barking and Dagenham Council in August 2006.  
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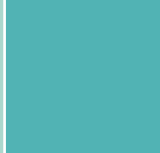
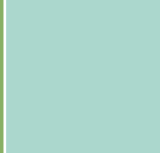
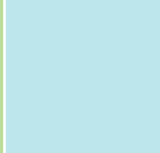
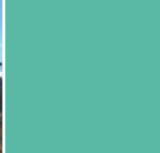


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## LIST OF ABBREVIATIONS

BTC	Barking Town Centre	LCBP	Low Carbon Buildings Programme
BVPI	Best Value Performance Indicator	LDA	London Development Agency
CH	Community Heating	LEC	Levy Exemption Certificate
CHP	Combined Heat & Power	LEP	London Energy Partnership
DSWH	Domestic Solar Water Heating	MBT	Mechanical Biological Treatment
DTI	Department of Trade and Industry	NHER	National Homes Energy Rating
EEC	Energy Efficiency Commitment	NPV	Net Present Value
ELT	East London Transit	DCLG	Department for Communities and Local Government
EPBD	Energy Performance in Buildings Directive	ROC	Renewables Obligation Certificate
ESCo	Energy Services Company	RSL	Registered Social Landlord
EST	Energy Saving Trust	SAP	Standard Assessment Procedure
GIS	Geographic Information Systems	SEPN	Sustainable Energy Policy Network
GHG	Greenhouse Gas	SfL	Solar for London
GLA	Greater London Authority	SPG	Supplementary Planning Guidance
GSHP	Ground Source Heat Pump		
HECA	Home Energy Conservation Act		
LBBB	London Borough of Barking and Dagenham		



# Executive Summary

## Introduction

The London Energy Partnership's Energy Action Area initiative was proposed in the Mayor's Energy Strategy in January 2004 and launched by the Energy Minister, Malcolm Wicks, and Mayor of London, Ken Livingstone, in July 2005. Barking Town Centre is one of just four areas in London to be selected by the London Energy Partnership for this status. As a new initiative there is little experience of how the status might be translated into reality for an area of London. This report is intended to set out that information in detail, and in effect provides a route map for the implementation of an Energy Action Area in Barking Town Centre.

Energy Action Areas are conceived in essence as "showcase low carbon communities"<sup>1</sup>. This report builds on work carried out in an options appraisal that set out some of the costs and options to Barking Town Centre becoming a low carbon community. It extends this work by examining the scope not just for new build areas but also existing housing/buildings which, without intervention, will be responsible for the majority of carbon emissions, once regeneration plans have been implemented.

## The Vision

The Low Carbon Options Appraisal published in September 2005 illustrates that community heating and combined heat and power (CHP) provide the most cost effective way for Barking Town Centre to become a low carbon community. The vision set out in this report for Barking Town Centre Energy Action Area is therefore of an area wide heating system served by one or more CHP based heat sources. The two preferred low carbon heat sources are Barking Power Station and a large biomass or energy from waste combined heat and power plant. This will be complemented with visible, largely building-integrated, renewable energy systems and a range of energy efficiency measures to the existing building stock.

As part of the London Thames Gateway Regeneration framework, the Town Centre could become part of a wider heat network serving a number of London Thames Gateway developments and incorporating a range of different heat sources and in particular the waste heat from Barking Power Station.

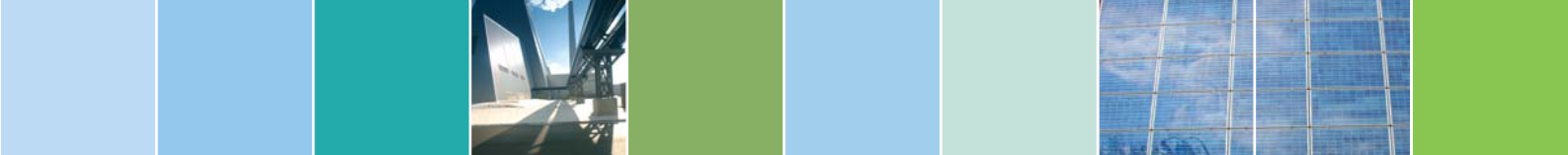
This vision has a number of implications in terms of carbon reduction targets, funding and financing, the planning framework, the roles of delivery partners, choices of technologies and the phasing of their implementation. This report explains in each case what must be done, by whom and when.

## Energy Action Area Target

We recommend that London Borough of Barking and Dagenham (LBBD) set an overall target for reducing CO<sub>2</sub> emissions by 11% by 2020, achieved with a 75% increase in the number of homes. This overall target figure includes a 32% reduction target for all new developments in the town centre compared to 2006 Building Regulations. Carbon emissions from building sources currently amount to 45,580 tonnes/year (t/yr). In the absence of any intervention this would rise to 52,563 t/yr after the regeneration had taken place, which would be an increase of 15%.

The 11% target implies a reduction of 4,825 t/yr below the existing baseline and 11,808t/yr below what the emissions would be if Building Regulation standards only are followed for the regeneration of the town centre. This target will be surpassed if the biomass or solid recovered fuel (SRF) CHP options can be realised. If LBBD wishes to pursue a more ambitious programme through connecting existing buildings to the district heating network then a reduction of 42% would be feasible – this figure would be close to the long-term 60% reduction level recommended by climatologists as required to address climate change. This would be an impressive achievement in the context of a considerable growth in floor area in Barking Town Centre.

<sup>1</sup> Green Light to Clean Power, Mayor of London, 2004



The 11% reduction target will require:

- CHP and community heating for all new developments
- 10% renewable energy requirement for electricity in new developments
- An energy efficiency programme for existing buildings to be retained.

### The Planning Framework & Technology Choices

The planning framework will need to specifically reflect the adoption of a community heating network and renewable energy technologies. All new developments will need communal heating systems compatible with the wider heat network. This in turn has implications for the choice of building-integrated renewable energy systems that developers should use - only electricity generating systems should be used, i.e. solar photovoltaic and wind. To ensure that the optimum carbon outcome is achieved under the new 2006 Building Regulations we further recommend that this 10% renewables requirement be in addition to the carbon target specified within the Regulations.

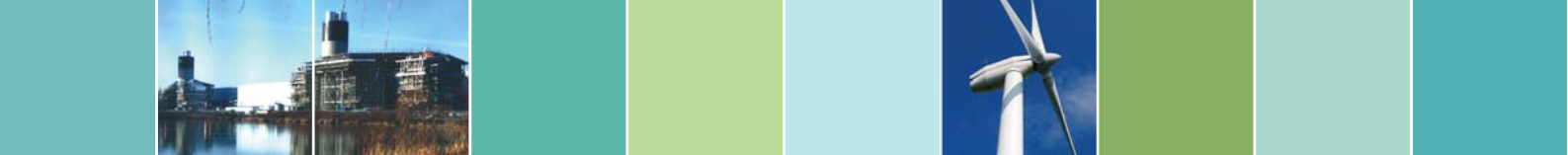
### Establishing a Community Heating Network within the Regeneration Programme

The first step is to build a natural gas fuelled central boiler plant within the Town Centre to provide heating for all developments over the next few years. In the medium term this will serve as the heat source for all new developments. In the longer term, once the connection has been made to one or more of the larger CHP sources (ie biomass, solid recovered fuel or Barking Power Station) this “heat station” would serve as top up and standby boiler plant. Once a heat network is in place, with a proven track record in reliability, it could then be rolled out to the existing buildings.

This is an early stage decision as the sizing of the heat network will need to allow for the later addition of the existing buildings.

### Funding and Financing

Table 1 illustrates the capital costs of the low carbon measures for the new build and the existing stock. Community heating and CHP generally cost more to install than conventional individual boiler solutions, but when the operational costs and revenues are compared over the longer term (the life cycle cost), they are often cheaper than the conventional alternatives. For Barking Town Centre the life cycle costs are in fact very similar for each individual option. The life cycle cost for biomass CHP is similar to the conventional approach.



There are a range of possible funding and financing sources for these options, but the Energy Efficiency Commitment (EEC) and the Low Carbon Building Programme (LCBP) are the most important sources of grant support. If EEC funding is available at the level indicated by energy utility companies, this represents a significant subsidy (around £7m) and means that

the development of a heat network from Barking Power Station to both the existing housing and new build areas would cost only £7m more than the alternative over 25 years (assuming a discount factor of 3.5%). For the biomass option a ruling from Ofgem will be required as to whether this will qualify for EEC support.

New Build	Technology / Heat Source		Capital Cost	Additional Life Cycle Cost 25 yrs <sup>2</sup>
Individual Boilers		£m	31.15	0.00
Heat Network & Stand-By Boilers	Barking Power Station	£m	37.50	6.07
CHP Plant & Stand-By Boilers	SRF CHP	£m	79.38	1.98
CHP Plant & Stand-By Boilers	Biomass CHP	£m	74.01	0.39
10% Renewables	50% Wind & 50% PV	£m	18.78*	11.93

Existing Buildings	Technology / Heat Source		Capital Cost	Additional Life Cycle Costs 25 yrs
Energy Efficiency Option	Insulation, Condensing boilers etc	£m	11.49*	5.74
Heat Network & Boilers	Barking Power Station	£m	19.65*	8.10

Table 1: Additional costs of low carbon measures for new build and existing buildings

## Delivery – A Barking Town Centre ESCo

The development of a heat network served by combined heat and power will require a delivery organisation. It is recommended that LBB set up an Energy Services Company (ESCo), or contract with an existing ESCo, to deliver the construction, operation and maintenance of the system, as well as retail the heat. The terms of reference for the ESCo could also include the delivery of energy efficiency initiatives to the existing building stock

\* Only additional capital costs are shown for these options

<sup>2</sup>Compared to individual gas boilers (if no capital grants are used)

and responsibility for claiming Renewable Obligation Certificates (ROCs) for the renewable energy systems installed as part of the 10% requirement within Barking Town Centre. There are a number of successful models set out in this report that LBBB could draw on to develop an ESCo. The choice of ESCo model will be developed over the coming months in consultation with LBBB officers.

## Implementation

Implementation of Barking Town Centre Energy Action Area requires action on a number of fronts. The key actions are listed below, enabling LBBB to embed the Energy Action Area objectives within the regeneration process. The current Energy Action Area project steering group should be continued, and possibly enlarged, to oversee overall delivery of this Implementation Plan while key responsibilities for day-to-day delivery should be allocated to a dedicated Energy Action Area team.

Energy Action Area status provides an opportunity for LBBB to add another strand to its marketing strategy to improve the image of Barking Town Centre to both internal and external stakeholders. Although a large number of tasks are required, the regeneration of Barking Town Centre is in itself a very significant process and the incorporation of low carbon measures will constitute a relatively small additional component.

Barking Town Centre is in an excellent position to become a leading Energy Action Area due to the close proximity of several low carbon energy sources (Barking Power Station and Solid Recovered Fuel) for a community heating network. The carbon reduction potential for Barking Town Centre is dependent on utilising these low carbon energy sources and therefore it is imperative that they are progressed immediately alongside the development of the community heating infrastructure that is required to distribute them.

Technology / Heat Source	Capital Cost £m	Carbon Saving CO <sub>2</sub> tpa	Capital Grant £m	Source	New Capital Cost £m	New Additional Life Cycle Cost 25 yrs £m
Individual Boilers	31.15	0			31.15	0.00
Barking Power Station	37.50	-4,500	1.57	EEC	35.92	4.66
SRF CHP	79.38	-4,603	1.57	EEC	77.81	Requires Ofgem ruling
Biomass CHP	74.01	-69,609	1.57	EEC	72.44	Requires Ofgem ruling
50% Wind & 50% PV	18.78	-2,090	8.57	LCBP, Green Fund	10.22	3.37

Technology / Heat Source	Capital Cost £m	Carbon Saving CO <sub>2</sub> tpa	Capital Grant £m	Source	New Capital Cost £m	New Additional Life Cycle Cost 25 yrs £m
Insulation, Condensing boilers etc	11.49	-4,488	0.44	EEC	11.05	5.3
Barking Power Station	19.65	-14,958	5.44	EEC	14.21	2.66

Table 2: Additional costs of low carbon measures for new build and existing buildings with grant funding



# Route Map to Implementation

## Defining the Energy Action Area

**Action 1:** LBBD and regeneration partners should adopt an 11% overall CO<sub>2</sub> reduction target for Barking Town Centre Energy Action Area for 2020 as part of corporate and regeneration policy. This reduction target would be achieved with an approximate 75% increase in housing units.

**Task 1.a** - Promote and communicate the vision and objectives of the Energy Action Area to all regeneration partners.

**Task 1.b** - Hold an Energy Action Area Implementation Plan launch event with all regeneration partners and stakeholders.

**Action 2:** Identify a number of sites for landmark renewable energy installations in the town centre to provide a visual presence for the Energy Action Area.

**Task 2.a** - Assemble a list of locations for stand-alone wind turbines, landmark buildings and renewable options for street furniture.

## Developing Organisational Framework and Capacity

**Action 3:** LBBD should put in place measures to ensure effective project management of the cross-cutting actions and implementation of the Energy Action Area.

**Task 3.a** - Form an Energy Action Area steering group with representation from all parts of the Council and partner organisations that will have a role in implementing the Energy Action Area.

**Task 3.b** – Establish a dedicated team for delivering the Energy Action Area, and agree responsibility for each of the Actions in this Implementation Plan.

**Action 4:** Provide training and support to aid Energy Action Area implementation.

**Task 4.a** - Produce a leaflet for developers that states clearly the objectives and requirements of the Energy Action Area for development in the town centre.

**Task 4.b** - Hold a seminar with prospective developer and design teams working in Barking Town Centre to enable the rationale behind the Energy Action Area requirements to be fully explained.

**Task 4.c** - Consider providing practical support for developers, architects and construction companies to both increase understanding and ensure compliance with Energy Action Area requirements. This support could take the form of an advice line, access to consultants and training seminars.

## Setting Planning and Policy Context

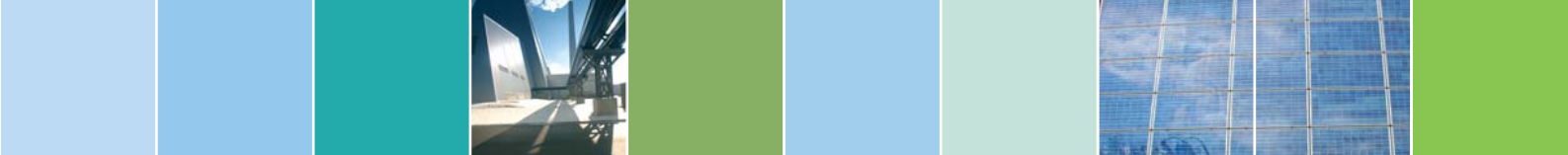
**Action 5:** Ensure that the development policies within the Local Development Framework (LDF) – and in particular the Barking Town Centre Area Action Plan – clearly specify Energy Action Area requirements.

**Task 5.a** - LDF policies should require that all new buildings in Barking Town Centre incorporate communal heating systems and the ability to connect to the community heat network at an appropriate time.

**Task 5.b** - LDF policies should require that in Barking Town Centre 10% of buildings' carbon emissions are cut through electricity generating renewable energy technologies.

**Task 5.c** - LDF policies should require that all new buildings include easily visible real-time energy consumption displays to encourage energy-efficient behaviour.

**Task 5.d** - The LDF should ensure that use of renewables should not be allowed to reduce energy efficiency standards as proposed in the 2006 Building Regulations.



**Action 6:** Ensure that all key policy documents take account of and enforce the Energy Action Area requirements, such as the Regeneration, Economic Development and Housing Strategies, all other regeneration and housing policies and plans, and the Barking & Dagenham Corporate Plan.

**Task 6.a** - Liaise with appropriate divisions to ensure requirements are included in key documents.

**Action 7:** Utilise planning conditions or planning gain to enforce community heating and 10% renewable energy (electricity) generation within all new developments in Barking Town Centre.

**Task 7.a** - Establish an Energy Action Area renewable energy funding pot, for developers to contribute to off-site renewable energy schemes where 10% renewable generation is not possible due to physical limitations.

**Task 7.b** - Determine the cost per kWh that is acceptable for developers to pay.

**Action 8:** Ensure stringent enforcement of the Building Regulations 2006, to ensure that the high standards met at the planning stage are not breached in practice by lack of understanding on the part of the contractors.

**Task 8.a** - Training schemes for site workers may be offered in partnership with other agencies, such as DCLG, in order to reduce non-compliance through lack of understanding.

## Financing and Delivery of the Energy Action Area

**Action 9:** Develop a business plan for setting up an ESCo to deliver and finance the community heating system and shared renewable energy infrastructure.

**Task 9.a** - Establish preferred ESCo model for the Council.

**Task 9.b** - Develop the legal framework for the preferred ESCo model.

**Task 9.c** - Develop business plan and financing model for the ESCo.

**Task 9.d** - Recruit staff and Board of Directors for the ESCo.

**Task 9.e** - Establish the ESCo.

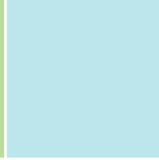
**Task 9.f** - Tender for private sector partner.

**Action 10:** Develop a 'funding strategy' for various elements of the Energy Action Area, including pump-priming for the establishment of the ESCo and funding for landmark renewable energy installations.

**Task 10.a** - Utilise the funding sources listed to identify and secure funding for different aspects of the Energy Action Area.

**Task 10.b** - Calculate set-up costs for the ESCo and compile funding bid/s to cover these.

**Task 10.c** - Identify most suitable funding pot/s, and submit funding bid for one or more landmark renewable energy buildings.



## Implementing Community Heating in Barking Town Centre

**Action 11:** Raise awareness amongst officers and Councillors about the installation and operation of modern CHP and community heating systems.

**Task 11.a** - Organise a visit for officers and Members to an existing community heating and CHP system in the UK.

**Task 11.b** - Ensure continuing professional development for officers working on the Energy Action Area in CHP, community heating and renewable energy.

**Action 12:** As a priority, secure a town centre site for the interim gas fired boiler plant that will provide community heating for the first 5 years until connection to Barking Power Station or completion of the large CHP plant.

**Task 12.a** - Calculate the size and other requirements of the site required for the initial boiler plant and identify a suitable Council-owned site in the town centre. Compile a proposal to allocate this site for the boiler plant.

**Action 13:** Once established, the ESCo should conduct a study to map out and understand the extent, routing, heat sources, and cost of the town centre community heating system.

**Task 13.a** - Stage 1: outline design to achieve sign-on from LBB and commitment to put system in place.

**Task 13.b** - Stage 2: detailed design to take forward to implementation and to inform other stakeholders.

**Task 13.c** - Analyse and design the community heating system in order to minimise running costs, distribution losses and capital costs.

**Task 13.d:** Use specialist consultants to analyse and design the community heating system in order to minimise running costs, distribution losses and capital costs.

**Task 13.e:** Appoint a consultant to design a community heating system for Fresh Wharf and other near term developments, including: identifying the main heat network routes for each development, establishing those areas where heat mains can not be installed, and identifying boiler plants for each regeneration area.

**Task 13.f:** Design the routing of the community heating network, by using Master Plans of the Station Quarter, London Road, Axe Street and others.

**Action 14:** Establish opportunities for connecting existing buildings to the heat network, particularly Council & other public sector buildings in the town centre.

**Task 14.a** - Ensure CHP and the potential interaction with a town centre heat network is included within the extension plans for Barking Town Hall, and also consider the inclusion of schools and Abbey Leisure Centre swimming pool within the heat network.

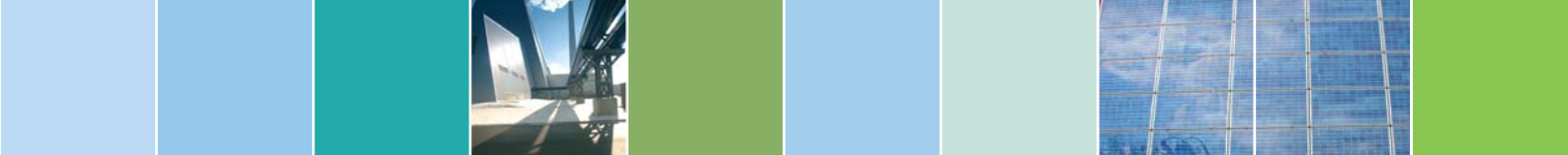
**Task 14.b** - Explore opportunities to connect the existing stock to community heating through additional funding, such as the Energy Efficiency Commitment (EEC).

**Action 15:** Ensure that heat meters are installed in all dwellings so that occupants pay for heat by the unit to encourage energy efficient behaviour.

**Task 15.a** - Ensure that developers include heat meters as a core component of communal heating system and provide information on heat meters to assist them.

## Developing the Low Carbon Heat Source for the Energy Action Area for the Longer Term

**Action 16:** Determine and pursue the preferred low carbon heat source for the town centre - either waste heat from Barking Power Station or an energy-from-waste gasification CHP plant on the edge of the town centre.



**Task 16.a** - Produce business cases and report on how practical the two options are to implement.

**Task 16.b** - Arrive at a preferred low carbon heat source based on the best business case and practical considerations.

**Action 17:** If heat from Barking Power Station is the preferred low carbon heat source, work with London Thames Gateway Development Corporation to establish a Thames Gateway Heat Transmission Network that will supply heat from Barking Power Station to Barking Town Centre and other regeneration areas.

**Task 17.a** - Produce Implementation Plan and progress the Heat Transmission Network.

**Action 18:** If an energy-from-waste CHP plant is the preferred low carbon heat source, determine the feasibility of setting up an energy-from-waste CHP plant on the edge of the town centre.

**Task 18.a** - Earmark site for a large CHP plant near the town centre in the longer term.

**Task 18.b** - Continue discussions with Shanks on prospects for utilising the waste fuel from the Jenkins Lane MBT plant.

**Task 18.c** - Hold exploratory talks with Energy Power Resources Ltd, Sembcorp and Novera as to the development of a biomass or energy from waste power CHP plant.

**Task 18.d** - Assess potential for a joint biomass and energy from waste CHP plant.

### Embedding the Energy Action Area Requirements within Key Development Projects

**Action 19:** For all regeneration sites in Barking Town Centre allocate actions for ensuring implementation of the Energy Action Area requirements.

**Task 19.a** - LBBD to determine the potential to which different developments proceeding in the

town centre can incorporate the Energy Action Area requirements, focusing on the sites that the Council owns where high standards can be ensured.

**Task 19.b** - Community heating and renewable energy requirements should be indicated as a high priority at all stages of the regeneration process, including the masterplanning and development brief stages.

**Task 19.c** - Ensure that developers have adequate energy strategies for utilising PV and wind power, for implementing intermediate heating options and eventual connection to the town centre community heating system.

**Task 19.d** - For developments at a more advanced stage, utilise Section 106 Agreements to incorporate Energy Action Area requirements.

### Action Plan for Upgrading Existing Buildings

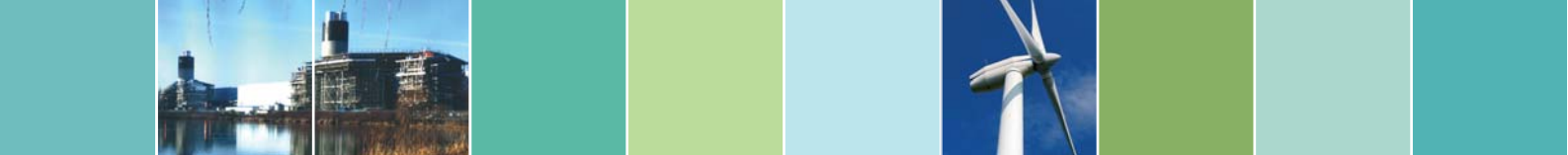
**Action 20:** Work with energy efficiency delivery bodies to implement a pro-active energy efficiency and renewable energy installation programme across existing council and private properties within the Barking Town Centre Energy Action Area.

**Task 20.a** – Appoint dedicated project manager to oversee energy efficiency programme for existing buildings in Barking Town Centre.

**Task 20.b** - Co-ordinate with existing structures/ delivery partners such as Warm Zones to bring together insulation and renewable energy funding streams within the Energy Action Area.

**Task 20.c** - Commission a more detailed feasibility survey of retro-fit renewables and energy efficiency measures on existing buildings.

**Task 20.d** - Establish tools to provide support for residents/businesses/organisations in existing buildings, such as a helpline and dedicated webpage.



## Promoting and Marketing the Energy Action Area

**Action 21:** Ensure engagement and buy-in from all stakeholders, and promote the Energy Action Area vision to the positive image of Barking Town Centre.

**Task 21.a** - Integrate the vision & objectives of the Energy Action Area within the marketing strategy and materials for the regeneration plans for Barking Town Centre.

**Task 21.b** - Consult on development proposals and the Energy Action Area in general, providing education on renewables and community heating as part of developments.

**Task 21.c** - Encourage the inclusion of energy representatives from residents and businesses, carry out information campaigns, provide information on funding sources, and deliver education on community heating in areas of existing buildings.

**Task 21.d** - Establish partnerships between relevant officers and local delivery agencies to ensure that programmes to encourage behavioural changes are developed.



# 1. Introduction

## 1.1 Background

Barking Town Centre (BTC) is one of four areas in London to be awarded Energy Action Area status by the London Energy Partnership (LEP). SEA/RENUE were appointed by the London Borough of Barking and Dagenham in December 2005 to develop a route map to implementing the Energy Action Area and provide a toolkit for other Energy Actions Areas to replicate this. This implementation plan was adopted by LBBD in August 2006.

This document represents the final report of the work on the BTC Route Map, combining all aspects of the brief: defining the Energy Action Area, production of community heating guidelines and upgrading existing buildings, funding, financing, ESCos, milestones, the pressures on developers, and the role of private sector partners.

## 1.2 Methodology

The approach to this work was structured around the original brief and separated into three stages. At each stage a report was produced and submitted for comment. Presentations were made to the steering group at each stage. A number of options considered in previous discussions have now been deleted from this final report or attached as appendices now that options have either been agreed or eliminated.

The initial information was gathered through:

- analysis of existing literature and policies;
- a series of meetings and interviews with key individuals and groups;
- a brief external survey of Barking Town Centre and the Barking Riverside area up to Barking Power Station.

Analysis of the area was conducted using GIS and MS Excel.

Meetings and interviews were held with:

- Development Teams;
- Key officers at LBBD;
- Representatives of the other Energy Action Areas;
- London Thames Gateway Development Corporation;
- Local stakeholders.

## 2. Defining the Energy Action Area

### 2.1 Key Characteristics & Objectives

Energy Action Areas are an initiative first put forward by the Mayor of London in his Energy Strategy for London. When determining what the key characteristics should be, reference obviously needs to be made to the Mayor's original intentions.

The Mayor's Energy Strategy describes Energy Action Areas as:

"well-defined geographical areas which can act as showcase low-carbon communities, demonstrate a range of sustainable energy technologies and techniques, and provide a means of targeting resources. They could act as a focus for improving energy efficiency in buildings, for example, integrating sustainable technologies and incubating local skills development. This approach would add value and profile to projects, generate nodes of good practice, and provide models for the rest of London and other urban areas to follow."

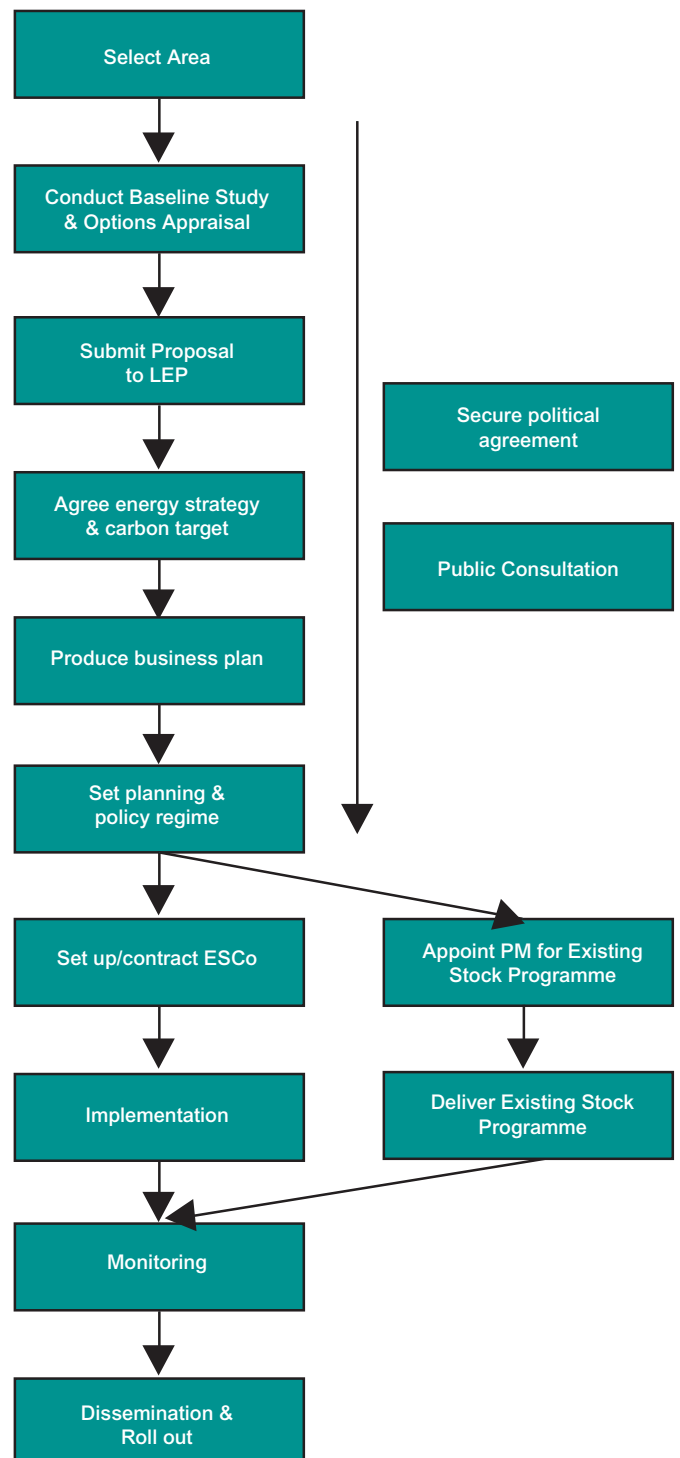


Figure 1: Key Steps to Implementation of an Energy Action Area

## 2.2 Barking Town Centre Energy Action Area Target

We recommend that LBBB set an overall target for reducing CO<sub>2</sub> emissions by 11% by 2020, achieved with a 75% increase in the number of homes. This overall target figure includes a 32% reduction target for all new developments in the town centre compared to 2006 Building Regulations.

It is recommended that the reduction target is set on the basis of a combination of the following:

- Community heating for all new developments with connection to Barking Power Station as a minimum but with SRF or pure biomass CHP as an ideal (to reduce emissions by 22% in new developments)
- 10% on site renewable requirement through electricity generation measures on new developments (in addition to any biomass CHP that might be provided)
- Cost-effective energy efficiency measures to the existing stock (to reduce emissions from existing buildings by approximately 16.5%)

Emissions calculated for the Low Carbon Options Study for all of BTC are 45,580 tonnes per year, of which 31,659 t/yr is made up by the building stock that will not be redeveloped. The table below shows the emissions reduction based on the above strategy ie heat from Barking Power Station to only the newbuild, 10% (non-thermal) renewables on newbuild and the application of energy efficiency and solar thermal measures to the existing stock. This would give a carbon reduction of 11% over the existing baseline.

Sector	Measure	CO <sub>2</sub> tpa
All	Baseline	45,580
All	Baseline BAU	52,563
Newbuild	10% Renewables	-2,090
	Heat from Barking PS	-4,500
Non-Regen Area	Energy Efficiency	-5,218
All	New Total	40,755
All	% CO <sub>2</sub> saving	11%

Table 3: Potential CO<sub>2</sub> Emissions Reductions – Minimum Target Option

The table below shows the potential saving if heat from Barking power station is also delivered to the buildings that are not to be redeveloped. In this case a 42% saving above the baseline is possible. The energy efficiency figures are lower in this case as not all measures will still be appropriate.

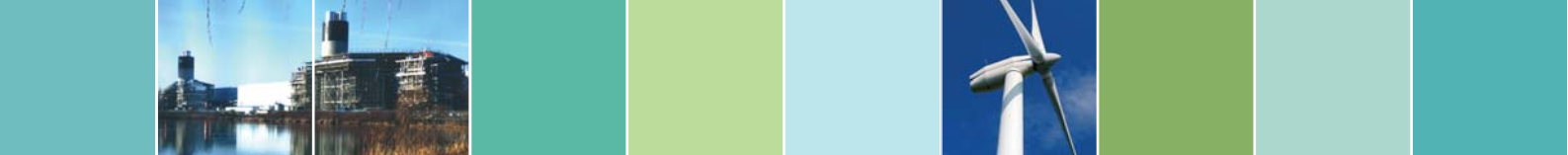
Sector	Measure	CO <sub>2</sub> tpa
All	Baseline	45,580
All	Baseline BAU	52,563
Newbuild	10% Renewables	-2,090
	Heat from Barking PS	-4,500
Non-Regen Area	Energy Efficiency	-4,488
	Heat from Barking PS	-14,958
All	New Total	26,527
All	% CO <sub>2</sub> saving	42%

Table 4: Potential CO<sub>2</sub> Emissions Reductions – Higher Target Option

**Action 1:** LBBB and regeneration partners should adopt an 11% overall CO<sub>2</sub> reduction target for Barking Town Centre Energy Action Area for 2020 as part of corporate and regeneration policy. This reduction target would be achieved with an approximate 75% increase in housing units.

**Task 1.a** - Promote and communicate the vision and objectives of the Energy Action Area to all regeneration partners.

**Task 1.b** - Hold an Energy Action Area Implementation Plan launch event with all regeneration partners and stakeholders.



## 2.3 Visible Landmarks

### 2.3.1 Visible features for the Energy Action Area

One of the areas in Europe with the largest concentration of sustainable energy technologies is the City of Freiburg in Southern Germany. The determination and passion amongst the community to implement sustainability has sprung in part from a desire to avoid the construction of a proposed nuclear power plant near the city. Some of the images from around the city are shown in the sections that follow, along with iconic sustainable energy developments from other locations. These highly visible, eye-catching uses of technology could be used to signify that a visitor is entering the BTC Energy Action Area.

### 2.3.2 Solar multi-storey car park

Although a multi-storey car park is an unlikely representation of sustainability, the building in Freiburg shows how renewable energy integration can have a very positive impact on the aesthetics of what are normally very unattractive structures. The saw-tooth pattern of photovoltaics (PVs) on the car park roof provides a very attractive and striking profile.

It is recommended that the 5-storey car park planned for BTC incorporates PV in a similar manner.



Figure 2: Multi-storey car park<sup>3</sup>

### 2.3.3 The solar factory

Partly as a result of the emphasis placed on renewable energy in Freiburg, a solar PV module manufacturing facility chose to locate in the city. The factory itself is designed with a large PV clad façade, using PV for solar shading.



Figure 3: Solar Factory, Freiburg<sup>4</sup>

### 2.3.4 The solar tower

The solar tower is another striking demonstration of renewable technology that is obvious to any visitor to Freiburg. Around 40% of the south facing side of the tower is clad in PV modules. A similar PV cladding development has recently been conducted in Manchester as a retro-fit application by the Co-operative Bank.



Figure 4: Street lighting that incorporates a solar panel

<sup>3</sup>Situated in Freiburg, Germany. Source: [www.ise.fraunhofer.de/english/fields/field1/mb5/projects/project4.html](http://www.ise.fraunhofer.de/english/fields/field1/mb5/projects/project4.html)

<sup>4</sup>Source: [www.solar-fabrik.de/fotos/4\\_seite.htm](http://www.solar-fabrik.de/fotos/4_seite.htm)

### 2.3.5 Wind turbines

Wind turbines could also provide an opportunity for an eye-catching landmark within the Energy Action Area.



Figure 5: Examples of urban wind<sup>5</sup>

### 2.3.6 Solar street furniture

Solar can be relatively easily integrated in to street lamps and other street furniture. This particular system has been designed for street and park furniture in South Australia. The armature design retro fits an existing light head and provides a suitable mounting surface for 1.2m x 1.7m solar panel.



Figure 6: Street lighting that incorporates a solar panel<sup>6</sup>

### 2.3.7 Large-scale CHP Plant

This energy from waste CHP plant was designed by architect Hundertwasser.

Whilst an incineration plant is not proposed for BTC, a large CHP plant for BTC might be given a similar makeover.



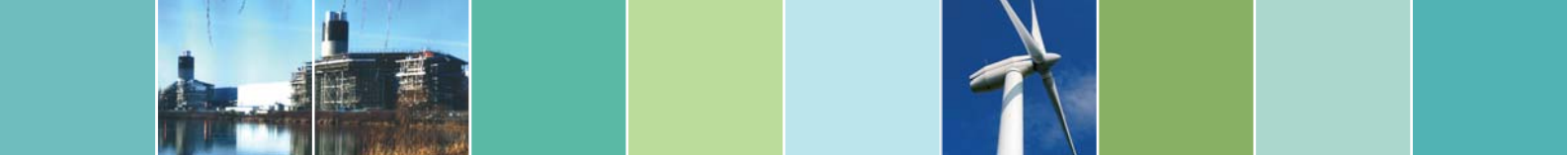
Figure 7: Vienna's Waste to Energy CHP Plant

**Action 2:** Identify a number of sites for landmark renewable energy installations in the town centre to provide a visual presence for the Energy Action Area.

**Task 2.a** - Assemble a list of locations for stand-alone wind turbines, landmark buildings and renewable options for street furniture.

<sup>5</sup>600W turbines on rooftop, Japan, source: [www.provenenergy.com](http://www.provenenergy.com), and small wind turbine at a Primary School in Lanarkshire, source: [www.scotland.gov.uk/library5/education/csbo-08.asp](http://www.scotland.gov.uk/library5/education/csbo-08.asp). Accessed December 2005

<sup>6</sup>Source: [www.arketype.com.au/urban\\_solar.htm](http://www.arketype.com.au/urban_solar.htm)



## 2.4 Incubating Local Skills Development

The development of local skills could be implemented through local labour into construction initiatives, identifying the range of sustainable energy skills that will be needed for the development and providing training for local people to meet these requirements.

The employment and skills impacts of regeneration or refurbishment schemes are often not considered separately. It is simply assumed that the work will lead to beneficial side effects in these areas, requiring no special intervention.

However some of the skills required are quite specialised and may not exist to any great degree. A concerted programme to train local people may provide better value to the contractor as well as benefits to the local community. This has been demonstrated in Aberdeen.

Aberdeen Heat and Power (AHP) is an ESCo set up by Aberdeen City Council to develop combined heat and power and district heating in Aberdeen. As part of the development of district heating, AHP identified a skills gap in the installation and maintenance of district heating. The company partnered with a local training provider to develop a skills base in this area. AHP now subcontracts the maintenance of the scheme to the company they formed. AHP consider the local company to be better value than existing alternatives, providing better quality services at a lower cost.

When the Energy Action Area becomes established, local skills development should be considered for Barking Town Centre. Links could be made with Building East which has already been set up to ensure local construction companies have the right skill base to take advantage of the large construction projects in the Thames Gateway.



## 3. Developing Organisational Framework and Capacity

### 3.1 Ensuring an Effective Approach at LBBB

There will be many departments involved in the delivery of the aims and objectives of the Energy Action Area. In Section 4 it is recommended that the aims be incorporated into the Corporate Plan to help reinforce the Energy Action Area objectives, both in terms of increasing visibility and also in making it a programme that the borough has to report on annually. However, it will not be enough to simply report on progress, due to the complexity of the task. Some areas will need more central co-ordination of outside agencies, such as the programme for existing stock improvements and the behavioural change programme, for which a dedicated project manager should be appointed.

It is envisaged that officers from the following departments/units will need to be involved to varying degrees:

- Environmental Sustainability
- Area Regeneration
- Development Control
- Building Control
- Economic Development
- Housing
- Press Office

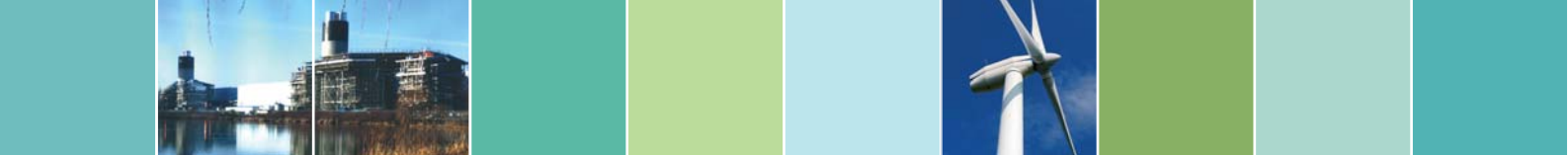
However, it is also likely that other departments will need to be involved at the appropriate time. In order to ensure that all of these departments have an input to the implementation of the Energy Action Area, and that there is no duplication of effort, it is advisable to create an Energy Action Area steering group within the council with representation from all relevant departments. In order to increase awareness, it is also advisable to involve an elected member, especially one that has a planning remit.

The officers involved should ideally be of different levels, and include at least one director, although it is recognised that this may not be practical on a day-to-day basis. This should therefore be a working group formed of all representatives, who can steer the work of the wider team. Current members of the Implementation Plan work steering group should be part of any new steering group set up.

**Action 3:** LBBB should put in place measures to ensure effective project management of the cross-cutting actions and implementation of the Energy Action Area.

**Task 3.a** - Form an Energy Action Area steering group with representation from all parts of the Council and partner organisations that will have a role in implementing the Energy Action Area.

**Task 3.b** - Establish a dedicated team for delivering the Energy Action Area, and agree responsibility for each of the Actions in this Implementation Plan.



### 3.2 Training and Support

It is also recommended that training and support be provided to ensure LBBB and other stakeholders understand the motivation behind the Energy Action Area, the measures available and the associated benefits and considerations. The various departments of LBBB itself need to be aware of the Energy Action Area, the contribution they can make and be in a position to help those being required or encouraged to put in place the Energy Action Area implementation measures, such as developers, residents and businesses. For more detail on training and support, please see Appendix 2.

**Action 4:** Provide training and support to aid Energy Action Area implementation.

**Task 4.a** - Produce a leaflet for developers that states clearly the objectives and requirements of the Energy Action Area for development in the town centre.

**Task 4.b** - Hold a seminar with prospective developer and design teams working in Barking Town Centre to enable the rationale behind the Energy Action Area requirements to be fully explained.

**Task 4.c** - Consider providing practical support for developers, architects and construction companies to both increase understanding and ensure compliance with Energy Action Area requirements. This support could take the form of an advice line, access to consultants and training seminars.

## 4. Setting Planning & Policy Context

### 4.1 Local Policy Framework

Below is a breakdown of the local policy framework which affects the Barking Town Centre Energy Action Area. The key energy aspects of these policies are detailed in Appendix 3.

- Barking and Dagenham Energy Strategy (Sept 05)
- The Barking Code (May 04)
- Barking Town Centre Action Plan (April 2003)
- Barking Town Centre Framework Plan
- Barking Town Centre Interim Planning Guidance (December 04)
- Barking Town Centre Low Carbon Options Study (Sept 05)

### 4.2 Policy Development to Facilitate Implementation of the Energy Action Area

Current policies and strategies already go some way to supporting Energy Action Area implementation. However, there are some changes that would substantially assist in progressing the Energy Action Area implementation and achieving more widespread political support for its principles and aims.

#### 4.2.1 Embedding the EAA Objectives within the Local Development Framework

##### 4.2.1.1 Local Development Framework (LDF) and Planning Policy

The current development of the LDF presents an excellent opportunity for ensuring that the Energy Action Area's aims are supported and strengthened, and that more stringent enforcement and negotiation measures are incorporated into later stages of Barking Town Centre's regeneration. LBBDD needs to consider further planning policy which addresses heat provision for new buildings through connection to

community heating infrastructure.

It is essential that the LDF has specific measures in relation to the Energy Action Area, and that the Energy Action Area aims are enshrined within this document. The Barking Town Centre Area Action Plan (which will be a Development Plan Document within the LDF) should incorporate Energy Action Area policies for community heating and 10% renewable electricity generation.

**Action 5:** Ensure that the development policies within the Local Development Framework – and in particular the Barking Town Centre Area Action Plan – clearly specify the Energy Action Area requirements.

**Task 5.a** - LDF policies should require that all new buildings in BTC incorporate communal heating systems and the ability to connect to the community heat network at an appropriate time.

**Task 5.b** - LDF policies should require that in BTC 10% of buildings' carbon emissions are cut through electricity generating renewable energy technologies.

**Task 5.c** - LDF policies should require that all new buildings include easily visible real-time energy consumption displays to encourage energy-efficient behaviour.

**Task 5.d** - The LDF should ensure that use of renewables should not be allowed to reduce energy efficiency standards as proposed in the 2006 Building Regulations.



#### 4.2.1.2 Barking and Dagenham Corporate Plan

The Energy Action Area requirements should also be included in Barking and Dagenham's Corporate Plan. The Energy Action Area can help enhance the regeneration process and have a significant role in the economic development of Barking Town Centre by benefiting businesses and households with reduced fuel bills, especially in the face of rising fuel prices. Having specific mention in the Corporate Plan will reinforce the Council's commitment to the Energy Action Area, both in the minds of residents and developers who are active in the borough.

#### 4.2.1.3 Regeneration and Economic Development Strategies

The Economic Development Strategy outlines LBBD's aspirations to improve the competitiveness of the business sector, and the economic well-being of its residents. This is a good policy document within which to include reference to behavioural change. LBBD officers should be working with the public and businesses to empower them to reduce their environmental impact and their energy consumption in particular. These aims should be incorporated into this document, as a way to help meet the 2020 vision for a vibrant economy with a sustainable community. This will also assist officers in establishing and promoting schemes that will deliver practical advice to residents and businesses, such as: advice through the local Energy Efficiency Advice Centre (EEAC) or Sustainable Energy Network (due to be established in London to replace the EEAC network in 2007-8); and maximising the use of initiatives aimed at business, such as Carbon Trust programmes, and forthcoming LDA programmes.

**Action 6:** Ensure that all key policy documents take account of and enforce the Energy Action Area requirements, such as the Regeneration, Economic Development and Housing Strategies, all other regeneration and housing policies and plans, and the Barking & Dagenham Corporate Plan.

**Task 6.a** - Liaise with appropriate division to ensure requirements are included in key documents.

#### 4.2.2 Existing strategy and policy

Within current policies, there already exists some leverage to encourage developers to incorporate sustainable energy measures within their buildings. The new 2006 building regulations will apply to all developments in Barking Town Centre and in addition to being more stringent than the previous regulations, they also place more emphasis on enforcement and compliance. There is also the London Mayor's Energy Strategy, which sets targets for embedded generation within each of the 33 London Boroughs. Additionally, LBBD has signed the Nottingham Declaration on Climate Change, developed its own Sustainable Energy Strategy, and produced Barking Town Centre Interim Planning Guidance which commits all major development within the town centre to generate 10% of energy needs from on-site renewable energy.

**Action 7:** Utilise planning conditions or planning gain to enforce community heating and 10% renewable energy (electricity) generation within all new developments in Barking Town Centre.

**Task 7.a** - Establish an Energy Action Area renewable energy funding pot, for developers to contribute to off-site renewable energy schemes where 10% renewable generation is not possible due to physical limitations.

**Task 7.b** - Determine the cost per kWh that is acceptable for developers to pay.

**Action 8:** Ensure stringent enforcement of the Building Regulations 2006, to ensure that the high standards met at the planning stage are not breached in practice by lack of understanding on the part of the contractors.

**Task 8.a** - Training schemes for site workers may be offered in partnership with other agencies, such as DCLG, in order to reduce non-compliance through lack of understanding.



### 4.3 Managing Pressures on Developers

Appendix 12 details the pressures facing developers, how these pressures impact on energy matters in any given development, and how these might be addressed or overcome. Conclusions of this work are that:

- Without clear guidance, developments in Barking Town Centre will not be compatible with the aims of the Energy Action Area. This is hardly surprising given that developers are currently unaware of the strategic aims of the Energy Action Area and the potential for community heating. Developers and their design teams will see their buildings in isolation and understandably attempt to meet requirements set by planning and building regulations within the site boundaries. Currently this appears to lead to a choice of ground source heat pumps and/or solar thermal.
- The EAA requirement that developments cut their carbon emissions by 10% through renewable electricity generation only will impose significant costs on developers. In the case of the Foyer this amounts to perhaps £230,000 to meet 4% of CO<sub>2</sub> emissions - though with grant funding this could be reduced to a contribution of perhaps £100,000. In light of this, some flexibility may be needed in implementing the requirement.
- Developers' design teams have their own philosophies about sustainability which reflect the spread of ideas within the architecture and engineering professions as well as the general public. These diverse philosophies will not always be compatible with the aims of the Energy Action Area. Both education and strict planning requirements (and enforcement of them) will be required to overcome this.
- Building-mounted wind has significant design and planning implications and needs to be thought through and integrated early on in the design process. There also exists a concern that building-mounted wind is an unproven technology.
- Without clear planning policies within the LDF, developers in Barking Town Centre may use the 10% renewables requirement to offset the need for higher energy efficiency standards under the 2006 Building Regulations.



## 5. Establishing an ESCo to Deliver the Energy Action Area

### 5.1 The Two Key Elements of a CHP System

This section of the report examines the organisational structures and mechanisms that can be used to develop the Energy Action Area, drawing on examples from elsewhere in the UK. It proposes establishing an Energy Services Company (ESCO) to design, build, finance and operate the community heating network in Barking Town Centre.

The regeneration of Barking Town Centre involves a number of different parties, such as developers, housing associations, the local authority and the London Thames Gateway Development Corporation. What is so special about the Energy Action Area that requires involvement from another contributing body? The central element of the low carbon strategy is a community heating network to deliver low carbon heat from Barking Power Station or a new CHP plant. There will also be a significant quantity of renewable energy installations required to meet the 10% generation target and there will be considerable activity in terms of retrofitting energy efficiency measures to existing buildings. A specialist delivery vehicle is required to finance, install and operate this sustainable energy infrastructure.

#### 5.1.1 Power plant operator

The Low Carbon Options study identifies 3 key sources of low carbon heat and power:

- Biomass CHP plant;
- Energy from waste CHP plant (taking waste SRF product from the Jenkins Lane MBT plant);
- Waste heat from Barking Power Station.

Different partners will be required in each case. In the case of Barking Power Station, one of the partners already exists (the power station operator), but for either a pure biomass or SRF plant a new partner will be required. There are a

number of companies involved in the development of SRF gasification plants, but Novera are building and operating the first plant in London. Shanks, who operate the two MBT plants from which SRF would be sourced, have suggested that they might consider either taking an equity stake or even developing a plant themselves. For a pure biomass plant the leading UK company is Energy Power Resources Ltd<sup>7</sup>. They have developed a large number of biomass plants using a range of different feedstocks across the UK. Sembcorp have also just developed a plant of a similar scale to the one envisaged for BTC using a range of biomass sources. An alternative arrangement would be to develop a single plant fuelled by both woody biomass and SRF.

#### 5.1.2 Heat network

A plant of the scale recommended is a specialist operation and is it not envisaged that the power plant operator would be vertically integrated i.e. that they would engage in selling heat (or power) directly to consumers. It is likely that a separate company will be required to operate and maintain a heat distribution network and sell heat to consumers. This network will also need to be financed. This is the most complex area of development as there is so little UK experience and it is here that an ESCo will be required. The following sections explain the principles of an ESCo and put forward a possible model for Barking Town Centre.

<sup>7</sup>[www.eprl.co.uk](http://www.eprl.co.uk)

## 5.2 What is an ESCo?

The term ESCo (Energy Services Company) is used to describe a wide range of different energy supply and energy efficiency arrangements. Essentially an ESCo does not supply just gas and electricity, but rather the services that energy provides, i.e. heat, light and ultimately comfort.

This is part of a general approach that has been put forward as a way of using market systems to achieve more resource efficient outcomes. When a company provides a service rather than a manufactured product, this gives the service provider an incentive to reduce the costs associated with the use of the product. For instance some lift manufacturers now sell a vertical transport service, charging for each metre travelled by the lift rather than simply charging for supply of the lift itself. This incentivises the company to manufacture for longevity and energy efficiency and maintain the lift to a high standard. Similarly some companies now sell floor covering

services, rather than carpet. Rather than replacing the whole carpet they simply replace tiles that are worn and have an incentive to produce a durable product rather than a shortlived one.

In the case of energy as the diagram below shows, a company supplying fuel has little interest in the efficiency of the boiler. In fact, it will arguably have an interest in the efficiency being low to maximise sales of fuel. An ESCo supplying heat or comfort has an incentive to minimise the cost of the heat provision and therefore improve the efficiency and longevity.

Inherent in all of this is the assumption that the service provider will be better placed to optimise the efficiency of the service - either through better access to finance, knowledge or the institutional capacity to deliver. In the case of combined heat and power an individual householder simply does not have the capacity to deliver a communal heat network, let alone the knowledge or finance.

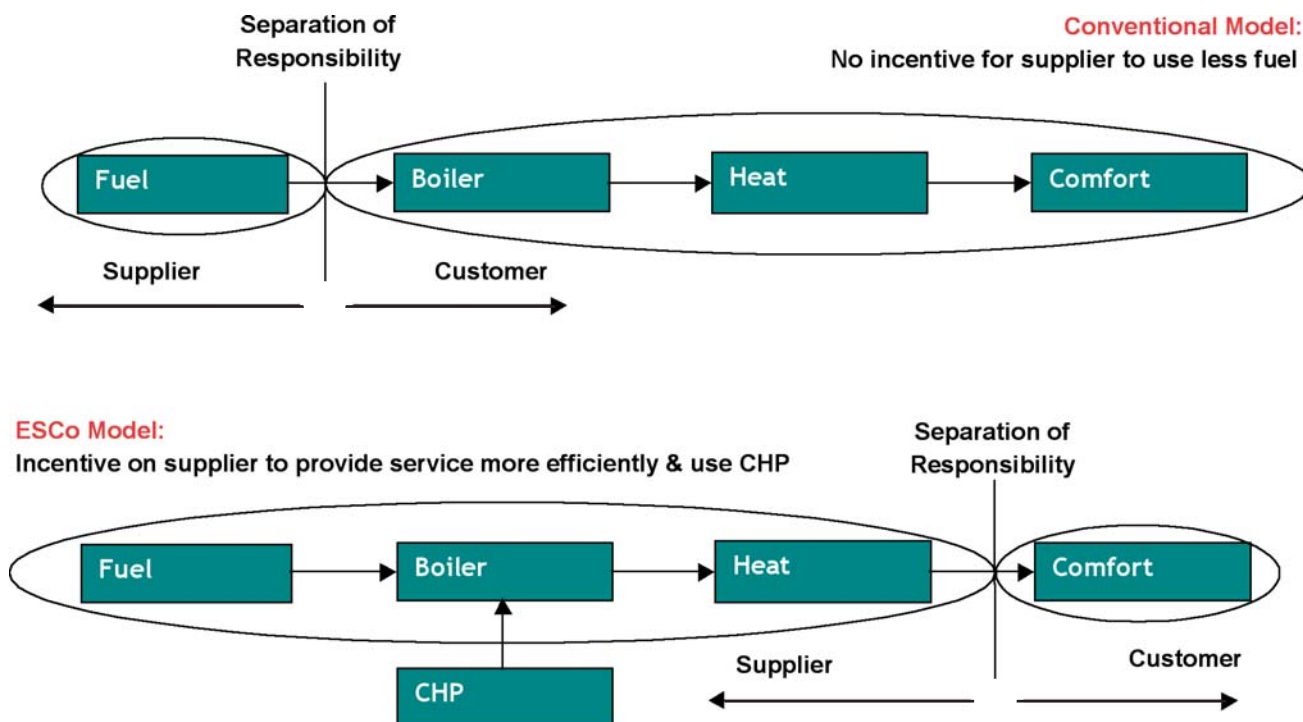
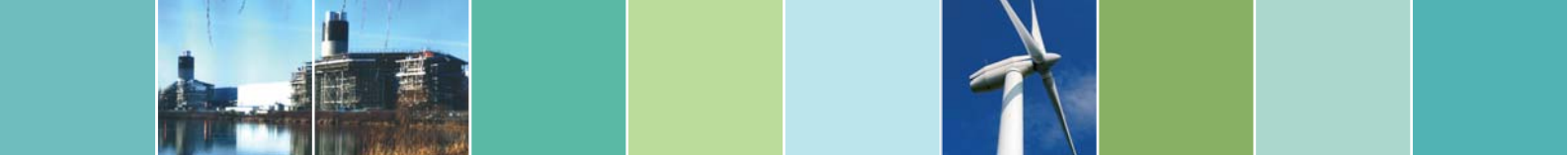


Figure 8: Conventional Model and ESCo Model



## 5.3 Possible Models for Barking Town Centre

There is a range of possible options for Barking Town Centre to follow. Some of these are explored below.

### 5.3.1 Barkantine Heat and Power

Barkantine Heat and Power (BHP) was set up through a Pathfinder PFI to serve 530 homes on the Barkantine Estate with heat from a 1.4MWe CHP plant in the London Borough of Tower Hamlets. Barkantine Heat and Power is owned by London Heat and Power which is in turn a subsidiary of EDF Energy. It started operation in March 2001.

BHP is responsible for managing the energy centre which houses the CHP, boiler plant and thermal store for a period of 25 years. At the end of the 25-year term, the Energy Centre reverts to Tower Hamlets Council's ownership, at which time the plant will be refurbished.

Whilst Tower Hamlets are reportedly very satisfied with BHP's management of the scheme, it seems the new parent company EDF Energy have shown little desire to develop further schemes (until the recent announcement of partnership with the Climate Change Agency). According to LB Tower Hamlets negotiating the PFI was a tortuous process and later schemes have been done in-house. A separate company, Dalkia, are responsible for maintenance of the plant. A tenant liaison officer is employed by EDF Energy on site.

### 5.3.2 Southwark

London Borough of Southwark own four CHP plant, (the largest of which is 1MWe) and around 90 boiler houses serving a total of 20,000 dwellings and a number of non-domestic properties including offices, a health centre and a number of shops. Maintenance is provided by 3 contracting companies but managed in house by Southwark Technical Services.

Heat is provided unmetered to residents using a charging formula based on the number of bedrooms. The CHP and networks have been financed using a combination of Southwark's own resources with some funding from EEC for CHP plants.

### 5.3.3 Woking - Thamesway Ltd

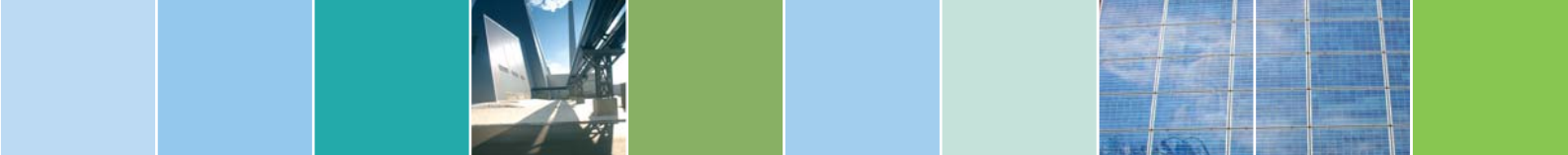
Woking set up a wholly owned company who then own a minority share in another company along with a Danish investment company who own the remaining 81%. The company is called Thamesway Ltd. The Woking Council Energy Manager is the director of the company. The Danish company have recently withdrawn and the ESCo is now wholly owned by Woking Council.

Woking have developed a number of CHP schemes using this model, believed to total around 5MWe. Finance has come in part from Danish investors and in part from the ability to keep a proportion of savings made.

### 5.3.4 Aberdeen Heat and Power

Aberdeen Heat and Power (AHP) were set up as a separate not-for-profit company by Aberdeen City Council. AHP is a company limited by guarantee and the board is made of local community representatives, and chaired by Mike King from the Combined Heat and Power Association. Ownership of heating components within the properties remains the property of the council leaseholder or RSL, but the heat network, CHP and energy centre is owned by Aberdeen Heat and Power.

The rationale behind setting up a special purpose vehicle was to maintain independence and control. Any surpluses made are either ploughed back into the scheme or used to lower fuel bills. The company currently employs no staff but effectively uses a combination of a consultant (Bill Rowe), financial services from council and the time of the Council's HECA officer. In the longer term it is their intention to employ dedicated staff.



AHP uses a company known as a consolidator to deal with electricity sales and the sale of electricity direct to tenants has recently been initiated. Like the Southwark scheme the council charges for heat with rent on a flat rate basis. The council then collects heating payments and in turn pays AHP.

Aberdeen Heat and Power provides heat to just over 1000 home as well as a swimming pool and sheltered housing, and further expansion is envisaged.

### 5.3.5 Southampton

Southampton City Council have now developed 2 separate CHP based ESCos. The first was a straightforward design, build, finance and operate model using an existing company called Utilicom. The scheme developed from a geothermal heat source in the centre of Southampton and heat network was developed from there to Southampton's own offices and other customers in the city centre. A 5.6MWe CHP plant has also been added to the scheme.

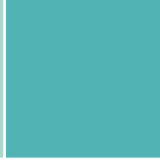
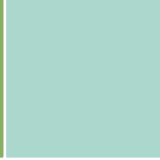
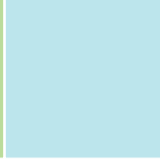
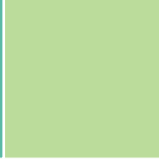
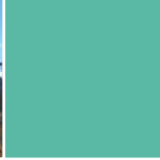
The second more recent Southampton development at Southampton Millbrook area has followed a similar model to the Aberdeen scheme. A company limited by guarantee has been established to oversee the development of a much larger heat network and the development of a 25MWe biomass fuelled CHP plant.

### 5.3.6 Transfer of risk



Figure 9: Map of ESCo Case Studies

The above figure attempts to map out the case studies described above in terms of the public sector involvement. Generally speaking there is a trade off between the transfer of risk and cost of capital. The business plan assumptions have been made on the basis of 3.5% discount factor. A fully private sector ESCo would expect to see returns of around 10%.



### 5.3.7 Other existing ESCo options

#### 5.3.7.1 Connective Energy

The Carbon Trust has a new initiative called Connective Energy. Connective Energy is a 100% owned subsidiary of the Carbon Trust. It has been set up to finance, own and operate connections between existing heat sources and existing heat loads. They would do this on the basis of 10% return on investment. They are a new venture and as yet have no schemes in the ground. This is a source of higher cost finance than public sector finance at 3.5%.

#### 5.3.7.2 London Climate Change Agency

The Climate Change Agency has an emerging role in the field of sustainable energy in London. The Agency was set up through the London Development Agency. The business plan for the Agency has not yet been announced and it is not clear what this will be but the model being proposed here is unlikely to fit with the current small gas CHP private wire favoured by the Agency.

#### 5.3.7.3 Utilities

Barking Power are one possible source of heat, but are unlikely to wish to engage in heat sales.

EDF Energy have historically been involved in CHP at the Barkantine scheme as outlined below but have shown little appetite to develop further schemes as yet, though their recent alliance with the Climate Change Agency may herald a different approach.

#### 5.3.7.4 ESCos

A number of private sector ESCos exist such as Utilicom, Vital Energi, EcoCentraGen who might be willing to take forward such as scheme. These would design, build, finance and operate a scheme.

## 5.4 A Barking Town Centre ESCo Model

The diagram below sets out the possible structure and role of a Barking Town Centre ESCo. Essentially it would purchase heat from one or more possible heat utility companies. This could either be done directly or through a separate company in charge of operating a transmission network. In Copenhagen a consortium of boroughs and the city council have formed a company for this purpose. Heat would be sold on to local residents and businesses. Many of the ESCo responsibilities could be subcontracted in the short term but in the longer term the company could develop in-house capabilities to deliver project management, operation and maintenance and metering and billing. The ESCo would be responsible for the operation and maintenance of the local standby and peak load plant.

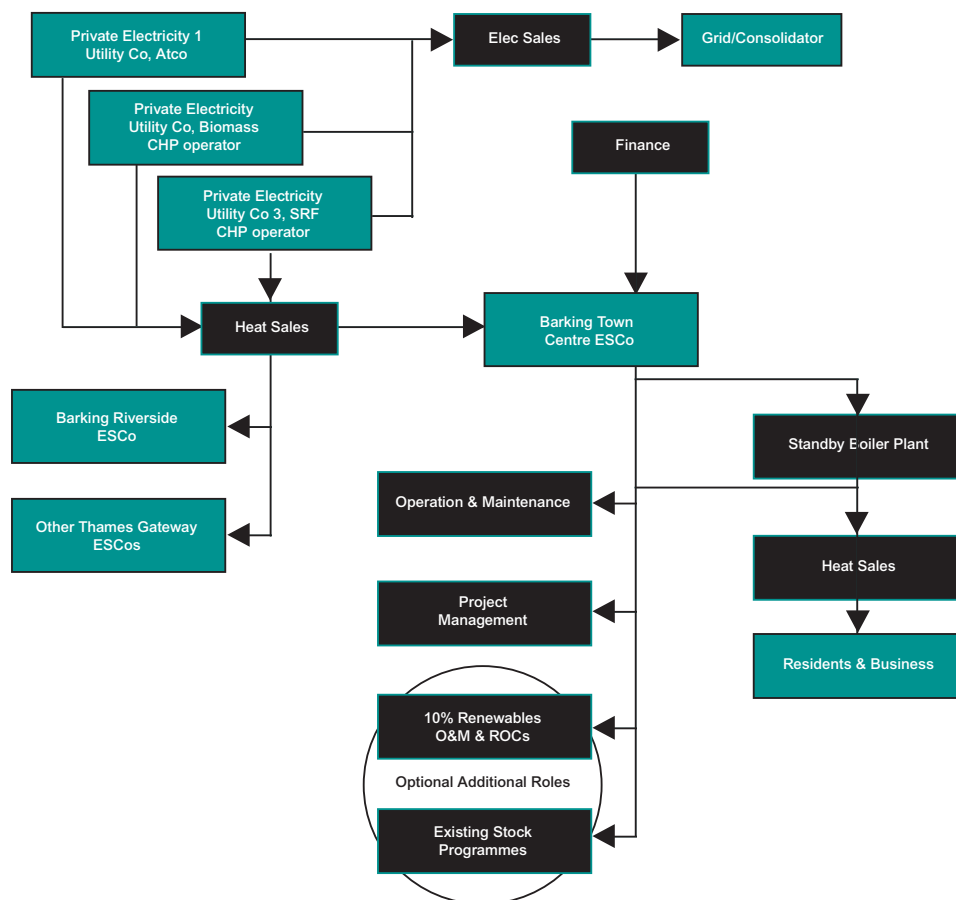


Figure 10: Potential Model for BTC ESCo

## 5.5 Possible ESCO Membership

### 5.5.1 Introduction

If LBBB chose to progress the option of a Barking Town Centre ESCo on the model of Aberdeen or Southampton Millbrook there are a range of possible organisations that could form the board of the ESCo besides LBBB itself.

### 5.5.2 Housing Associations

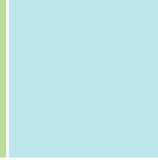
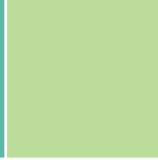
A number of Housing Associations are involved in the BTC redevelopment. Housing Associations have in other areas been responsible for the management and operation of community heating. The chief executive of a local Housing Association would bring business administration expertise to the board of an ESCo as well as representing local interests.

### 5.5.3 Community Development Trusts (CDT)

A Community Development Trust is envisaged to manage communal spaces in Barking Town Centre in the Gascoigne Estate area and as community heating constitutes a further communal facility requiring management this could be seen as part of the CDT's remit.

### 5.5.4 London Thames Gateway Development Corporation (LTGDC)

The LTGDC is extremely interested in the development of a heat network from Barking Power Station and is currently investigating suitable approaches for the delivery of a London Thames Gateway heat network. LTGDC is also highly supportive of the Barking Town Centre Energy Action Area.



### 5.5.5 Thames Gateway London Partnership (TGLP)

The TGLP is a strategic partnership supporting the regeneration of the Thames Gateway and the many organisations involved the regeneration process. The TGLP may well want to be involved in the Barking ESCo and support the development of the Barking Town Centre Energy Action Area.

### 5.5.6 Industry Champions

There are a number of individuals who may wish to become involved in the delivery of a CHP based ESCo. In Southampton, Michael King from the CHPA (Combined Heat and Power Association) has considerable expertise in this area and is a director on their board.

### 5.5.7 East London University

A representative from the engineering department at East London University or a local higher education college might offer expertise in this area as well as being a customer of the wider network in the longer term.

### 5.5.8 Residents' Associations

A representative from local residents' association would enable residents to have a say in charging mechanisms and the provision of a critical service.

## 5.6 Conclusion

The development of a heat network served by combined heat and power will require a delivery organisation. It is recommended that LBBD set up an Energy Services Company (ESCO) or contract with an existing ESCo to deliver the construction, operation and maintenance of the system, as well as retail the heat. The terms of reference for the ESCo could also include the delivery of energy efficiency initiatives to the existing building stock and responsibility for claiming ROCs for the renewable energy systems installed as part of the 10% requirement within BTC. There are a number of successful models set out in this section that LBBD could draw on to develop an ESCo. The choice of ESCo model will need to be developed over the coming months in consultation with all BTC regeneration partners.

**Action 9:** Develop a business plan for setting up an ESCo to deliver and finance the community heating system and shared renewable energy infrastructure.

**Task 9.a** - Establish the preferred ESCo model for the Council.

**Task 9.b** - Develop the legal framework for the preferred ESCo model.

**Task 9.c** - Develop the business plan and financing model for the ESCo.

**Task 9.d** - Recruit staff and Board of Directors for the ESCo.

**Task 9.e** - Establish the ESCo.

**Task 9.f** - Tender for private sector partner.

## 6. Utilising Funding & Financing Options

### 6.1 The Capital Cost associated with developing the Energy Action Area

The Low Carbon Options study calculated the additional capital costs for the low carbon strategies – these are based on the planned construction of approximately 7,000 new housing units over the next fifteen years. The findings are summarised in the tables below for the new build and the existing stock.

New Build	Technology / Heat Source		Capital Cost	Additional Life Cycle Cost 25 yrs <sup>8</sup>
Individual Boilers		£m	31.15	0.00
Heat Network & Stand-By Boilers	Barking Power Station	£m	37.50	6.07
CHP Plant & Stand-By Boilers	SRF CHP	£m	79.38	1.98
CHP Plant & Stand-By Boilers	Biomass CHP	£m	74.01	0.39
10% Renewables	50% Wind & 50% PV	£m	18.78*	11.93

New Build	Technology / Heat Source		Capital Cost	Additional Life Cycle Cost 25 yrs
Energy Efficiency Option	Insulation, Condensing boilers etc	£m	11.49*	5.74
Heat Network & Boilers	Barking Power Station	£m	19.65*	8.10

Table 5: Additional costs of low carbon measures for new build and existing buildings

\* Additional capital costs are shown for these options

<sup>8</sup>Compared to conventional individual gas boilers (if no capital grants are used)

## 6.2 Grant Funding

Community heating and CHP generally cost more to install, where an existing gas network is in place, than conventional individual boiler solutions. However, when the operational costs and revenues are compared over the longer term (the life cycle cost) they are often cheaper than the conventional alternatives. For Barking Town Centre the life cycle costs are in fact very similar for each individual option.

The life cycle cost for biomass CHP is similar to that for an individual boiler solution. However for the options for connection to the existing stock and the other heat source options there are both

additional capital and lifetime costs. This is also true for energy efficiency measures to the existing stock.

Unless a strategy is adopted whereby the developers or the eventual customers are asked to pay more for heat (and electricity) than they would have done had the development gone ahead with more conventional energy provision, then grant funding will be required.

There are a range of possible funding sources for these options. A summary of these is set out in Table 8, with a more detailed description available in the Appendix 4.

Mechanism	Acronym	Applicability	Value	Future variation	Total Value	Lifetime
Energy Efficiency Commitment	EEC	Subsidy to domestic energy saving & CHP	0.7-.9p/kWh	Unknown beyond 2008	£396m for EEC2	EEC2 2005-8 EEC3 2008-11
Levy Exemption Certificates	LECs	CHP & renewable elec can claim	Up to 0.43p/kWh	Increase with RPI	Unlimited	
EU Emissions Trading Scheme	EU ETS	Cap & trade system on 20MWh plant	Current price £6/tonne CO <sub>2</sub>	Market instrument – value of carbon	Limited by govt caps	Phase II to 2012
Low Carbon Buildings Programme	LCBF	Capital support for building integrated renewables and CHP	Varies depending on technology	Unknown beyond 2009	£80m	2006-9
Renewable Obligation Certificates	ROCs	Awarded to renewable generators	4.5p/kWh	Market instrument	Limited by % obligation	2016
Utility Green Funds	-	Capital grants for community renewables	Approx 50% capital cost	Unknown	£2m/yr nationally	Unknown
EU Funding Concerto	Concerto	Capital support for building integrated renewables and CHP & "Eco-building"	35% of capital cost	FP7 2007-2013 being agreed now	Around £3m per community	FP7 2007-2013 being agreed now
EU Intelligent Energy	Save, Altener, Steer	Support for large sustainable energy initiatives	50% of programme cost	FP7 2007-2013 being agreed now	Approx £50k per project	FP7 2007-2013 being agreed now
Carbon Trust Schemes	-	Business advice & support – includes free business audits	100% funding for business advice	Unknown	Unknown	Unknown
London Development Agency	LDA	Business advice & support	100% funding for business advice	Unknown beyond 2009	Unknown	3 years

Table 6: Summary of support mechanisms

None of the above programmes are fixed and are subject to continual review. New schemes could radically alter the funding framework.

## 6.3 Other Mechanisms

The most obvious local options are simply to require developers to incorporate these technologies into developments or require developers to contribute to the cost through Section 106 Agreements. Where this is not possible, the cost could be subsidised by accepting a lower value for the sale of LBBB owned land.

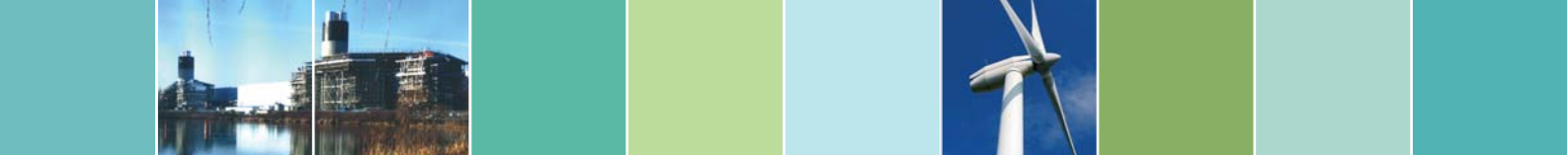
Alternatively the cost of the installation of the network could be recouped by increasing heat charges. New homes will anyway have much reduced heating requirements compared to the homes they will replace. Some of this reduction in heating charge could be used to subsidise the development of the heat network. This strategy will of course not be available to the extension of the heat network to the existing buildings where a reduction in heat charges will need to be offered to persuade consumers to connect.

## 6.4 Conclusion

Technology / Heat Source	Capital Cost £m	Carbon Saving CO <sub>2</sub> tpa	Capital Grant £m	Source	New Capital Cost £m	New Additional Life Cycle Cost 25 yrs £m
Individual Boilers	31.15	0			31.15	0.00
Barking Power Station	37.50	-4,500	1.57	EEC	35.92	4.66
SRF CHP	79.38	-4,603	1.57	EEC	77.81	Requires Ofgem ruling
Biomass CHP	74.01	-69,609	1.57	EEC	72.44	Requires Ofgem ruling
50% Wind & 50% PV	18.78	-2,090	8.57	LCBP, Green Fund	10.22	3.37

Technology / Heat Source	Capital Cost £m	Carbon Saving CO <sub>2</sub> tpa	Capital Grant £m	Source	New Capital Cost £m	New Additional Life Cycle Cost 25 yrs £m
Insulation, Condensing boilers etc	11.49	-4,488	0.44	EEC	11.05	5.3
Barking Power Station	19.65	-14,958	5.44	EEC	14.21	2.66

Table 7: Additional costs of low carbon measures for new build and existing buildings with grant funding



It can be seen from the table above that Energy Efficiency Commitment (EEC) and the Low Carbon Building Programme (LCBP) represent the two most important sources of grant support. If EEC funding is available at the level indicated by EDF, this represents a significant subsidy (around £7m) and means that the development of a heat network from Barking Power Station to both the existing and new build areas would cost only £7m more than the alternative over 25 years (assuming a discount factor of 3.5%). For the biomass option a ruling from Ofgem will be required as to whether this will qualify for EEC support. Other major sources of support, LECs and ROCs are already included in the original business case assumptions.

As part of the detailed business plan development work for the operator of the heat network, securing this funding stream will be critical. A ruling from Ofgem will probably be required to ascertain whether EEC support can apply to a biomass based CHP system. It will be impossible to secure funding for the lifetime of the scheme initially since the next round of EEC will only be available to 2011 and the details of this will only be fixed next year. Therefore a phased approach to securing EEC funding should be adopted. As EDF have a stake in Barking Power Station, they may be the most amenable EEC provider.

A critical factor in EEC funding is whether CHP will continue to qualify for “uplift” – effectively an additional 50% support in future rounds of EEC – also to what extent suppliers will be limited to achieving 10% of their target through uplift measures.

**Action 10:** Develop a ‘funding strategy’ for various elements of the Energy Action Area, including pump-priming for the establishment of the ESCo and funding for landmark renewable energy installations.

**Task 10.a** - Utilise the funding sources listed to identify and secure funding for different aspects of the EAA.

**Task 10.b** - Calculate set-up costs for the ESCo and compile funding bid/s to cover these.

**Task 10.c** - Identify most suitable funding pot/s, and submit funding bid for one or more landmark renewable energy buildings.

# 7. Implementing Community Heating in Barking Town Centre

## 7.1 Introduction

The vision set out in this report for Barking Town Centre Energy Action Area is of an area-wide heating system served by one or more CHP based heat sources. As part of the London Thames Gateway Regeneration framework, the Town Centre could become part of a wider heat network serving a number of London Thames Gateway development sites and incorporating a range of different heat sources.

The development of community heating and combined heat and power in Barking Town Centre raises a number of issues in terms of:

- design of the heat network;
- choice and location of heat sources;
- phasing of the heat network;
- routing of the heat network;
- the complementarity of other technologies and interaction with the planning system.

This section sets out how some of these issues have been dealt with elsewhere, explores a range of possible solutions, and recommends a specific way forward. Please see Appendix 5 for an introduction to the historical development of community heating schemes.

**Action 11:** Raise awareness amongst officers and Councillors about the installation and operation of modern CHP and community heating systems.

**Task 11.a** - Organise a visit for officers and Members to an existing community heating and CHP system in the UK.

**Task 11.b** - Ensure continuing professional development for officers working on the Energy Action Area in CHP, community heating and renewable energy.

## 7.2 Community Heating Guidelines

### 7.2.1 Introduction

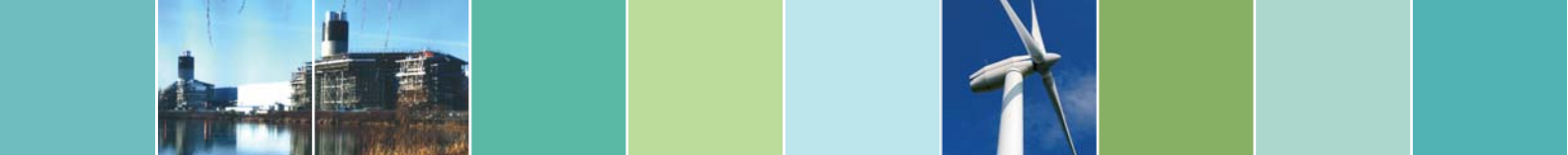
Schemes can start with the installation of a heat network linking buildings together, initially utilising fossil fuels. Once a viable heat network is established, renewable fuels such as biogas, wood-chip or other choices can feed heat into the system.

The physical elements of a community heating system are a central heat source, a heat distribution network and end-user installations in each dwelling. Installing the heat mains in conjunction with other main services would also be a cost effective strategy.

The Energy Action Area Options Study, carried out by PB Power, estimated the energy demand for existing buildings within the Barking Town Centre Energy Action Area, as shown in the following table:

Current Baseline	Gas MWh/y	Electricity MWh/y	CO2 tonnes/y	Gas %	Electricity %	CO <sub>2</sub> %
New Build Areas	42,339	13,667	13,921	27.5%	36.0%	30.5%
Existing Buildings	111,625	24,303	31,659	72.5%	64.0%	69.5%
B&D all Energy Action Area	153,964	37,970	45,580	100.0%	100.0%	100.0%

Table 8: Energy demand and CO<sub>2</sub> emissions for existing buildings



It is clear that the energy consumption of the existing housing/buildings areas represent an important part of the energy used by the whole Energy Action Area (see new build areas map in Appendix 7). According to the above study, most of the thermal energy for the new build sites will be required by the Gascoigne Estate and the Station Quarter areas (see heat map in Appendix 7).

The following table shows a summary of the energy demands and CO<sub>2</sub> emissions for the reference case as estimated by the Energy Action Area Options Study.

Gas & Power consumption	Gas MWh/y	Electricity MWh/y	CO <sub>2</sub> Tonnes/y
Axe Street	4,531	3,165	2,221
Town Square	2,182	1,524	1,069
Gascoigne Estate	17,263	5,204	5,521
Fresh Wharf	5,676	2,051	1,961
London Road & North Street	3,276	1,570	1,298
Station Quarter	18,089	12,557	8,834

Table 9: Energy demands and CO<sub>2</sub> emissions for the regeneration sites

The Gascoigne Estate is mainly a residential area while the Station Quarter is a mixed area, combining residential and commercial properties.



### 7.2.2 Community heating network

In order to connect different buildings, a heating network connected to the energy sources is required. The network would normally consist of pre-insulated pipes (or heat mains) that are buried in the ground in a similar way to gas or water mains.

This type of pipe system is covered by different European standards. They are very reliable, with service lives in excess of 30 years and produced by specialist manufacturers. They would normally include a leak detection system located within the insulation that helps to locate and solve the fault, which in turn will avoid corrosion of the pipes.

Modern pre-insulated pipes can withstand temperatures as high as 140°C, but this is not normal practice in current design as it is not usually economical for community heating. Lower supply temperatures, 90°C or lower, and low return temperatures (below 50°C) are preferred to reduce the pipe heat losses, prolong the longevity of the system and increase the efficiency of CHP.

Large community heating systems with high static pressures usually adopt medium temperature networks (up to 120°C) where the consumers are indirectly connected. Smaller-scale community heating systems are normally suited for lower temperature networks.

The design of the heat distribution network is fundamental to the economic viability of community heating, because it has a major impact on the capital and running costs. The network design affects costs as follows:

- Installation costs - An important proportion of the pipe installation costs (around two thirds) is related to digging and reinstatement. Costs could be minimised by selecting routes with low reinstatement costs or by optimising the network design. Pipes should be sized to allow for future needs.

- Running costs - The two main factors that affect running costs are distribution heat losses and pumping costs. Pipe losses can be reduced by choosing low flow and return temperatures. Pumping costs can be reduced by increasing the temperature difference between the flow and return water temperatures, and by using a variable flow system.

Economical optimisation is normally carried out when designing community heating networks. It involves the evaluation of capital costs, running costs and distribution heat losses. The idea is to minimise the life-cycle cost for the system.

As the BTC Energy Action Area will be developed in stages, it is likely that isolated networks will be developed with time and will be eventually connected to one or more CHP/boiler plants. Incorporating heat loads to existing networks requires careful hydraulic design. If the system is not well designed to accommodate this, it could compromise the development of the larger scheme.

In order to connect all the different sites, community heating networks should be developed in each regeneration site as they develop and connected later to a larger CHP plant in order to supply most of the heat and power for all the sites.

As the heat networks develop for each site, they would form the base for a bigger community energy network. For example, taking the Fresh Wharf estate, the following figure shows an illustrative heat network for the area and the phasing that has been proposed for the site development. A heat network could start in the middle and run through the development. The network could grow with the development, connecting different buildings. This network could be connected to others within the area through the whole BTC development.

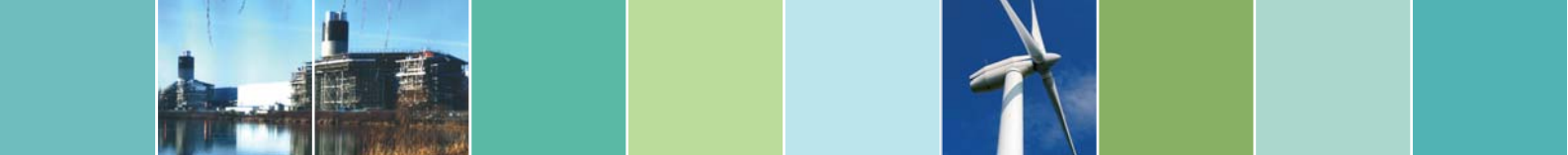


Figure 11: Proposed heat network and phasing for the Fresh Wharf development

If all the regeneration sites were developed into community heating areas, as shown in the next figure, they could be connected via a main heat network coming from a larger plant.



Figure 12: Individual heat networks for the regeneration sites

### 7.2.3 Interim measures for developing a community heating network

Whatever low carbon heat source is selected in the long term, the most important first step is to ensure that all developments are, at the very least, compatible with a community heating network and ideally that a network is developed as part of the regeneration process connected initially to gas fired boiler plant. This boiler plant will initially provide all the heat for the development but in the longer term will become top-up and standby plant, so the

investment will not be wasted. Other interim measures should include:

- Where it is not economic to connect to the central boiler plant initially or in developments not yet connected, use local temporary gas fired boilers;
- Size heat mains in order to cope with larger heat load in the future;
- Ensure that community heating systems are designed to be compatible with each other in the future;
- Ensure the end-user installations are compatible with future larger energy plants;
- Utilise appropriate control systems to minimise energy wastage;
- Ensure heat charges are appropriate and promote the use of community heating systems;
- Ensure a good maintenance and management system is in place.

A programme of energy efficiency and solar thermal could reduce emissions by 16.5% on the current baseline for the existing buildings, saving an estimated 5,218 tonnes/year at a capital cost of £11.49m. The largest savings could be achieved by fuel switching: replacing electric heating systems by gas central heating systems with condensing boilers. For further analysis of interim measures, please see Appendix 6.

**Action 12:** As a priority, secure a town centre site for the interim gas fired boiler plant(s) that will provide community heating for the first 5 years until connection to Barking Power Station or completion of the large CHP plant.

**Task 12.a** - Calculate the size and other requirements of the site required for the initial boiler plant(s) and identify a suitable Council-owned site in the town centre. Compile a proposal to allocate this site for the boiler plant.

## 7.2.4 Community heating for new developments

The final phasing of all the different new build areas is still under development, but it is known that Town Square is currently being developed. Axe Street, Fresh Wharf and Station Quarter will follow. Community heating design and control strategies should be adopted as soon as possible to avoid potential technical conflicts with the other developments. The community heating system should allow for the phasing of the various stages of a development and allow future systems to connect to it from different places. At present, we do not have detailed plans for phasing of new build areas other than Fresh Wharf, but they should be analysed in the future in order to establish an optimum design.

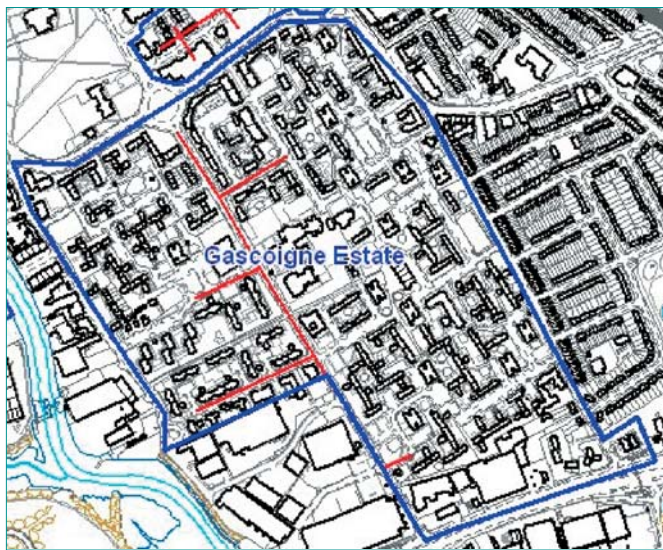


Figure 13: Gascoigne Estate heat mains

In the case of the Gascoigne Estate, it is unknown how this area will be developed, but Gascoigne Road is right in the centre of this area. This road could be used as the main artery for the heat network as shown in the above figure. The advantages and constraints of doing this should be investigated, not just for this area, but for all the other new build areas.

### 7.2.4.1 Design of Barking Town Centre community heating system

A study should be carried out as soon as possible in order to map out and understand the extent, routing, cost and other implications of a community heating system, within the new build areas and also throughout the existing housing/buildings areas.

This probably needs to be carried out in two stages:

- Stage 1 - outline design to achieve sign-on from LBB and commitment to put system in place
- Stage 2 - detailed design to take forward to implementation and to inform any other stakeholders (e.g. individual developments).

The studies need to

- calculate heat loads
- identify heat sources (as has already been started in this study, further work would need to be carried out to further investigate and formalise these)
- design the distribution system through to development areas and user interfaces.

LBB may also wish to consider a study of the currently available boilers that could be used as a temporary basis prior to completion of the community heating network. This could also formalise the plan of action for the management of the temporary boiler facilities while the mains system was being put in place.

**Action 13:** Once established, the ESCo should conduct a study to map out and understand the extent, routing, heat sources, and cost of the town centre community heating system.

**Task 13.a** - Stage 1: outline design to achieve sign-on from LBB and commitment to put system in place



**Task 13.b** - Stage 2: detailed design to take forward to implementation and to inform other stakeholders.

**Task 13.c** - Analyse and design the community heating system in order to minimise running costs, distribution losses and capital costs.

**Task 13.d**: Use specialist consultants to analyse and design the community heating system in order to minimise running costs, distribution losses and capital costs.

**Task 13.e**: Appoint a consultant to design a community heating system for Fresh Wharf and other near term developments, including: identifying the main heat network routes for each development, establishing those areas where heat mains can not be installed, and identifying boiler plants for each regeneration area.

**Task 13.f**: Design the routing of the community heating network, by using Master Plans of the Station Quarter, London Road, Axe Street and others.

**Action 14**: Establish opportunities for connecting existing buildings to the heat network, particularly Council & other public sector buildings in the town centre.

**Task 14.a** - Ensure CHP and the potential interaction with a town centre heat network is included within the extension plans for Barking Town Hall, and also consider the inclusion of schools and Abbey Leisure Centre swimming pool within the heat network.

**Task 14.b** - Explore opportunities to connect the existing stock to community heating through additional funding, such as the Energy Efficiency Commitment (EEC).

### 7.2.5 End-user installations

The end-user components of the community heating system are normally similar to what already exists in conventional gas-fires systems, such as pipework, radiators, hot water-storage, thermostatic and time controls.

A significant difference is that there will be a consumer unit interface instead of a boiler. This unit will normally take less space than a boiler and does not require a flue pipe or any gas connections. This unit does not need to be located next to an outside wall.

Hot water will come from the heat mains and is then distributed to the radiators and hot storage tank. In some models, these units can produce instantaneous domestic hot water via a heat exchanger, so there is no need for storage. These systems can be controlled in a similar way to conventional systems, which include room temperature, hot water temperature, and timer controls for heating and hot water.

There are two main ways for charging for heat, using a service charge or using heat meters. Service charges are normally related to the property size, so it is not related to actual consumption. Service charge does not promote energy efficiency but does not penalise other more vulnerable users (e.g. elderly people). Heat meters work in a similar manner to electricity meters. They record the kWh of heat used by the property and customers are charged only for the heat used.

**Action 15**: Ensure that heat meters are installed in all dwellings so that occupants pay for heat by the unit to encourage energy efficient behaviour.

**Task 15.a** - Ensure that developers include heat meters as a core component of communal heating system – and provide information on heat meters to assist them.

### 7.2.6 Developing the low carbon heat source for the Energy Action Area for the longer term

There are 4 potential long-term CHP based heat sources:

- Pure Biomass – this would involve construction of a new (20MWe) plant;

- Solid Recovered Fuel from the Jenkins Lane waste depot – again this would involve the construction of a new gasification plant;
- Barking Power Station – taking heat from the existing plant and potentially the extension;
- Local Gas-Fired CHP plant.

There are uncertainties around all of these options although the last is relatively easily achievable. The biomass and SRF options both require a sizeable site as well as securing a fuel supply. The SRF fuel supply is readily available with two Mechanical Biological Treatment plants under development in Havering and Newham, but a BTC scheme may be in competition with other developments wishing to secure this fuel.

Ideally a combination of all the first three should be developed to serve a larger network serving all of the London Thames Gateway developments.

Biomass fuels within the borough will include tree surgery and clean wood waste. This fuel could be collected and used in a centralised biomass energy plant. This would need to be developed in conjunction with other businesses and organisations, and in particular Shanks East London.

Research has identified four potential sites for a CHP plant near the Barking Town Centre. All the individual heating networks could be connected to a larger energy production site. The Energy Action Area Options Study stated that a conventional gas fired CHP plant would require around 2,500 m<sup>2</sup> of land-take in order to supply the heat and power to all the regeneration sites. If a biomass CHP plant was chosen as the solution, it was estimated that more than 14,000 m<sup>2</sup> would be required, mainly for storing the biomass fuel. The space requirements for a CHP gasification plant using SRF are not known at this stage, but it could probably be somewhere between the previous two.

Sites identified and examined as part of this study are:

- Potential biomass locations - Beckton sewage treatment works, timber site on River Road, and the industrial site south of the Gascoigne Estate;
- Mechanical Biological Treatment plant at Jenkins Lane.

The location of these potential sites has to be considered when designing the distribution network. See Appendix 8 for maps and details of sites.

**Action 16:** Determine and pursue the preferred low carbon heat source for the town centre — either waste heat from Barking Power Station or an energy-from-waste gasification CHP plant on the edge of the town centre.

**Task 16.a** - Produce business cases and report on how practical the two options are to implement.

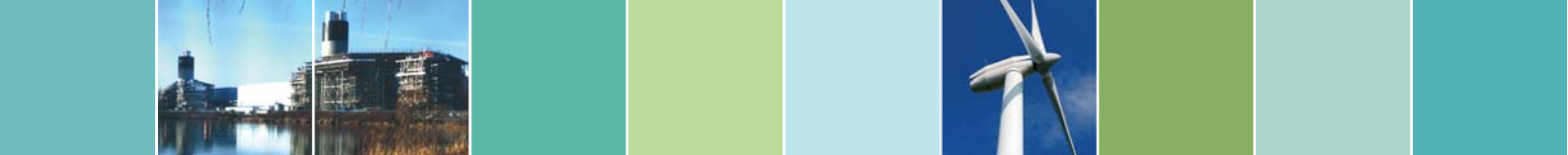
**Task 16.b** - Arrive at preferred low carbon heat source based on the best business case and practical considerations.

**Action 17:** If heat from Barking Power Station is the preferred low carbon heat source, work with London Thames Gateway Development Corporation to establish a Thames Gateway Heat Transmission Network that will supply heat from Barking Power Station to Barking Town centre.

**Task 17.a** - Produce Implementation Plan and progress the Heat Transmission Network.

**Action 18:** If an energy-from-waste CHP plant is the preferred low carbon heat source, determine the feasibility of setting up a CHP plant on the edge of the town centre.

**Task 18.a** - Earmark site for a large CHP plant near the town centre in the longer term.



**Task 18.b** - Continue discussions with Shanks East London on prospects for utilising the waste fuel from the Jenkins Lane MBT plant.

**Task 18.c** - Hold exploratory talks with Energy Power Resources Ltd, Sembcorp and Novera as to the development of a biomass or energy from waste power CHP plant.

**Task 18.d** - Assess potential for a joint biomass and energy from waste CHP plant.

### 7.3 Technology Compatibility

The welcome introduction of the 10% on-site renewable energy requirement through the London Plan and through Barking and Dagenham’s and other London Boroughs’

planning requirements has brought forward an increase in interest in renewables and a range of solutions. However it is important to consider how these different technologies will work together as a whole and provide the optimum carbon reduction.

The table below gives a guide to the compatibility of different supply technologies, or more accurately how they well they work together. It is perfectly possible that solar thermal can be installed together with CHP and district heating, but they both provide carbon free heat simultaneously, meaning that no additional carbon savings are achieved by installing solar thermal if CHP has already been selected.

Technology	CHP/DH	Ground source heat pumps	Solar thermal	Solar PV	Wind	Micro-CHP	Hydro
CHP/district heating (DH)	7	7	7	3	3	7	3
Ground source heat pumps	7	7	3	3	3	7	3
Solar thermal	7	3	7	3	3	7	3
PV	3	3	3	7	3	3	3
Wind	3	3	3	3	7	3	3
Micro-CHP	7	7	7	3	3	7	3
Hydro	3	3	3	3	3	3	7

Table 10: Technology Compatibility

It’s clear from the above table that the development of community heating and CHP is ideally compatible with renewable electricity generating systems i.e. PV, wind and hydro.

## 8. Embedding the Energy Action Area Requirements within Key Development Projects

### 8.1 What can be done at what stage?

#### 8.1.1 Ensuring delivery within key development sites

A number of measures have been recommended throughout this Implementation Plan for pushing forward the Energy Action Area in BTC. Some of these are general measures which will benefit the implementation overall, or are not related to specific regeneration developments, and should be put in place as soon as possible. Others relate more directly to developments and may only be able to be put in place at certain stages of the development plans.

**Action 19:** For all regeneration sites in BTC allocate actions for ensuring implementation of the Energy Action Area requirements.

**Task 19.a** - LBBD to determine the potential to which different developments proceeding in the town centre can incorporate the Energy Action Area requirements, focusing on the sites that the Council owns where high standards can be ensured.

**Task 19.b** - Community heating and renewable energy requirements should be indicated as a high priority at all stages of the regeneration process, including the master planning and development brief stages.

**Task 19.c** - Ensure that developers have adequate energy strategies for utilising PV and wind power, for implementing intermediate heating options and for eventual connection to the town centre community heating system.

**Task 19.d** - For developments at a more advanced stage, utilise Section 106 Agreements to incorporate Energy Action Area requirements.

#### 8.1.2 Time frames for incorporating development-specific measures

For any particular development proposal, each implementation task can be incorporated up to and including the development phase as shown in Table 11 below.

Task	Development stage:						
	Master-planning	Tender for development partner	Development brief	Initial design pre-planning	Planning application	Detailed design	Construction
Compliance with EU Performance in Buildings directive and other existing policies and targets	3	3	3	3	3	3	.
Compliance with Borough renewables targets and new policies on 10% electricity generation through renewable technologies and provision of connection to community heating network	3	3	3	3	3		
Section 106 agreements enforcing 10% electricity generation through renewable technologies and provision of connection to community heating network					3		
Preliminary indicator studies for PV and wind turbines on late-stage developments; discussion with developers to incorporate			3	3	3	(3)	
Public consultation on development proposals and Energy Action Area in general and education on renewables and community heating as part of developments			3	3	3	3	3
Marketing of benefits of Energy Action Area measures to developers		3	3	3			
Feasibility and outline design study for Town Hall expansion	3	3	3	3			

Table 11: Timeframe for incorporating facilitation/implementation measures

### 8.1.3 Marketing benefits to developers

There are a number of significant benefits to developers of incorporating carbon reduction measures that may not be immediately apparent in the face of some of the draw-backs (see Appendix 12). These should be highlighted to encourage their engagement in the Energy Action Area. Please see Appendix 13.

## 8.2 Measures to be Employed at Various Stages of each Regeneration Development

### 8.2.1 Phasing of key development areas in the town centre

Table 12 outlines the current position of each of the developments under consideration within the Barking Town Centre Energy Action Area. Different measures could be employed for each regeneration project at their respective development stage. This is further detailed in Appendix 9.

Development phase	Master-planning	Development brief	Tender for development partner	Initial design pre-planning	Planning application	Detailed design	Construction
<b>Tanner Street Gateway</b>	3	3	3	3	3	3	Due complete summer 06
<b>Tanner Street Triangle</b>	3	3					To complete 2008
<b>Town Square</b> (LLC, housing and retail)	3	3	3	3	3	3	3 LLC underway, housing Ph1 in progress Jan04-Dec06, housing & retail Ph2 Oct06-08, Ph3 Dec06-09
<b>Greater Axe Street</b> (Housing, car park, health centre, Lidl junction, Captain Cook corner, Leisure centre)	3	3	3	3 draft design	3 flats on car park area has consent, Health Centre appn March		flats construction nov05-07,
<b>Fresh Wharf</b>	3	3	3	underway			2006-2020
<b>Station Quarter</b>	3 ongoing		3				
Foyer	3	3	3	Being finalised			Due summer 06
Cambridge Road	3	3	3	3	Planning application due		Due summer 06
The Lintons	Being finalised		3				07/08
<b>London Road/ North Street</b>	complete March 06						07/08
<b>Gascoigne Estate</b>			In progress				2008-2018
<b>Superstore area</b> Abbey Rd, Tesco	Also ongoing	By Oct 06					
<b>Town Hall refurbishment</b>	Plan stage only						

Table 12: Current status of regeneration developments

## 8.2.2 Summary of actions for key development areas

Table 13 below provides a summary of the actions appropriate to each development. These actions should be applied to all future developments as well and incorporated into development work plans drawn up by Regeneration Case Officers.

### Responsibility Key:

	Regeneration
	Developer
	Development Control
	Developer / Development Control / Regeneration
	Area Regeneration

Task	Masterplanning to include EAA measures	Development brief: 10% renewable energy, CH connection	10% Renewable Energy Feasibility study	Public consultation (energy aspects)	Section 106 Agreement	Late-stage incorporation
Tanner Street Gateway						
Tanner Street Triangle						
Town Square						for phases 2 and 3 (residential /retail)
Greater Axe Street						
Health Centre, car park & other proposals						
Axe Street flats						
Fresh Wharf					as alternative to earlier measures	
Station Quarter						
Foyer			Formalise study & discuss further with developers		as alternative to earlier measures	
Cambridge Road					as alternative to earlier measures	
The Lintons						
London Rd/ North St						
Gascoigne Estate						
Superstore area						
Town Hall refurbishment						

Table 13: Actions applicable to specific developments

## 8.2.3 Existing buildings in the town centre

For implementation of the Energy Action Area in existing buildings, see Section 9 and Appendix 10 for recommendations. Although these would not be linked to development time-scales, connection of existing buildings to community heating would depend on the progress of installation of the community heating distribution network in the area. Detail on the implementation of community heating is presented separately in Section 7.

## 9. Action Plan for Upgrading Existing Buildings

### 9.1 The Need to Focus on Existing Housing

Table 14 shows the energy demands and CO<sub>2</sub> emissions for the existing buildings (calculated by the Energy Action Area Options Study). Residential properties which will not be affected by the redevelopment programme currently consume more than 50% of both gas and electricity consumption in Barking Town Centre. Overall the residential sector is responsible for 75% of CO<sub>2</sub> emissions within Barking Town Centre and therefore attention should be focused on the options available for improving the energy efficiency of existing housing.

Existing buildings that will not be redeveloped	Gas MWh/y	Elec MWh/y	CO <sub>2</sub> Tonnes/y
Residential	80,293	19,443	23,616
Non-Domestic	31,332	4,860	8,043
<b>Total</b>	<b>111,625</b>	<b>24,303</b>	<b>31,659</b>

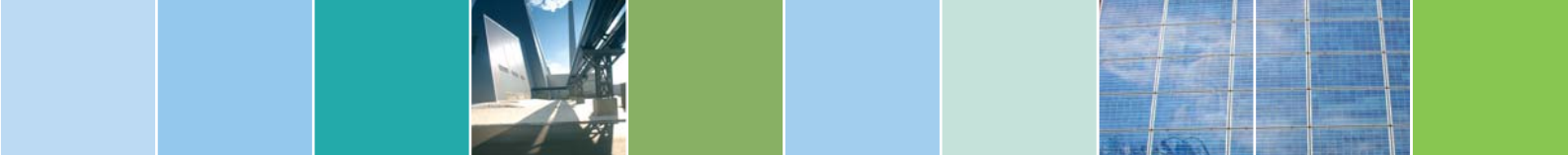
Table 14: Energy demand and CO<sub>2</sub> emissions for existing buildings that will not be redeveloped

A number of options are available for improving the envelope of existing buildings in terms of energy performance and the retro-fitting of renewable technologies. Of the various insulation measures that might be applicable to the existing housing stock, cavity wall insulation and loft insulation represent the best value for money. Solid wall insulation, flat roof insulation, floor insulation and double glazing tend to be very expensive measures, unless the element needs to be replaced or upgraded in some way: for example, where re-roofing is required or window frames are rotten.

### 9.2 Feasibility Study of Energy Efficiency Measures In Existing Buildings

The feasibility study identified homes in the town centre where the following measures could be implemented:

- Cavity Wall Insulation - it is estimated that approximately 1000 homes have the opportunity to be improved through cavity wall insulation;
- Loft Insulation - it is estimated that approximately 1,400 homes have the opportunity to be improved through loft insulation;
- Double Glazing - it is estimated that approximately 1,300 homes have the opportunity to be improved through double glazing;
- Condensing Boilers - it is estimated that approximately 3,000 homes have the opportunity to be improved through replacing boilers with condensing boilers;
- Replacing Electric Heaters with Condensing Gas Boilers - it is estimated that approximately 1,500 homes have the opportunity to be improved through replacing electric heaters with condensing boilers;



- Energy Efficient light bulbs - it is assumed that 4 traditional light bulbs can be replaced by energy efficient ones in all homes;
- Solar Water Heating (houses only) - it is estimated that approximately 800 homes can accommodate solar water heating systems.

Implementing these low cost energy efficiency measures would reduce carbon emissions from existing buildings by approximately 16.5%. Appendix 10 outlines the analysis and provides greater details on how each of these measures can be applied to the existing homes in Barking Town Centre.

However, the study was not able to examine the extent to which PV and wind turbines could be added and how feasible external cladding of solid walls would be. Such measures (particularly if there is a limited level of involvement) will have smaller overall impact on carbon reduction targets than the efficiency improvements above and will have greater costs, so will be less of a priority. However, they could be useful in providing some visible examples of putting the Energy Action Area into effect in residential and non-residential areas, and would be a tangible way of involving the wider community in the Energy Action Area.

A more detailed survey of the existing residential and non-residential properties should be carried out to determine the actual potential for retrofitting renewable energy installations and energy efficiency measures. Such measures would include, for example, PV, wind turbines (building integrated or stand-alone), cavity wall insulation, loft insulation and external cladding of solid walls.

### 9.3 Heat Network for Existing Buildings

A further energy efficiency option is to connect all the existing buildings to the Barking Town Centre community heating network. Installing community heating networks in the existing domestic properties could cost in excess of £10m. Appendix 11 analyses the potential for a heat

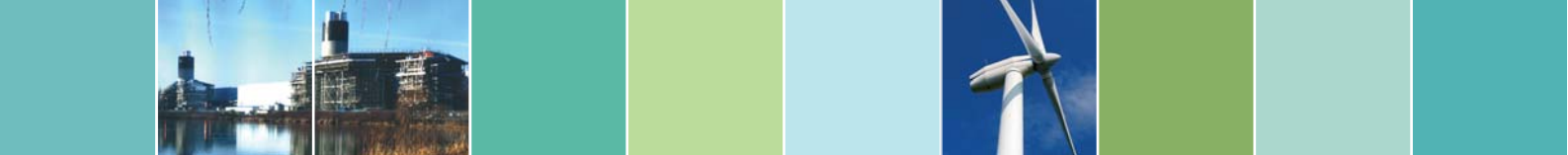
network outside the new build areas themselves and concludes that the potential CO<sub>2</sub> reductions from connecting the existing housing/buildings stock to district heating could be very large: 14,958 tonnes per year if heat from Barking Power station is used.

The table below shows a summary of the overall carbon savings for measures to the new-build and the existing stock. The biggest saving by far is the connection of existing stock to district heating, some three times the savings achieved through connecting new build to community heating. The additional cost of achieving this is £8.1m over 25 years, compared to the additional cost for the new-build of £6.07m for the Barking Power station option.

Sector	Measure	CO <sub>2</sub> tpa
All	Current Baseline	45,580
All	Future Baseline BAU	52,563
Newbuild	10% Renewables	-2,090
	Heat from Barking PS	-4,500
Existing buildings	Energy Efficiency	-4,488
	Heat from Barking PS	-14,958
All	New Total	26,527
All	% CO <sub>2</sub> saving	42%

Table 15: Potential CO<sub>2</sub> Emissions Reductions

This clearly shows that the opportunity to connect the existing stock to district heating should be pursued, if this additional funding can be sourced, for example from EEC funding. However, the table above actually involves double counting as a number of the energy efficiency measures should not be undertaken in conjunction with community heating. Condensing boilers could not be used in conjunction with community heating (it is a competing heating technology) and solar water heating would have little benefit in conjunction with community heating. If community heating is rolled out to existing buildings then these energy efficiency measures should not be taken forward. Please see Appendix 1 for further details on further technical studies that would be useful for progressing the Energy Action Area.



## 9.4 Developing an Active Energy Efficiency Programme in Barking Town Centre

Implementing these energy efficiency measures will require a proactive energy efficiency programme in the town centre. The two key elements involved are the promotion of government and energy utility grants to residents and also the development of new grant programmes specific to Barking Town Centre by forming partnerships with energy utilities and other funding bodies. The Council can also directly improve the energy performance of its social housing stock and harness energy efficiency grants for council housing. The Council is most likely to be able to bring-in additional funding if it has established good marketing programmes that are successful in accessing all sections of the community.

LBBB already has a partnership with London Warm Zone which provides a fuel poverty programme for households in the borough. On a ward by ward basis they are providing every fuel poor household with the opportunity of coming out of fuel poverty to cover all parts of the borough by 2013. As LBBB is already working with London Warm Zone they might be the best vehicle through which to implement this town centre energy efficiency programme – but LBBB should consider all prospective partners including the North East London Energy Efficiency Advice Centre or other specialist energy efficiency agencies in determining the best approach to the programme. The Council may even wish to establish an energy agency within Barking Town Centre so as to provide a local presence for the energy efficiency programme – this could be housed within the Barking ESCo.

The Council is also part of the Solar for London scheme which provides grants and installation support to householders for solar water heating systems – this could be built upon to deliver a retrofit renewable energy programme for existing housing. In addition the implementation of Decent Homes improvements provides the Council with the opportunity to significantly improve insulation levels in council properties as the properties will already be having works carried out.

**Action 20:** Work with energy efficiency delivery bodies to implement a pro-active energy efficiency and renewable energy installation programme across existing council and private properties within the BTC Energy Action Area.

**Task 20.a** - Appoint dedicated project manager to oversee energy efficiency programme for existing buildings in Barking Town Centre.

**Task 20.b** - Co-ordinate with existing structures/delivery partners such as Warm Zones to bring together insulation and renewable energy funding streams within the Energy Action Area.

**Task 20.c** - Commission a more detailed feasibility survey of retro-fit renewables and energy efficiency measures on existing buildings.

**Task 20.d** - Establish tools to provide support for residents/businesses/organisations in existing buildings, such as a helpline and dedicated webpage.



## 10. Promoting and Marketing the Energy Action Area

### 10.1 Promotion of the Energy Action Area to Local Stakeholders

#### 10.1.1 Contributing to the positive image for Barking Town Centre

The Energy Action Area presents LBBB with a range of opportunities to engage and inspire the local community, disseminate ideas relating to sustainable energy choices and environmental issues, and enhance the image of Barking Town Centre for both the local area and outside audiences. There are a number of barriers and challenges to the successful promotion of the Energy Action Area, such as lack of knowledge of the benefits of renewable energy technology, appropriate targeting of key audiences and ensuring that the stakeholders most affected by the development are kept informed and engaged with the process. Addressing these challenges will enable LBBB to engage fully with the local community and use the implementation of the Energy Action Area to develop more positive relationships with stakeholders.

The image of the designated Energy Action Area will be greatly improved if the local community can take pride in what is being achieved, whether through having their opinions considered during the regeneration process, or through the installation of tangible renewable energy technologies, which can act as a landmark for the local area and a positive advert for low carbon development. For examples from other Energy Action Areas, please see Appendix 16.

#### 10.1.2 Developing an Energy Action Area brand

Developing a specific brand for the Energy Action Area will allow LBBB to draw together the various strands of low carbon regeneration and present them as an effective whole to stakeholders. The Greater London Authority have ownership of the Energy Action Area brand and will need to be involved in the brand development for Barking Town Centre.

#### 10.1.3 Potential tools for promoting the Energy Action Area

There are a number of potential tools for consulting on and promoting the Energy Action Area:

- Consultation - focus groups, workshops and open days give residents and local businesses a chance to express any concerns they may have regarding the developments, which will also provide LBBB with an idea of what barriers need to be addressed.
- Active local engagement in energy issues - developing links with local residents' and businesses groups or including a community representative on local residential management groups provide an opportunity to engage with the wider community.
- Community Funding - producing a guide to funding possibilities and coordinating community energy projects would help the wider community to become directly involved in the low carbon development.
- Advice and Dissemination of Information - an energy advice line and dedicated website or web pages will help local residents and businesses to reduce their own carbon emissions
- Local Issues - the most effective approach to communicating environmental messages is to make climate change issues a key part of the economic and social regeneration of the area
- Events - the Energy Action Area can be successfully linked to current successful and recognised events, presenting the opportunity to capitalise on an already interested audience, through information stalls or leaflet distribution.
- Landmark installations - although these installations might not have a large impact on carbon reduction they will provide a tangible image for the community and for publicity of the project.

- Engaging with Schools - focusing information campaigns on school children is an effective means of approaching a wider target audience and presents opportunities to deliver key messages through creative media.
- Engaging with the renewable energy sector - coordinating toolkits, reports and dissemination events could be an effective means of publicising LBBB's achievements and the successes of the Energy Action Area, while maintaining interest in the targets of the regeneration.

For further detail on these promotional tools please see Appendix 17.

## 10.2 Marketing Opportunities from Energy Action Area Implementation

### 10.2.1 An innovative and green marketing message

Energy Action Area status provides BTC with the opportunity to become a showcase area for London's future development mechanisms, making BTC itself synonymous with an innovative and practical approach to urban development. This will complement LBBB's aims to regenerate BTC economically and socially, as well as achieving a high standard in taking action to mitigate climate change. Low carbon development status provides ample opportunity to reposition BTC as not just a regeneration area, but a modern and positive place to live, work and invest, with good potential for positive press interest to raise the area's profile.

The implementation of the Energy Action Area will provide LBBB with further opportunities to develop a positive relationship with current residents and businesses, while attracting interest from outside the area. LBBB will be seen to be an active local authority, delivering major improvements for the area and addressing environmental challenges.

### 10.2.2 Current marketing messages

The current key messages for LBBB's regeneration marketing team focus on promoting BTC as a good place to live and work, with Energy Action Area information included when BTC is being placed in a wider context. These messages aim to raise the profile of the area and challenge the present perception of Barking & Dagenham as a social housing borough. There are two main strands of this message: developing a more positive profile for BTC to outside agencies and engaging with residents regarding the changes in their area.

The strategy has a particular focus on housing choice, with the regeneration aiming to provide aspirational and affordable housing. A key message here is the emphasis on present residents being included in the change, rather than 'gentrification' - often seen as the negative effect of regeneration - causing local people to be unable to remain in BTC.

Transport is a very important part of message, both for the reduction of car use which will be implemented through the Energy Action Area, and emphasis on the good public transport links to central London. LBBB have a strategic transport group working on the delivery of this key message.

The Energy Action Area is presently a complementary element of a wider marketing strategy to improve perception of BTC. However, as the implementation of the low carbon development begins, some elements of the regeneration may require a more tailored approach.



### 10.2.3 Benefits of the Energy Action Area for people using Barking Town Centre

Successful employment of carbon reduction measures and environmentally sensitive design throughout the BTC Energy Action Area will produce results that will achieve London-wide and possibly national recognition and acclaim. It will be an impressive example for other local authorities to follow and reproduce elsewhere, of how to successfully reduce carbon emissions in the battle against climate change.

It is important that parties involved in the implementation of the Energy Action Area measures, from LBBB to the developers, understand the benefits that low-carbon development can bring about, in order to achieve an increased level of commitment to their incorporation.

Although the incorporation of low carbon features present a number of challenges to developers (as briefly listed in section 4.3 and further elaborated in Appendix 12), developers will also benefit in a number of ways from developing in Barking Town Centre Energy Action Area. These benefits to developers include:

- Improving the developer's reputation and expertise in this field of increasing importance, particularly through involvement in landmark low carbon developments;
- Helping developers get ahead of the game in terms of building low carbon developments with legislative requirements continuing to become more and more stringent in future years;
- Increasing saleability with the units being marketed as green homes;
- The Energy Action Area status is likely to assist developers in securing funding opportunities; and,

- Energy efficiency and renewable energy contractors are more likely to get involved in, or assist with, developments in the Energy Action Area than one-off developments elsewhere due to the focus of sustainable energy activity.

Appendix 13 gives further detail on these benefits and how LBBB should highlight these to developers to encourage sign-on to the Energy Action Area requirements.

There are also many benefits to residents, businesses and the public sector and these are detailed in Appendix 14.

**Action 21:** Ensure engagement and buy-in from all stakeholders, and promote the Energy Action Area vision to the positive image of Barking Town Centre.

**Task 21.a** - Integrate the vision & objectives of the Energy Action Area within the marketing strategy and materials for the regeneration plans for Barking Town Centre.

**Task 21.b** - Consult on development proposals and the Energy Action Area in general, providing education on renewables and community heating as part of developments.

**Task 21.c** - Encourage the inclusion of energy representatives from residents and businesses, carry out information campaigns, provide information on funding sources, and deliver education on community heating in areas of existing buildings.

**Task 21.d** - Establish partnerships between relevant officers and local delivery agencies to ensure that programmes to encourage behavioural changes are developed.



## 11. APPENDICES

Please see separate report, Barking Town Centre Energy Action Area Implementation Plan: Appendix, for detailed appendices (this report is available from the Council).  
The contents of this report are as below.

1. Technical Studies to support the Implementation of the Energy Action Area
2. Training and Support for Stakeholders
3. Wider policy context relevant to Barking Town Centre and sustainable energy
4. Funding and Financing Options
5. Historical Development of Community Heating Schemes
6. Temporary biomass boilers and requirements for fuel
7. New build areas and heat map of new build areas
8. Community Heating Energy plant sites around Barking Town Centre
9. Milestones for Developments - Opportunities for each Development
10. Energy Efficiency Options for Existing Residential Properties
11. CHP Option Analysis for existing residential properties
12. Potential pressures on developers
13. Benefits to Developers of building in the Energy Action Area
14. Benefits of the Energy Action Area for Residents and Public Sector
15. Public consultation from other Energy Action Areas
16. Examples of promotional tools from other Energy Action Areas
17. Potential Tools for promoting the Energy Action Area
18. Public Consultation Event Held in Barking as part of Study
19. Further Information from Public Consultation Event

