



Lewisham Town Centre AAP

Low Carbon and Decentralised Energy Strategy Recommendations

December 2010
London Borough of Lewisham

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Content

Chapter	Title	Page
1.	Introduction	9
1.1	Scope	9
1.2	The site	10
1.2.1	Location	10
1.2.2	Preferred Development Framework	11
1.2.3	Specific Developments and current status of work	12
2.	Key anchor loads	14
2.1	Overview	14
2.2	DeMAP findings - The Ramboll Report	14
2.3	Heat mapping for the LTC's specific development sites	15
3.	Energy strategy options	17
3.1	Introduction	17
3.2	CO ₂ emission reduction policy in the UK	17
3.2.1	Building Regulations and 'zero carbon'	17
3.3	The London Plan	19
3.3.1	The Lewisham Core Strategy Policies	19
3.3.2	Financial Incentivisation Mechanisms	20
3.3.2.1	Feed-In Tariffs	20
3.3.2.2	Renewable Heat Incentive	20
3.3.2.3	Renewable Obligation	21
3.4	CO ₂ emission reduction opportunities in Lewisham Town Centre	21
3.5	The role of Decentralised Energy in Lewisham Town Centre	25
3.5.1	Industry precedent in decentralised energy	25
3.5.2	Viability Equation	26
3.5.3	Decentralised Energy for Lewisham Town Centre	27
3.6	Establishing realistic options for delivering Decentralised Energy for Lewisham Town Centre	29
3.6.1	Introduction	29
3.6.2	Principles for consideration	29
3.6.3	Overview of energy issues for existing buildings	30
3.6.3.1	East and West of Elmira Street Energy Centre	32
3.6.3.2	Lewisham Gateway Energy Centre	33
3.6.3.3	Tesco site	33
3.6.3.4	Summary of relevant district energy proposals for current sites	33
3.7	Recommendations for including Decentralised Energy in an AAP energy strategy approach	35
3.7.1	Introduction	35
3.7.2	Cluster 1: Loampit Vale	35
3.7.3	Cluster 2: Lewisham Gateway	36
3.7.4	Cluster 3: Ladywell road area	36
3.8	Preferred Approach	37
4.	Management and Delivery	39
4.1	Overview	39
4.2	ESCo principles	39

4.3	Initiation Process _____	39
4.4	ESCo Responsibilities _____	40
5.	Conclusions	41
5.1	Next steps _____	41
Appendices		42
Appendix A. List of development coming forward as received from LBL _____		43
Appendix B. Map of development coming forward as received from LBL _____		50
Appendix C. London Heat Map Study for LBL. _____		52

1. Introduction

1.1 Scope

The purpose of this document is to provide the London Borough of Lewisham (LBL) with a qualitative energy study aimed at narrowing down the range of potential options and identifying a clear strategy around policy, thermal masterplanning / integration opportunities and technology options within the Lewisham Town Centre Area Action Plan.

Community energy opportunities for integrating new and existing buildings have been considered in this report, which by building upon previous work carried out, provides both high level commentary on technical viability and specific commentary on the likely direction of a suitable energy strategy.

This information is given in order to allow a review of the policy direction for LBL and assist in determining what energy strategy options are likely to present a suitably robust and deliverable solution in line with the overall aim of minimising CO₂ emissions in the Town Centre Area.

Whilst a decentralised approach is known by the industry to represent one effective solution to the reduction of CO₂ emissions for development, viability and deliverability are crucially linked to the specific details of existing and anticipated new heat users. The study has therefore been assessed against both existing heat mapping information and the list of developments coming forward in the town centre area, as received from LBL.

The main requirements of such a study are:

1. determine major heat users and key anchor loads
2. identify potential qualitative standalone energy strategies for the major developments
3. identify potential qualitative community energy strategies linking some or all of the major developments
4. provide discussion on potential energy centre locations and phasing implications
5. provide discussion on potential to link smaller developments and existing major public/private buildings in the area
6. comment on financial viability and ESCO issues in relation to setting up a community energy system

Bullet point 1 is discussed in the chapter 2 of this report and reflects the DeMap findings and the site specific information provided by LBL. Bullet points 2 and 3 are objects of discussion of chapter 3. Bullet points 4, 5 and 6 are discussed in chapter 4.

1.2 The site

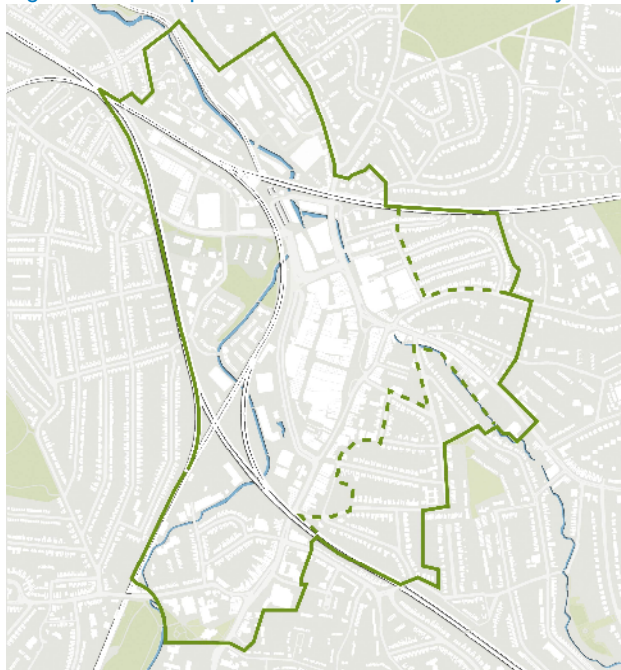
This section introduces the Lewisham Town Centre area, for which an action plan is being prepared, and summarises the strategic and local context.

1.2.1 Location

Lewisham is an inner London Borough covering around 14 square miles, located in south east London. It is a vibrant and diverse Borough, home to more than 240,000 people. It is in a dynamic and strategic location and designated as a Major Centre within the London Plan. Lewisham Town Centre is especially well connected to central London by rail and DLR and has developed as an important retail and service centre, centred on the historic street market and the Riverdale Shopping Centre.

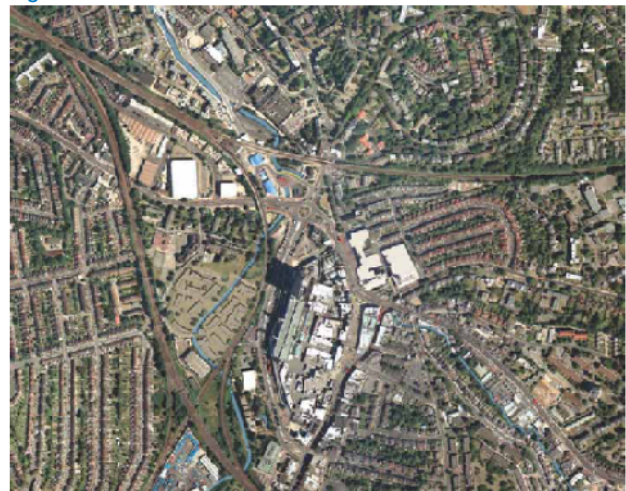
In addition, Lewisham is located within the Thames Gateway area of London. The Thames Gateway (TG) is the name given to the area that extends from Lewisham and Tower Hamlets in London to Tilbury in Essex and the Isle of Sheppey in Kent. This area has been identified by Government as the main area for development growth in the South East. Lewisham is part of the Thames Gateway and a member of the London Partnership set up to achieve social, cultural, economic and physical regeneration in this part of London and beyond.

Figure 1.1: Proposed Area Action Plan boundary



Source: LTC AAP Further Options Report, preferred option LTC SH9 (solid line indicates existing boundary, dashed line illustrates amended boundary)

Figure 1.2: Aerial view of Lewisham Town Centre

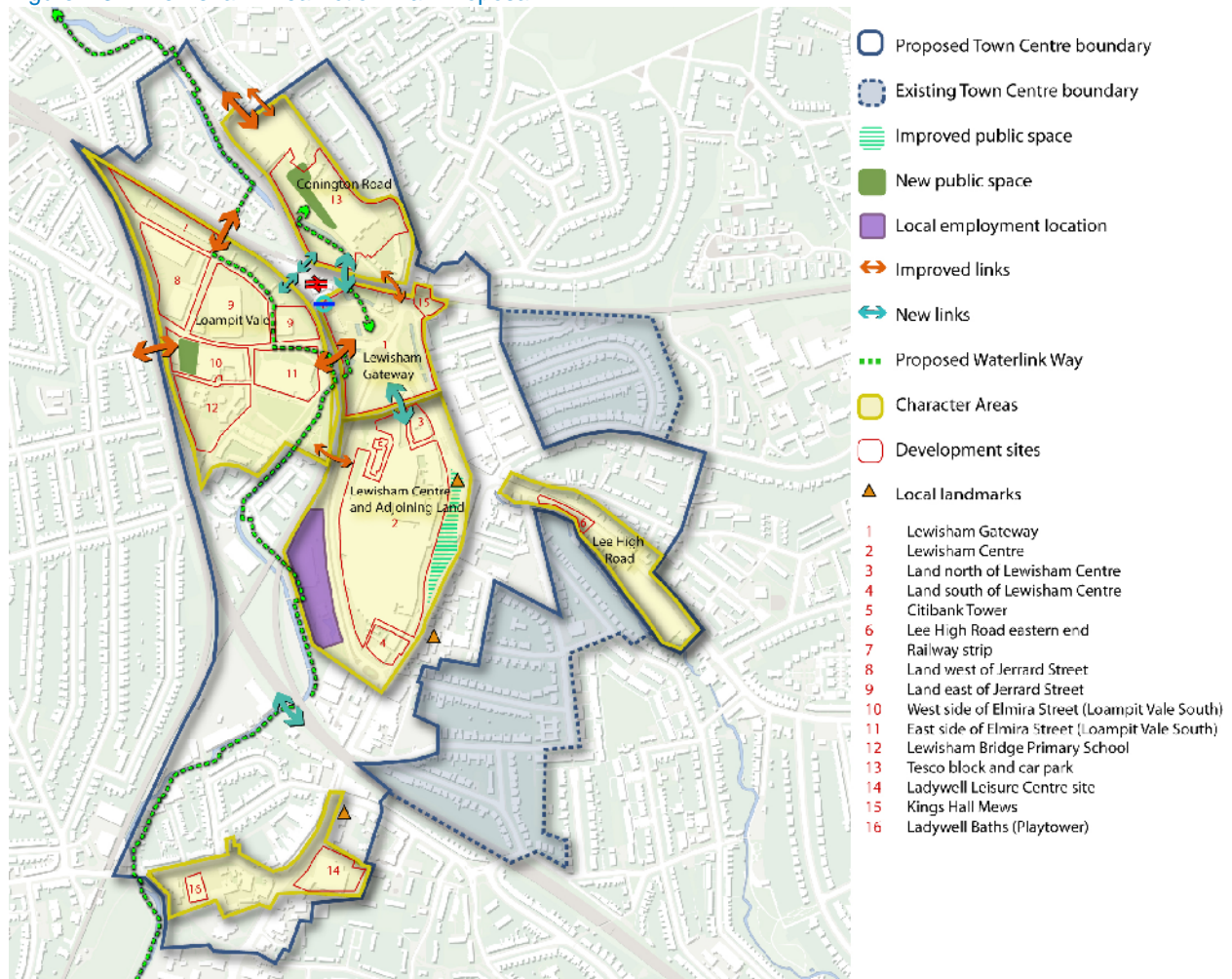


Source: LTCAAP – Preferred Options Report, April 2007

1.2.2 Preferred Development Framework

The aims of the emerging AAP are to stimulate development interest and encourage regeneration projects whilst protecting those areas sensitive to change. They have a strong implementation focus and will provide the framework for implementing regeneration initiative.

Figure 1.3: Lewisham Area Action Plan Proposal



Source: LTC AAP Further Options Report

A series of character areas and sites have been identified in Lewisham town centre. These areas have a diverse character and present significant opportunities to enhance the vitality and viability of Lewisham town centre in line with PPS4. The six Sub-areas have been identified as follows:

- Gateway character area
- Loampit Vale character area
- Conington Road character area
- Lee High Road character area
- Ladywell character area
- Central character area

The character areas provide a means to realise the vision, themes and objectives of the AAP. Specifically, these areas include a number of development sites which could deliver new retail floor-space and homes.

Table 1.1: Preferred development sites framework

Character Area			
	Homes	Net retail (sq.m.)	Other
Gateway	800	17,000	8,000sqm office 5,000sqm hotel 5,000sqm leisure
Loampit Vale	1,650	13,100	
Conington Road	400	3,000	
Lee High Road	110	2,000	
Ladywell	150	1,400	
Central	200	600	
Total	3,310	37,100	8,000sqm office 5,000sqm hotel 5,000sqm leisure

Some of the above development sites have been further divided into other specific construction sites. The next paragraph discusses in more detail the current status of proposed construction for each of the development sites mentioned in the AAP.

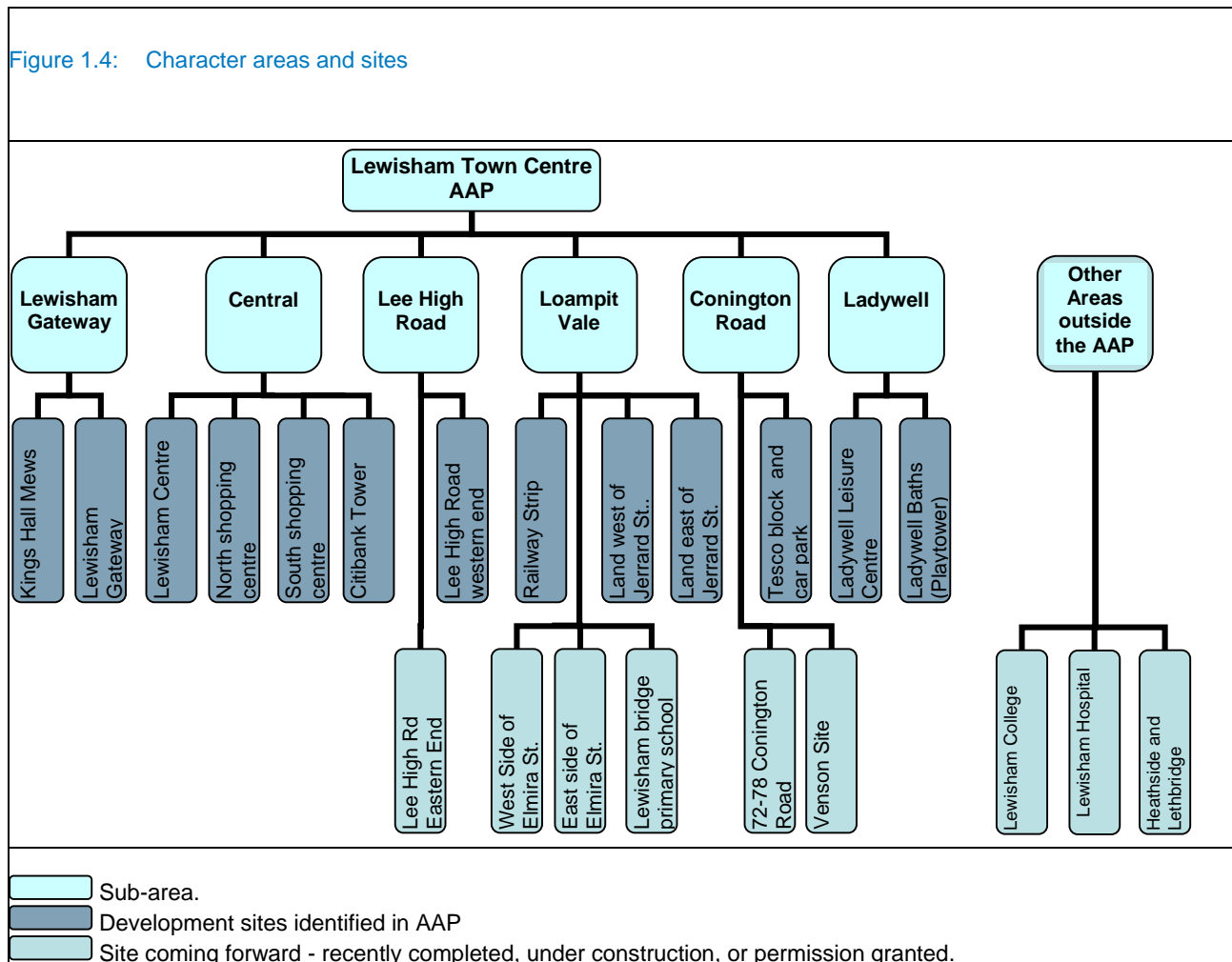
1.2.3 Specific Developments and current status of work

In order to narrow down the energy strategy options to those that are realistic a preliminary study of the specific sites has been undertaken for LTC, based on both information gathered from the AAP Further Options Report and a list of development coming forward in the town centre area including a map showing their locations received from Matthew Pullen at LBL (see **Appendix A** and **Appendix B**). This study categorises the sites as follows:

1. Site coming forward: those sites which have been completed recently, are under construction or benefit from planning consent.
2. Development sites as identified in the AAP: those sites that are identified in the AAP as potential development sites.

Figure 1.4 shows the identified sites grouped according to their character area and can be summarised as follows:

- 13 development sites as identified in the AAP;
- 6 sites which are coming forward; and
- 3 sites outside of the AAP area



2. Key anchor loads

2.1 Overview

Fundamental to the success of a district heating system is the density of the heat demand, and identification of any high demand single building users such as hospital and leisure centres will be a key part of the strategy.

The purpose of this chapter it is therefore to determine the major heat consumers within the boundary of the site specific information provided by LB Lewisham from drawing on the LDA's Decentralised Energy Masterplanning Programme (DeMAP) findings. The core of the DeMAP is the heat mapping study that has been performed by Ramboll (Denmark) for the London Borough of Lewisham (LBL). The Ramboll report, issued in May 2010, provides information and findings for the entire LBL of which Lewisham Town Centre (LTC) represent a small area. Nevertheless, LTC has been indentified as an important area in relation to the implementation potential of district heating schemes. Therefore, the starting point of this study is the Ramboll Report and its findings for the area of LTC, as discussed in the following section.

2.2 DeMAP findings - The Ramboll Report

The main objective of the Ramboll heat mapping study was to collect/estimate heat consumption data for a list of "priority buildings" for later illustration on the London heat map website.

This priority list was provided in the project brief for the whole Borough of Lewisham. The Lewisham Town Centre (LTC) is part of the borough and it has been indentified in the Ramboll study as one of the main areas that could be focused upon to provide potential for heat network development.

The focus area of LTC is described in the Ramboll report as follows:

"Central Lewisham: The Lewisham Town Centre is earmarked as a major regeneration area in the borough. The two main development areas are Lewisham Gateway, a mixed-use project providing up to 800 new homes and Loampit Vale, a scheme of eight buildings ranging in height from 5 to 24 storeys incorporating a new leisure centre with an 8-lane swimming pool, 788 new homes, commercial units, and various community facilities. Both developments list CHP and community heating as the preferred servicing strategy. Other developments that can benefit from a potential network are Conington Road (462 apartments), Lee High Road, as well as existing Lewisham Bridge Primary School. Within this Focus Area 11 buildings/connections have been identified"

The list of buildings identified for LTC's focus area and its heat mapping are shown in **Appendix C**. This list also identified existing and new homes.

It should be noted that only new homes have been identified for LTC's focus area within the Ramboll Report. Proposed developments were benchmarked based on a 20%, 50% or 80% reduction of Part L value depending on the predicted construction date. Benchmarks used are as follows:

- Office: assuming 67 kWh/m²/annum (80% of 2006 Part L Benchmark for Office)
- Residential: assuming 80 m²/unit and 47 kWh/m²/annum (80% of 2006 Part L Benchmark for Residential)
- Hotel: assuming 58 m²/unit and 47 kWh/m²/annum (80% of 2006 Part L Benchmark for Hotel)

The estimated heat consumption for the focus area of LTC as given in the Ramboll report is equal to 9,784 MWh/yr. This figure represents the sum of all the estimated heat consumptions of proposed homes and

two local government existing buildings. On the above figure the Ramboll Report has commented as follows:

“There are many more buildings that fall outside the priority list but are worthy of inclusion in any future heat network viability and design. The above figures, therefore, are a significant underestimation of the total amount of heat available within the LTC. It must be noted, however, that not all of this potential load will ever be a viable opportunity.”

2.3 Heat mapping for the LTC's specific development sites

The purpose of this town centre specific study is to add a further layer of detail to the priority list of buildings chosen for LTC in the Ramboll Report. Adopting the same methodology outlined in the Ramboll Report and extending the calculation over all the specific development sites identified in the previous section of this report, the findings of our investigation can be summarised as follows:

Table 2.1: Heat consumptions estimation for the specific developments considered at LTC

Sub-Areas	Development sites	Site coming forward	No.dwellings										Commercial, m2		Heating consumption	
			Potential	Coming Forward	Shops & services	Restaurants/Pubs	Takeaways	Offices	Hotel	Education/Health	Leisure	Coming forward MWh/yr	Potential housing, MWh/yr			
1 Gateway	1 Lewisham Gateway 15 Kings Hall Mews (1-13)	1 Lewisham Gateway 36 Kings Hall Mews (1-13)		800	12,000	4,000	1,000	8,000	5,000	10,000	5,000	5,237	-			
2 Centre	2 Lewisham Centre	2 Lewisham Centre	200		600							40	752			
	3 Land north of the shopping centre	3 Land north of the shopping centre														
	4 Land south of the shopping centre	4 Land south of the shopping centre														
	5 Citibank Tower	5 Citibank Tower														
3 Lee High Road	6 Lee High Road eastern end	7 Lee High Road - 104-120		57	2,000							348	-			
		8 Lee High Road - 18-28	14	-								53				
		9 Lee High Road - 32-34	3	11								-				
		10 Lee High Road - 36-56	22	83								-				
		11 Lee High Road - 58-64	14	53								-				
4 Loampit Vale	7 Railway strip	13 Thurston Industrial Estate 4	456									-	1,715			
		14 Thurston Industrial Estate 5										-				
	8 Land west of Jerrard Street	15 Thurston Industrial Estate 1		406	6,771				1,980							
	9 Land east of Jerrard Street	16 Thurston Industrial Estate 2						-								
		17 Thurston Industrial Estate 2a						-								
	10 West side of Elmira Street	18 Thurston Industrial Estate 3						-								
		19 Loampit Vale a						788	1,856	314		8,059		5,285		
	11 East side of Elmira Street	20 Loampit Vale b														
12 Lewisham Bridge Primary School	26 Lewisham Bridge Primary School					8,326	484									
5 Conington Road	- Gilmex and Blakely site	21 72-78 Conington Road		400								1,504	-			
	13 Tesco block and Car park	23 Venson Site, Conington Road														
6 Ladywell	14 Ladywell Leisure Centre	-	150		3,000							201	564			
	16 Ladywell Baths (Playtower)				1,400							94				
Sites outside AAP area		31 Heathside and Lethbridge	1,054	138	512					768		598	3,963			
		37 Lewisham College														
		Total	1,874	2,628								15,918	7,046			
		Total AAP opportunities		4,502												

The data in Table 2.1 sets out the annual energy consumption of each of the specific development sites identified in this report. Some developments have no current heat data but have been included for information, as they may have the potential of contributing to the development of a heat network.

The heat loads for the sites of Lewisham Gateway and East and West of Elmira Street have been extracted from the Energy Strategy reports for these sites. The loads for the remainder of the sites have been benchmarked using the Ramboll methodology in order to generate comparable data between our report and the London Heat Map for LBL.

The above calculation distinguishes between heat loads likely to be available in the near future, attributable to the mixed use sites identified as “coming forward” from the LBL, and potential heat loads that may be available afterwards in order to fulfil the AAP’s housing aspirations.

Using this method the estimated heat consumption for the coming forward sites is equal to 15,918MWh and is therefore larger than the value presented in the Ramboll Report due to the fact that more detail has been included. Additional heat loads, potentially up to 7,046MWh, could be available for a further expansion of the district heating if the housing numbers in the AAP are considered.

3. Energy strategy options

3.1 Introduction

This section of the report is couched in terms of answering three questions:

- What are the major opportunities for CO₂ emission reduction in Lewisham Town Centre?
- What role, if any, should DE play in minimising CO₂ emissions in Lewisham Town Centre?
- Is DE realistic and if so what options are there for delivering it?

As the scope of the assessment is qualitative rather than quantitative this section is based on precedent and a number of industry reports that give a good steer as to where the answers will lie. However as many aspects of this area are in a state of flux the recommendations are given in terms of a direction that should be followed rather than absolute certainty. The outcomes will be influenced by the rapidly evolving policy framework for CO₂ emission reduction and the resultant industry reaction to each change. The following section therefore summarises key policy issues and subsequent sections then address the three questions in turn.

This section has informed section 3.1.10 of the AAP Further Options Report.

3.2 CO₂ emission reduction policy in the UK

3.2.1 Building Regulations and 'zero carbon'

The government's aspiration to create zero carbon new buildings started with the 'Building a Greener Future' document in 2007. This document contained a proposed timeline of tightened policy amendments, to be implemented via Part L of the Building Regulations, culminating in the requirement for all new homes submitted to Building Regulations approval after 2016 to be 'zero carbon'. The proposals included steps of improved carbon emissions to be implemented in 2010 and 2013 updates to Part L, with the 2010 element implemented in October 2010. A similar aspiration for non-domestic buildings exists, culminating in all new non-domestic buildings to be zero carbon from 2019, but the plans for how this is to be achieved in policy as less advanced.

The relevance to the AAP is that the final CO₂ emission reduction policy approach will affect the cost burden that the Building Regulations trajectory towards zero carbon will have on developers of new sites. In turn, it will have an impact on the policy requirements for schemes in the town centre and also have an impact on viability scenarios. Since the emergence of the concept of 'zero carbon' in UK policy, the definition has already changed several times and the government is currently in the process of establishing a final definition through industry consultation. The emerging definition is based on a 3 tier hierarchical approach whereby a minimum level of demand reduction through energy efficiency measures will be required, followed by a minimum level of carbon emission reduction through on-site measures (or through connecting to an existing heat network), with the final element of CO₂ emissions offset through the connect of a set of 'Allowable Solutions'. This is as outlined in the following table:

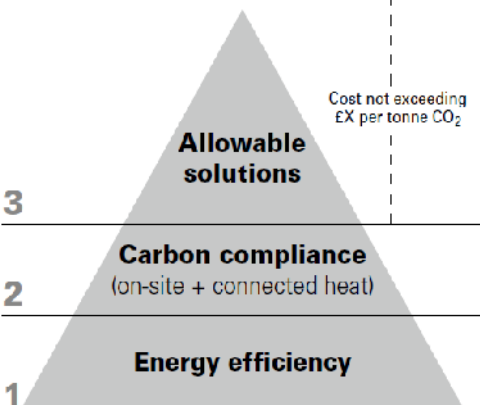
Zero Carbon Hierarchy	List of 'Allowable Solutions'
 <p>The diagram is a pyramid divided into three horizontal sections, numbered 1, 2, and 3 from bottom to top. Section 1 is labeled 'Energy efficiency'. Section 2 is labeled 'Carbon compliance (on-site + connected heat)'. Section 3 is labeled 'Allowable solutions'. To the right of the pyramid, a dashed vertical line extends from the top of section 3 down to the top of section 2, with the text 'Cost not exceeding £X per tonne CO₂' next to it.</p>	<ul style="list-style-type: none"> • Carbon compliance beyond the minimum standard • Energy efficient appliances / controls schemes • Export of LZC heat / cooling to surrounding developments • S106 Planning Obligations • Retrofitting of existing buildings in the locality • Investment in LZC energy infrastructure • Off-site renewable electricity via private wire • Any other measures announced by Government

Table 3.1: Zero Carbon Hierarchy as outlined in "Definition of Zero Carbon Homes & Non-Domestic Buildings"

The most recent updates in relation to these three elements of definition are as follows:

- **Energy Efficiency:** In November 2009, following a 3 months study undertaken by the Zero Carbon Hub (the Hub) the Minister of State for Housing and Planning announced a minimum fabric energy efficiency standard for 'zero carbon' homes as 46k Wh/m²/year for detached, semi-detached and end-of-terrace dwellings and 39 kWh/m²/year for apartment blocks and mid-terrace houses.
- **Carbon Compliance:** In a written Ministerial statement issued in July 2009 the Carbon Compliance target was announced to be 70% of regulated energy, as calculated using a bespoke calculation methodology developed for the consultation. This was updated in July 2010 by a statement from the new minister that a study was to be undertaken by the Zero Carbon Hub into both the methodology and where the Carbon Compliance level should be, based on viability.
- **Allowable Solutions:** A consultation on Allowable Solutions stated for the end of 2009 failed to materialise, however in the same statement in July 2010 the minister noted that the current list of was to be reviewed.

One point to make, in terms of how developers can respond while the details of the above are still in abeyance, relates to the interaction between Carbon Compliance and Allowable Solutions when determining viability. So for new build projects that span 2016, as are included within the AAP, the detail of both aspects is critical to robust decision making.

3.3 The London Plan

The London Plan has been a driver of energy policy and its evolution is therefore of relevance when considering the future of energy in the built environment for the capital, particularly the energy requirements placed on developers of new sites and the energy solutions that therefore may emerge.

An Examination in Public on the next revision of the London Plan has recently ended, with the response expected in spring 2011 and the final plan expected to be implemented in August 2011.

In relation to energy policy, emphasis on renewable targets that have been typical of the previous revisions appear to be disappearing in favour of an overall CO₂ emissions reduction target, with a suggested figure of 44% reduction from Part L 2006 for the first 3 years to 2013. However the requirement to consider decentralised energy is expected to still remain. There is some uncertainty whether this figure is to apply to the 'total' emissions (including appliance load) or whether it only applies to the regulated load that is covered by the Building Regulations. If the latter applies then the new targets appear to be lower than those that are currently set.

3.3.1 The Lewisham Core Strategy Policies

These emerging policies support the Council's ambition for Lewisham to play a leading role in responding to climate change - locally, regionally and nationally as outlined in the Lewisham Climate Change Strategic Framework.

Emerging Core Strategy Policies 7 and 8 endorse the use of the following energy hierarchy:

- Use less energy ('Lean')
- Supply energy efficiently ('Clean')
- Use Renewable Energy ('Green')

Emerging Core Strategy Policy 8 states that proposals, for major developments (with a floorspace of 1,000 sq.m. or 10 residential dwellings or more) will be required, amongst other things, to:

- connect to an existing or approved decentralisation energy network, safeguard potential network routes, and make provision to allow future connection to a network or contribute to its development, where possible within the Regeneration and Growth Areas
- integrate on-site renewable energy generation into the design of a building to ensure CO₂ emission reductions are maximised
- all new residential development (including mixed use) will be required to achieve a minimum of Level 4 standards in the Code for Sustainable Homes
- fully contribute to CO₂ emission reductions in line with the regional and national requirements, and make a financial contribution to an offset fund if this cannot be adequately achieved on site

A focus on demand reduction (i.e. being 'Lean') should always be the first step in CO₂ emission reduction.

3.3.2 Financial Incentivisation Mechanisms

The following section outlines the main financial incentivisation mechanisms currently set out, or in the process of being so, by government to incentivise low and zero carbon technologies. The relevance to the AAP is that the relative levels to which they are set for micro and community energy approaches will directly affect how the industry responds to the zero carbon challenge and which energy solutions will generally emerge as front runners in both cost and risk terms.

3.3.2.1 Feed-In Tariffs

A Feed-In-Tariff (FIT) is a policy mechanism which is designed to encourage 'small scale' renewable electricity generation by allowing the generator to earn a regulated income from every kilowatt hour generated. As of 2010, FIT legislation is in place in 63 countries across the world.

From April 2010 Feed-in tariffs (FIT) is available for electrical generation from renewable sources. The tariff value varies with the source and size of generation. PV panels of less than 4kW installed on new buildings will benefit from a generation tariff of 36.1 pence/kWh for electricity produced and consumed in the development. The onsite consumption would also offset the cost of imported power, offering a further benefit which, depending on the supply agreement, could be in the region of 10 - 15 pence/kWh. However if there is no on site consumption, the electricity could be exported and would receive an additional export tariff of 3 pence/kWh.

The tariff levels remain fixed for the lifetime of a particular system, which is 25 years for PV. However to incentivise early installation a 7% annual depreciation rate will apply, which will have the effect of reducing the generation tariff for new installations that begin generating after 2012. For instance a scheme that starts generating in 2012 or 2013 would receive a generation tariff of 33 pence/kWh for its lifetime rather 36.1 pence/kWh. In addition it should be noted that a review of the scheme is planned for 2013. Overall therefore the incentive exists for schemes that can get up and running in the relatively short term, but cannot necessarily be relied upon for long term revenue.

In relation to CHP, only gas-fired MicroCHP units of 2kW below will benefit from the FITs.

In relation to the Capitalisation of Feed-In Tariffs for PV, it has been the intention of DECC in setting the Feed In Tariffs (FITs) that a rate of return of 5-8% should be achievable on the investment. However only the 'owner' of the generating equipment can receive the income consequently it is not straightforward for a housebuilder to enjoy the return on investment. New companies are springing up that offer attractive PV financing offers based around a long term south facing roof rental agreement. The offers available are limited for individual home owners but are more prevalent for social landlords and commercial property owners.

3.3.2.2 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is a forthcoming piece of legislation to provide a fixed rate financial incentive for renewable heat. In April 2011 the previous government was intending to introduce the Renewable Heat Incentive to encourage renewable heat generation. The full details are still under consultation and may be subject to some variation but it was intended that the scheme would pay an incentive per kWh based on a fixed rate of return for heat generated from renewable technologies such as

biomass, solar thermal or heat pumps. The rate of return was intended to be around 12% for all technologies except solar thermal which would be 6%.

The RHI has recently been ratified by the new government in the Comprehensive Spending Review of 20th October 2010, but the details and therefore the degree to which it can be relied upon to solve potential funding issues are still unclear.

3.3.2.3 Renewable Obligation

Renewable Obligation Certificates (ROCs) are the basic “currency” of the Renewable Obligation cap and trade system with 1 ROC issued for every MWh of qualifying renewable electricity generated. ROCs are issued to operators of eligible generating stations.

The Renewables Obligations Order requires Electricity suppliers to either have a certain proportion of their supply from renewables sources or to purchase the required ROCs which are auctioned quarterly.

The revision of the order in April 2009 introduced the concept of ROC Banding, whereby a different number of ROCs are awarded per MWh of electricity according to the type of technology that is used to generate the electricity.

Generation Type	No. of ROCs per MWh
Landfill gas	0.25
Co-firing of biomass	0.5
Energy from Waste CHP	1
Dedicated biomass	1.5
Advanced pyrolysis	2
Advanced gasification	2
Dedicated biomass CHP	2

Table 3.2: the quantity of ROCs eligible per MWh of power for some of the relevant technologies.

In terms of renewably fuelled CHP, the order defines it as “qualifying combined heat and power generating station” means a combined heat and power generating station which has been accredited under the CHPQA.’

3.4 CO₂ emission reduction opportunities in Lewisham Town Centre

CO₂ emission reductions are typically achieved through application of the following hierarchy:

- Use less energy (‘Lean’)
- Supply energy efficiently (‘Clean’)
- Use Renewable Energy (‘Green’)

A focus on demand reduction should always be the first step in CO₂ emission reduction, however after a certain point a law of diminishing returns means that it then becomes more cost effective to look at the offsetting of remaining CO₂ via efficient energy supply techniques and the application of renewable technology. For new buildings and major refurbishment the improvement in energy efficiency of buildings

is being driven through the Building Regulations and for the existing stock improvements will come through other national policy such as the Household Energy Management Strategy. The main focus of this report is therefore the degree to which the AAP can facilitate good practice in the Clean and Green steps of the hierarchy.

'Clean' and 'Green' carbon emission reductions can be achieved through application of the following list of low carbon and/or renewable energy technologies (the option numbers relate to the energy strategy section of the Further Options Report):

- Option 17A: Solar Thermal (ST);
- Option 17B: Photovoltaics (PV);
- Option 17C: Wind turbines;
- Option 17D: Gas-fired CHP;
- Option 17E: Biomass or bio-fuel fired CHP;
- Option 17F: Air Source Heat Pumps (ASHP);
- Option 17G: Ground Source Heat Pumps (GSHP); and
- Option 17H: Decentralised Energy

While it is possible for each of these technologies to individually achieve an element of CO₂ emission reduction some are more suited to particular types of energy profile, some compete for the same energy load and therefore cannot be considered in parallel, some are more cost effective than others and all have technical implications that should be considered.

The principles of the technical issues that affect viability are illustrated in Table 3.3: Energy Supply Options

The table shows which of the particular technologies suit which energy loads and therefore which have the potential to compete with each other. The main differentiating factor is those technologies that produce heat and those that produce electricity, although in some instances further restrictions occur.

Energy	Use	ST	PV	Wind	Wood (bio-fuel)	CHP	ASHP	GSHP
Heat	Hot water supply	✓	×	×	✓	✓	? ¹	? ²
Heat	Space heating (or for cooling)	×	×	×	✓	?	✓	✓
Electricity	Lights, pumps and fans (Part L regulated); small power and appliances (Non-regulated under Part L)	×	✓	✓	×	✓	×	×

Table 3.3: Energy Supply Options

¹ ASHP can supply hot water but normally with a lower efficiency.

² GSHP can supply hot water but normally with a lower efficiency.

Table 3.4 includes technical consideration for Lewisham Town Centre specifically by summarising the suitability of application of the technologies to an urban location.

Technology	Considerations	Applicable to LTC
Solar Thermal	Roof angle, orientation and shading Pipe run to cylinder Individual twin coil DHW cylinder or communal system with metering issues	✗ [Limited roof area will reduce suitability in high density sites]
Photovoltaics	Roof angle, orientation and shading Requires inverter and connection to distribution board Impact of panel on roof	✓ [Although limited roof area]
Wind turbine (Building mounted)	Requires inverter and connection to distribution board Noise concerns Output is heavily dependent on site, i.e. gable end or other suitable exposed site on building Industry research indicates that output is often negligible	✗
Wind turbine (Small stand alone)	Output is heavily dependent on exposed site Requires inverter and connection to distribution board Private wire network connection for CSH credits Noise concerns Public perception issues O&M requirements	✗ [Would be sheltered by taller buildings]
Wind turbine (Medium/large stand alone)	Issues of visual impact Also issues of Radar interference with airports Noise, radar, flicker and ecology concerns Output is heavily dependent on exposed site EIA and separate planning application Requires connection to power distribution network (probably HV) Private wire network connection for CSH credits O&M requirements	✗ [Would be sheltered by taller buildings]
CHP	Energy centre Greater space take than regular gas boiler Only counts as renewable if biomass fuelled O&M requirements (including ash removal if biomass fuelled) Planning impact of flue Requires connection to power distribution network Communal heat network	✓
Biomass Boiler	Energy centre(s) Greater space take than regular gas boiler Twin-lined flue Fuel store and access for delivery O&M requirements including ash removal Planning impact of flue Communal heat network Air quality considerations Ongoing cost of fuel	✓
ASHP (Air source heat pump)	Low temperature heating system Current calculation methodology gives undue benefit to ASHP systems. Can require supplementary systems for extremes of temperature	✗ [Systems not easily available for apartments]

Technology	Considerations	Applicable to LTC
GSHP (Ground source heat pump)	Greater space take than regular gas boiler Vertical boreholes or external space required for horizontal loop Low temperature heating system Current calculation methodology allows GSHP to emit significantly more carbon than non-electric systems Heat network and energy centre for communal system Can require supplementary systems for extremes of temperature Uncertainties over output in practice	✓ Lack of sufficient ground area, however could be feasible if heating and cooling loads are relatively balanced]
Decentralised Energy	Energy and cost-efficient way to reduce CO ₂ emissions Requires a large energy centre and guaranteed baseload	✓

Table 3.4: Technology Considerations for Lewisham Town Centre

From the above it can be seen that the technologies that may have suitability to the town centre application in order to achieve the AAP aspirations in relation to CO₂ emission reduction are as follows:

- Wood fuelled biomass
- Photovoltaic panels (where sufficient roof area exists)
- CHP
- GSHP
- Decentralised Energy

A coordinated strategy for the AAP will need to make sure that a priority of decision making is established for instances where several technology options exist. In relation to this the following observations are relevant:

- Of the options selected Photovoltaics will be the technology that will offset electrical load, and CHP and biomass offset heat load (together with electricity in the case of CHP). Therefore there is limited technical potential for these to compete with each other
- The PV option represents 'micro-generation' opportunities that will be suitable on specific cases only
- The biomass and CHP options can be implemented at either a building or a community scale
- Biomass boilers can be fitted with filters that reduce the particulates to acceptable levels even for Air Quality Management Areas

Overall therefore the question is whether small or large scale CHP and biomass solutions are more appropriate and whether, where PV opportunities exist, they should be prioritised over the heat based approach of biomass or CHP.

The answer to these questions lie in assessing the cost effectiveness of each of the options, and this is addressed in the following section.

3.5 The role of Decentralised Energy in Lewisham Town Centre

3.5.1 Industry precedent in decentralised energy

Having established in board brush terms which low and zero carbon technologies might be suitable for the AAP area, the next step is to establish which are likely to be cost effective solutions given the characteristics of the town centre site. To establish this it is necessary to consider cost effectiveness in the long term rather than just upfront capital outlay.

The role of decentralised energy in the search for CO₂ emissions has been the subject of many industry reports, a number of which have been outlined below.

Sustainable Community Infrastructure Task Group report (SCI Report): joint UK GBC and Zero Carbon Hub task group, report launched in Feb 2010.

A task group set up with the aim to achieve a greater understanding, between all stakeholders, regarding the actions that need to be taken to unlock the most socially-equitable, cost-efficient and carbon-effective ways of delivering sustainable community-scale infrastructure solutions.

The common outcomes from research into this area can be summarised by the following extract from the UK GBC/Zero Carbon Hub Sustainable District Infrastructure report:

"Deployment of integrated, cost effective, low carbon infrastructure is increasingly recognised as having an important role in meeting the challenges of delivering a sustainable built environment. However there is currently a gap between what national policy imperatives are appearing to require, what planners and local political leaders are seeking to establish and what industry appears geared up to deliver." UK GBC/Zero Carbon Hub SCI report, Feb 2010.

The SCI report recommends that barriers to delivering sustainable district infrastructure can be overcome by issues such as commitment from the public sector to community networks, leadership and up-skilling at local government level and an ability of public and private sector parties to create novel delivery partnerships.

The potential and costs of district heating networks: report by Poyry for DECC in May 2009.

The study identified the potential costs and benefits of district heating, assessed the technical potential in the UK and investigated the economic and non-economic barriers to further investment and deployment. The report was part of ongoing work by DECC into the need for, and form of, policy options to support district heating systems.

The "Poyry" report on low carbon district heating networks, whilst identifying short-term capital cost issues, identifies district heating networks as one of the most cost effective carbon abatement technologies for the medium term, reducing carbon emissions at £50/tonne.

This is powerfully captured in the following graph from the report, showing the 'implied carbon abatement cost' potential in £/tCO₂ of various low and zero carbon technologies. As can be seen, almost all those that use a community approach fare better than the micro-renewable alternatives.

Decentralised Energy report: by London First, October 2009

This report set out the measures needed to meet the Mayor's target of decentralising a quarter of London's energy supply by 2025, as part of a city-wide strategy to cut carbon emissions.

The London First report recommended that decentralised energy be planned on a district scale and connect to the existing stock, with Boroughs undertaking energy masterplans. It also recommended a new 'integrator' body within LDA to help plan and deliver this new infrastructure and a PPP approach for delivery, with the public sector unlocking and de-risking schemes to help attract the private investment required to build this new energy infrastructure.

Power in numbers: the benefits and potential of distributed energy generation at the small community scale, Energy Savings Trust, Nov 2008

This study explored the relative merits of distributed energy technologies at the community level compared with the individual level. The aim of the study was to:

- inform the Energy Saving Trust on its strategy for community distributed energy,
- assess the overall UK, English, Scottish and Welsh potential of acting at a community level with respect to distributed generation,
- assess the cost and carbon benefits of community scale energy projects compared with individual microgeneration projects, and
- evaluate policy scenarios for the support of community distributed energy and inform the policy debate accordingly.

The report concluded that, in the search for solutions to the reduction of CO₂ emissions in the built environment, activity aimed at creating community energy projects can be justified. It summarised that community scale energy solutions tend to have the lowest cost and that developers and new build communities will be incentivised to encourage a community approach to energy. It noted that this is particularly true for inner city developments, as through spatial constraints many will not have access to onsite electricity measures without a community solution.

3.5.2 Viability Equation

Since the advent of the first London plan in 2004 the industry has been acquiring knowledge in relation to the financial viability and delivery implications of decentralised energy. This has been acquired through collaborative industry exploration, such as the reports outlined above together with government backed initiatives, such as the work of the Zero Carbon Hub.

Of particular interest has been the financial implications of district heating, given that the UK has little experience or precedent to draw on. It has emerged that the cost of the distribution pipe-work has a significant impact on viability, thus making the concept of heat density an important aspect to consider. Early industry advice on this gave figures such as 30 dwellings per hectare and 3,000 kW/km² as typically being markers above which a district heating system might be viable. However, the viability equation is not a static one and these figures are affected by issues such as:

- what constitutes 'business as usual' against which a district system is being compared, i.e. as the policy environment tightens it is no longer possible to compare with conventional energy solutions
- the ability of the energy sector and finance industry to assist in solving the need for higher upfront capital injection in order to implement district energy schemes
- the industry uptake of district heating such that monopoly situations don't affect the cost of pipe-work

- the ability to streamline groundwork with other trades and how the statutory authorities allow district heating pipe-work to be accommodated in 'adopted standard' roads
- the emerging design solutions to issues such as distribution losses (which will affect both size and specification of pipe-work and components)
- the influence of government incentivisation and cost of compliance burden on viability comparisons and energy strategy selections, particularly with respect to 'on plot' micro based or decentralised approaches
- how local authorities are facilitating decentralised energy solutions on a local scale such that developers can discharge their compliance burden by connection to an existing system
- how the tightening of Building Regulations policy, specifically the improvements in fabric energy efficiency which will lead to reduced heat demand, will affect the viability.

In relation to planning the locations of and arrangements for decentralised energy plant, it should be noted that energy centres cannot always be delivered upfront due to technical and economic reasons. In particular a CHP system, which would ideally be sized to cater for the whole development in order to achieve higher efficiencies, would not then be financially or technically viable to operate until a certain level of build out has been achieved. This could be in the region of 60%. In an ideal world it would not be preferable to use multiple energy centres and CHP installations because experience in other developments has shown that in the long term this increases long term operational costs (including cost to occupiers) as well as technical complexity. Furthermore, multiple centres may not be the most effective in terms of carbon emission reductions. However it is sometimes the case that overall cost and CO₂ emission reductions can be sacrificed in order to achieve some forward momentum and this is especially likely to be true in the current climate of uncertainty and developer need for flexibility. Delaying capital expenditure until it is needed may have significant improvements to net present value and cash flow.

3.5.3 Decentralised Energy for Lewisham Town Centre

The work above is sufficient to draw the conclusion that, given the plan includes approximately 1,100 homes that will be required to be zero carbon and providing upfront finance and cashflow issues can be resolved, decentralised energy could have a key role to play in the CO₂ emission reduction aspirations of the AAP. In terms of financial viability, the direction of travel towards a wider uptake of decentralised solutions is likely to be through the implementation of small schemes and a longer term plan to join individual schemes together, as is encapsulated in the London Heat map initiative.

Therefore in order to respond to energy related policy for new build developments a community scale biomass or CHP approach should be prioritised over other building scale, heat producing low carbon equivalents. Also, when considering the direction of policy aspiration in terms of CO₂ reduction, the most cost effective solution long term is likely to be one which absorbs the energy demands of as many high density buildings as possible into a community based system rather than including a plethora of individual building micro-based solutions.

It should be noted in relation to this last statement that the conclusions drawn so far are broad brush only and not based on any quantitative assessment of the specific Lewisham situation or the specific financial viability issues facing the site specific developers. Therefore some flexibility will be required in the emerging AAP strategy to allow both the implications of the continued government refinement of the incentivisation situation to be taken into account and to allow site developers room to influence the outcome on a site specific basis given the opportunities and constraints of their particular site.

In relation to this, developers of new dwellings constructed prior to 2016 that will have to meet the lower CO₂ reduction targets through the Building Regulations may prefer to apply a micro renewables approach given the flexibility and cashflow advantages of such systems. However, providing the development profile is of sufficient density, these dwellings represent a more attractive set of heat customers than is the case for homes built to later regulation requirements with higher energy efficiency targets. Therefore an approach through the AAP that is able mitigate cashflow issues and facilitate upfront funding through third party investment as outlined in a further section below will be a key part of any decentralised solution.

A common thread in all the studies listed above is that some of the main barriers to the increased use of community scale solutions are non-technical and relate to the difficulties of coordinating a diverse range of stakeholders to take collective action. Thus the power of the AAP is in providing a strong indication of the commitment to make decentralised energy a reality for Lewisham Town Centre, so that stakeholders have the confidence to support the scheme in whatever way relevant to their own interests, be it community approval, financial investment or developer skills and support.

3.6 Establishing realistic options for delivering Decentralised Energy for Lewisham Town Centre

3.6.1 Introduction

As outlined above, decentralised energy is well established in concept terms as a long term solution to CO₂ emission reduction in urban areas. The challenge for the LTC AAP is to establish what can be considered realistic responses to this approach in reality and what policy to put in place to facilitate this. As the implications and returns of decentralised energy are a long term issue, even perhaps beyond the timescales of the AAP, the overall recommendations for the AAP are to consider the decentralised energy opportunities and encourage implementation when realistic within the timescales, whilst carrying out a watching brief on those assets that may become suitable in the longer term, in order to proactively facilitate discussions that might prove beneficial in the future and make sure that inadvertent barriers to a future implementation are not established in the meantime.

The following sections outline the principles for consideration in terms of deliverable decentralised energy and the opportunities presented within the LTC area.

3.6.2 Principles for consideration

The following principles are of importance when assessing the suitability of an area for a decentralised energy scheme:

- Large heat user(s)
 - Large heat users are the most crucial element of any cluster development. Ideally a number of large energy users or a number of energy users concentrated into a small area creates an ideal environment. Often (one or more) anchor loads are sought as these can provide either a secure and sizeable income stream or be seen as a landmark building that influences the thinking of others in the vicinity.
- Large heat producer
 - The provision of a primary energy source is also a requirement. Any successful network should seek out a local source of energy, preferably a source of waste heat. Waste heat would normally be assumed to come from a source which would otherwise have to “dump” this heat as part of its process. Waste heat can often be secured at a price less than conventional energy sources from fossil fuel, for example. Where no such waste heat can be found, conventional sources of fossil or biomass should be sought.
- Existing networks and/or new development(s)
 - In some instances small heat networks may already have been developed and could form part of a new wider network; they may also contain a heat source that can be used either directly as a primary energy source or as future back-up. In most instances, however, they will have been sized to accommodate the intended load and have little capacity for expansion.
 - Larger networks may also have been developed and the extent to which new networks and buildings can interlink would be subject to discussion with the operator of such a network.
 - New developments can provide an ideal platform for creating a new heat network that is then able to connect to a wider area. The new development will often have regulatory requirements that mean decentralised energy is already under consideration and thus can act as the anchor load and the site of any primary energy source. This often makes the development of a wider network more viable as the initial asset provisions can be accommodated by the new development.
- Public buildings(s)

- Connecting public buildings not only provides a series of potential anchor loads but also sends a very positive message to other building owners in the area. This action often provides assurance from prospective connectors, who may harbour concerns over that suitability and connectivity to a heat network.
- Building Diversity
 - In an ideal scenario a heat network should strive to secure a variety of buildings with differing demand profiles and heat loads. This variation helps to optimise the sizing and selection of heat network equipment. It should be noted that whilst this is desirable, it is by no means essential that this should always apply.

Using these principles in qualitative terms, the steps towards establishing realistic opportunities for LTC are then as follows.

- Identify new and refurbished sites of relatively high density or large heat load
- Identify new sites which, as part of a response to the London plan or other policy requirement, are already considering a district heat network
- Link associated timescales of development or refurbishment with that of the AAP and of other identified sites in the vicinity
- Establish a 'watching brief' for those sites that don't immediately fit in terms of timescale or proximity
- For those sites that appear to have synergy, look in further detail at the characteristics of the sites e.g. in terms of logistics with respect to distance and complexity of connection, to rule out any logistical or other 'show stoppers'
- Retain any sites discarded at this stage on the 'to watch' list
- For the short list of sites, facilitate further detailed assessment of logistical and technical issues such as potential energy centre locations, connecting pipework routes, operator issues etc.

It should be noted that in almost every case the issues described ultimately relate to cost and therefore financial viability rather than technical possibility.

As outlined above potential assets exist in both new and existing heat users. The following two sections therefore cover briefly the energy related issues for these two types of asset.

3.6.3 Overview of energy issues for existing buildings

Existing buildings with heat demands that are suitable for decentralised energy will preferably meet some fundamental criteria:

- Base load heat demand for a sizeable portion of the year
- Demand quantities and profiles that can be supplied by the decentralised energy system; and
- Heat temperatures that can be supplied by the system.

Buildings that are likely to be suitable will have relatively high occupancies and operating hours. Some typical examples are:

Type	Notes on suitability of building use
Swimming Pools	Pool heating and domestic hot water (DHW).
Leisure Centres	Long operational hours, high DHW load.
Hospitals	24hr operation. High temperatures for space heating, high DHW load
Residential Care Homes	High temperatures for space heating, high DHW load
Hotels	Long operational hours, high DHW load. Often have leisure facilities
Community Heating	Affordable warmth, especially for the elderly and young children.
University Campus	Heat for office and teaching areas, and evening activities. Accommodation will have high DHW load.
Museums	Need to maintain stable conditions independent of opening hours. Potential requirement for dehumidification.
Schools	Suitable where there are extended hours, boarding, evening or leisure facilities.

Examples of such anchor loads that have been identified for LTC through discussion and the existing heat mapping information are as follows:

- Lewisham Hospital
- Existing Heathside and Lethbridge Estate
- Lewisham Police Station
- Lewisham Christian Centre

How they could be incorporated into future decentralised energy approach has been outlined in the 'recommendations' section below. The list is not exhaustive and forms a first pass at the exercise, illustrating how a more detailed assessment with occupier engagement could lead to beneficial outcomes.

The majority of the sites will need to remain on the 'to watch' list. The high single heat users that are suitably placed but are not planning relevant refurbishments within the timescales of nearby developments. If the local authority can monitor and engage in energy discussions with the heat user on an 'in principle' basis, thereby establishing the potential commitment to and future refurbishment timescales that allow the anchor load to be tracked as a future 'heat customer' asset, albeit beyond the plan period.

Overview of energy issues for relevant LTC development sites

At present, development specific heating networks for Lewisham Gateway and Loampit Vale are being proposed by the relevant developers and a brief description of the proposals is given below.

Investigation has been carried out on the possibility of installing a community energy centre system at East and West of Elmira Street. The single energy centre has been intended to provide heating to the whole development.

Figure 3.2: Indicative phasing of district heating for East and West of Elmira Street

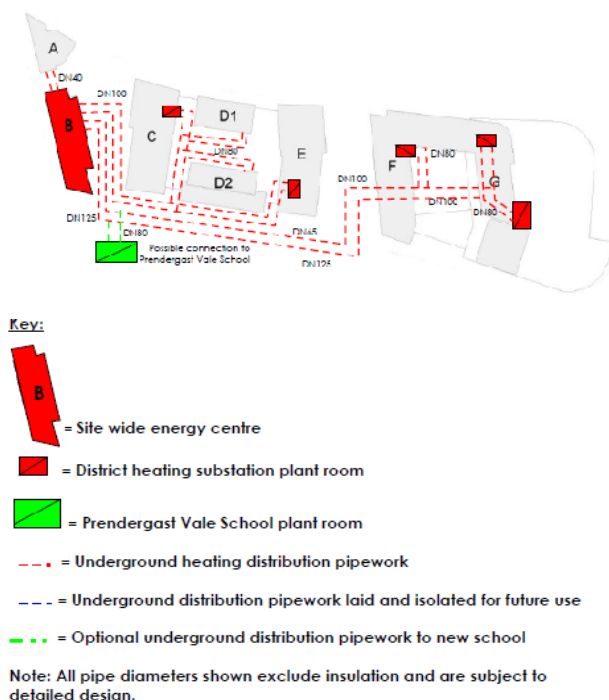


Figure 26. Step reductions in CO₂ emissions at Loampit Vale

Source: LV11: Energy Strategy March 2009, Barratt

- 2no. 210kW_e CHP units that will generate low carbon heat and electricity. The CHP will generate sufficient heat to meet the developments domestic hot water and leisure centre swimming pool needs whilst not exceeding the developments base power demands.
- A 400kW biomass boiler that will meet 75% of the developments annual space heating demands reducing CO₂ emissions by approximately 9.5%.
- A 53kW_p (approximately 400m²) of photovoltaic modules that could provide a 1.5% reduction in CO₂ reduction. It is proposed that the

It should be noted that the proposed pipe-work design gives cause for concern, as the radial distribution arrangement allows the potential for major pipe-work distribution losses. This issue should be raised with considered if possible, as distribution losses can have a significant effect on the CO₂ emission reductions achieved in practice as well as the financial viability of the operating scheme.

3.6.3.2 Lewisham Gateway Energy Centre

A biomass CHP installation has been proposed for Lewisham Gateway³. The energy centre would require a large scale plant room and fuel store as well as the district heating network. It is estimated that around 60-90m² of floor space would be required to accommodate a CHP system and backup boilers at this site. This figure excludes the space required for the fuel store, which can vary significantly in size depending upon the hours or days' operational equivalent held in reserve. This is in turn dependent upon the frequency of fuel deliveries. If the plant were to be located inside an existing building, it may be necessary to install fume extraction equipment to meet Building Regulations standards. The flue(s) should also not extend more than one metre above the roof-line if installed in an existing building.

The approximate size of biomass CHP system that would be suitable for the Lewisham Gateway development is a 0.4MWe system. This is a relatively small capacity system for this type of technology and a commercially ready system may be difficult to source. It is more likely that a 0.5MWe unit would be available. It may be possible to locate the CHP system underground; however, biomass CHP requires a substantial flue diameter and length which would need to be landscaped appropriately.

Over-sizing of the CHP plant has also been anticipated to accommodate future demand, or possible connection of industrial heat. This would result in a comparable increase in CHP plant footprint and fuel storage requirements.

3.6.3.3 Tesco site

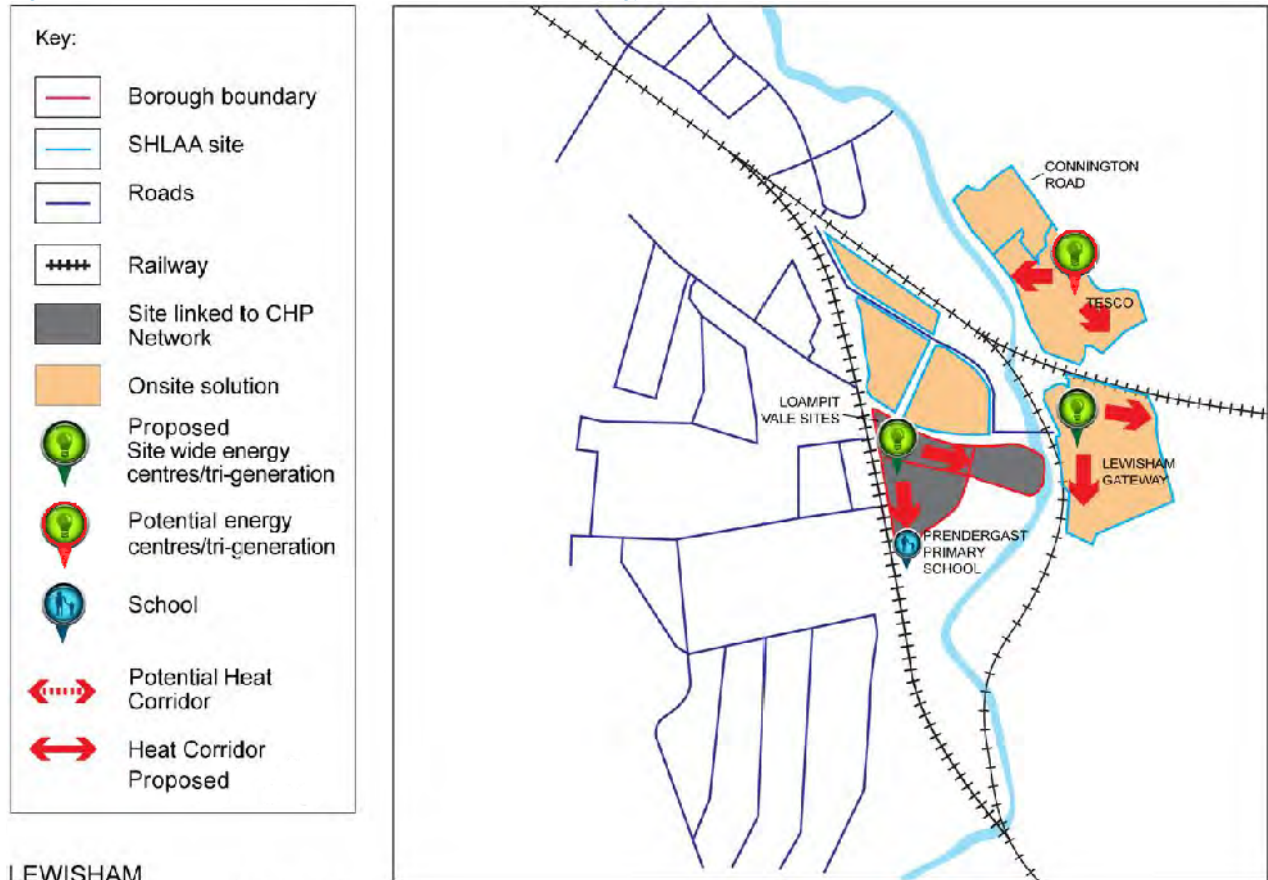
The Tesco site is noted in this section given that the site has capacity for a significant number of apartments in addition to the extension / refurbishment of the existing supermarket and, as a GLA referable scheme, is likely to have to be required to consider decentralised energy in response to the London Plan.

3.6.3.4 Summary of relevant district energy proposals for current sites

A map of the three schemes is given in Figure 3.3. At present Loampit Vale is the only area with a proposed connection to an external site (Prendergast Primary School). However the aim for a coordinated energy strategy for the AAP and beyond would be to facilitate the linking up of such sites in the future, where logistics such as proximity and road/rail/water course infrastructure allow. To put such a concept in context for LTC these main arteries are also shown in the map.

³ LBL Renewables Evidence Base Study Feb 2010, Atkins.

Figure 3.3: Lewisham Town Centre: Decentralised Energy Centres proposed for development specific scheme.



LEWISHAM

Source: LBL Renewables Evidence Base Study Feb 2010, Atkins

3.7 Recommendations for including Decentralised Energy in an AAP energy strategy approach

3.7.1 Introduction

Based on the above principles and site specific information for LTC a series of potential heat network clusters were identified for further consideration. In each case the primary catalyst development is listed below, with the long list of possible heat assets also given in brackets:

- Cluster 1: Loampit Vale East and West of Elmira Street (associated development: Prendergast Vale School and further potential developments) including the Tesco refurbishment and associated residential development (associated buildings: Heathside and Lethbridge and further potential developments)
- Cluster 2: Lewisham Gateway (associated development: Lewisham Centre and Lee High Road).
- Cluster 3: Ladywell Leisure Centre (associated building: Hospital)

The recommendation for each cluster is given below, alongside an explanation of how this was derived. It should be noted that at this stage the viability of each building connection has not been assessed as this is an activity that would occur during a more detailed feasibility study of each potential opportunity.

3.7.2 Cluster 1: Loampit Vale

Energy characteristics

Land West of Jerrard Street: nearly expired outline consent that is not currently being acted upon includes intent for a biomass heating scheme, but no spatial details available, and a S106 agreement that stipulates a 145kW biomass boiler.

Loampit Vale South: a site that is already being developed with district heating, the location of the energy centre currently shown as being on the north east corner of the site and therefore in the right position for possible future linking northwards with the Land West of Jerrard Street site above

Tesco development: the site has capacity for a significant number of apartments and the extension of an existing Tesco that will need to comply with the London Plan need to consider decentralised energy.

Heathside and Lethbridge sites: outside the AAP area and with the potential to be connected to a local decentralised system, except that they are logistically split by the existence of the existing Gilmex and Blakely site.

Potential existing anchor loads: swimming pool already under development.

Recommendations

With respect to decentralised energy this is a potential future cluster and should be put on the 'to watch' list, as although probably beyond the timescales of the AAP, the existence of Loampit Vale South with its own site energy centre could act as a catalyst for a future possibility to link with the development West of Jerrard street, if the consented scheme is taken forwards in any similar format for a system comprising of two energy centres and resilience linking, as well as the possibility for connection to the swimming pool as and when there is likely to be major pool refurbishment. The carrying through of the decentralisation

energy theme if the existing consent for the site West of Jerrard street be extended should be a priority. Another watching brief for this potential cluster, to encourage the development of a decentralised scheme for the Tesco site that would then have long term potential with respect to a larger LTC linked scheme.

3.7.3 Cluster 2: Lewisham Gateway

Energy characteristics

Lee High Road: scale of new development established as likely to be minimal.

Lewisham Gateway: Outline consented scheme with its own decentralised energy system planned. Details of the plant location are unknown. Development timescales also are unconfirmed but the scheme remains a strategic priority.

Potential existing anchor loads: Lewisham Centre

Recommendations

This is a site that would suit a coordinated decentralised energy strategy spanning out from the Lewisham Gateway development, and proactive planning for encompassing existing anchor loads such as the Citibank tower as and when they might be undertaking appropriate refurbishment. In terms of planning for a phased approach it is recommended that the solutions for early phases considered that are based on the installation of temporary high efficiency gas boilers, used to provide heat and establish the concept of district heating. In this way, once a critical mass on installation has been established the connection and conversion into a wider system could then be progressed.

3.7.4 Cluster 3: Ladywell road area

Energy characteristics

Primarily small scale sites that are already underway. However some of the development, centred around Ladywell Leisure Centre, forms part of Lewisham's Low Carbon Zone where Lewisham is working with the Mayor of London, GLA and a range of public, private and community sector groups to deliver a reduction in CO₂ emissions of 20% by 2012 and a 60% reduction by 2025. Thus new build in this area, including 150 flats and 1,400m² of retail, will be likely to consider decentralised energy as part of an associated development response.

Potential existing anchor loads: University Lewisham Hospital (outside the AAP boundary) 24,350 MWh in 2009 (Source Ramboll report via the NHS website)

Recommendations

Given the small scale of future new development in the Ladywell area it is considered that the most appropriate response is to encourage a decentralised energy approach for the re-development of the Ladywell Leisure centre site as part of the response to the Low Carbon zone and carry out a watching brief on the opportunities to link both this and any other new development to the hospital site as and when a suitable refurbishment of the hospital energy scheme is being undertaken.

3.8 Preferred Approach

The purpose of this section is to identify a recommended approach with a view to informing the preferred option for the energy strategy in the Area Action Plan Further Options Report.

A coordinated strategy is required to inform specific energy strategies within different parts of the town centre and on specific sites or clusters of sites. In this context, the following observations are relevant:

- PV technologies are best placed to offset electrical load
- Gas-fired CHP and solar thermal are effective at offsetting heat load (together with electricity in the case of CHP). It should be noted that solar thermal and CHP are not normally suitable to be used in conjunction as they compete for the same base heatload
- The CHP option can be implemented at either a building or a community scale

Based on the analysis contained within this report the following list represents those technologies identified as most suitable in relation to the town centre:

- Solar thermal (Option 17A);
- Photovoltaic panels (Option 17B);
- Gas-fired CHP (Option 17D); and
- Decentralised Energy (Option 17H).

The above options are likely to be the offer the most effective CO₂ reduction with Decentralised Energy likely to be the most cost effective at higher levels of reductions. The fragmented nature of development timetables for key sites precludes the development of a large scale decentralised energy network in the short to medium term. As such the AAP energy strategy should be based on a pragmatic approach which recognises the varying trajectories, phasing constraints and delivery fixes for key sites. The preferred option should therefore focus on the implementation of small schemes and a longer term plan to join individual schemes together, as is encapsulated in the London Heat map initiative.

It is recommended that the Council take the following steps to monitor opportunities for decentralised energy in the town centre:

- Identify new and refurbished sites of relatively high density or large heat load.
- Identify new sites which, as part of a response to the London plan or other policy requirement, are already considering a district heat network.
- Link associated timescales of development or refurbishment with that of the AAP and of other identified sites in the vicinity.
- Establish a "watching brief" for those sites that don't immediately fit in terms of timescale or proximity.
- For those sites that appear to have synergy, look in further detail at the characteristics of the sites e.g. in terms of logistics with respect to distance and complexity of connection, to rule out any logistical or other fundamental constraints.
- Retain any sites discarded at this stage on the „to watch“ list.

- For the short list of sites, facilitate further detailed assessment of logistical and technical issues such as potential energy centre locations, connecting pipework routes and operator issues.

Potential clusters

It is recommended that the Council promote the following decentralised energy clusters:

Cluster 1: Loampit Vale

This is a potential future cluster and should be placed on the 'to watch' list. This system would comprise two energy centres and resilience linking, as well as the possibility for connection to the swimming pool as and when there is a major pool refurbishment. In addition an expansion in retail floorspace, the Tesco site has capacity for a significant number of new homes and an energy centre. Although beyond the timescales of the AAP, the existence of an energy centre at Loampit Vale South and the development of one on the Tesco site could act as a catalyst for future linkages to developments in the area, including on Thurston Road.

Cluster 2: Lewisham Gateway

The outline consent for Lewisham Gateway makes provision for an energy centre and there is scope to consider longer term options to link into adjacent sites as the detailed scheme for the Gateway is progressed. In terms of planning for a phased approach it is recommended that the solutions for early phases are based on the installation of temporary high efficiency gas boilers, used to provide heat and establish the concept of district heating. Then once a critical mass on installation has been established the connection and conversion into a wider system can be progressed. Potential anchor loads include the Lewisham Centre.

Cluster 3: Ladywell Road area

This area is part of Lewisham's Low Carbon Zone where Lewisham is working with the Mayor of London, GLA and a range of public, private and community sector groups to deliver a reduction in CO2 emissions of 20% by 2012 and a 60% reduction by 2025. The Ladywell Leisure Centre is a key Council-owned development site and there is an opportunity to incorporate decentralised energy, possibly linking into University Lewisham Hospital to the south of the AAP area.

It is recommended that the preferred option is to require all "major developments" to integrate clean and green technological solutions that maximise CO2 emission reductions and ensure future development of cluster and area-based DE networks are promoted and protected. This adopts a pragmatic approach which reflects current policy guidance, draws on a qualitative assessment of energy loads and responds to the likely phasing and varying implementation programmes and technical fixes for key sites.

4. Management and Delivery

4.1 Overview

In relation to the successful establishment of a decentralised energy network there will be procurement, economic, management and delivery issues to be addressed. The most common ongoing management solution is that of the Energy Services Company (ESCo). This option has therefore been discussed in the sections below.

4.2 ESCo principles

Where a community energy system is being installed a favoured approach is to generate, supply and distribute energy via an Energy Services Company (ESCo). These can be (but are not always) a special purpose vehicle company, set up specifically for the development, which will operate the energy facility and provide energy services on a long term contract. These can be subsidiaries of commercial ESCo companies and partially/wholly owned by community organisations or developers. In essence, they are not substantially different, in the way they operate, than the existing large utility companies.

It is envisaged that the communal heat network and energy centre at LTC would be operated by some form of ESCo. The Lewisham Town Centre energy strategy could be developed with ESCo delivery in mind based on Mott MacDonald Fulcrum's experience of procuring, and working with ESCos on other projects.

Most examples of large city centre district heat networks in the UK have had substantial involvement from the local authority, particularly at their initiation. Their co-ordination combined with the potential to bring large anchor loads is often crucial to bring forward systems of a viable scale. Involvement from LBL in creating an opportunity for an ESCo involvement could range from reducing risk for private sector investment to direct procurement or even to ongoing interest in the ESCo itself. The ability for the public sector to borrow at lower cost and take a longer term view may be useful in helping to fund networks that would be operating for many decades.

4.3 Initiation Process

A key area of discussion at the beginning of the process is the various drivers involved. Having a clear view helps in ensuring that the discussions procurement does not go down a blind alley or become too protracted. Thus it is important that at the start thought is made regarding the concerns of the various parties involved. Ultimately, it is likely assignment for any ESCo contracts would be passed to the parties responsible for the long term management of Lewisham Town Centre, such as management companies, the housing associations or the local authority. Therefore it is important that these are among the procuring parties or at least their interests are taken into account. Furthermore, it is also important to bear in mind the interests of other stakeholders such as the future consumers.

After establishing the drivers, the procurement process would involve outlining an ESCo model and methods of delivery. These would then be used to produce a list of potential suitable companies who would be invited to tender to an agreed list of requirements. From the returns and subsequent interviews a preferred bidder would be selected for detailed negotiations.

4.4 EScO Responsibilities

The appointment of an EScO would likely be to finance and operate the communal heat network and energy centre, contractually providing heat and electricity to Lewisham Town Centre for a defined period – a 30 year contract is often used. Such an appointment would be ensured to work alongside the phasing of the development.

In short, the ESCO can be responsible for the following aspects:

- Development of the system over the phases according to the energy strategy.
- Operation, management and ongoing maintenance of the community energy system.
- Direct management of energy billing and development of mechanisms for managing this service and billing occupants.
- Purchase of all primary energy required by the scheme.
- Provision of capital funding to the scheme and details of mechanisms for providing such funding.
- Achievement of carbon targets for the project and hence potential plant arrangements in terms of low or zero carbon technologies.

In order to achieve a fair charging arrangement, there are contractual mechanisms that can ensure the prices paid by the consumers are at or below market price. Consideration should be given to a commitment that, through these contractual requirements, the prices charged by the EScO are competitive compared to current national energy prices.

This can be approached through the inclusion in the contract of a clause that ensures that the energy price supplied will be at or below a 'basket' of UK market energy prices. A guaranteed percentage price reduction of 5% is often used. This ensures that the energy supplied through a private wire is not unfair for the consumer. The specific approach that an EScO might apply to the development is dependent on the EScO in question.

5. Conclusions

The existence of such a large amount of new development in Lewisham Town Centre provides an opportunity to create decentralised energy networks based on district heating. The following potential clusters have been identified across LTC:

- Cluster 1: Loampit Vale East and West of Elmira Street (associated development: Prendergast Vale School and further potential developments) including the Tesco site and associated residential development (associated buildings: Heathside and Lethbridge and further potential developments)
- Cluster 2: Lewisham Gateway (associated development: Lewisham Centre).
- Cluster 3: Ladywell Leisure Centre (associated building: Hospital)

Most new development sites will be brought forward by private developers, and although these may be planning to include centralised systems there is always a chance that these may go ahead without consideration of wider potential, such as extending networks to existing or new sites or providing additional energy generation. Therefore, LBL have a particularly powerful role to play in ensuring that district networks can be created in LTC.

As demonstrated by Barking Town Centre, a district heating network can be introduced in by incorporating local communal networks within each development as they are built. As the developments will meet the installation costs, no external financing will be required during this initial stage. The local-area communal heating networks can be inter-connected into wider networks by incorporating required technical specifications within developments.

5.1 Next steps

To further develop a route to delivery the following steps should be taken.

- Assessment should be made of major technical barriers such as large utility mains, large road crossings and the potential to cross railways;
- A business case should be developed by checking financial viability, operator compatibility and investigating business models;
- Technical guidance should be published to allow network compatibility (as at Barking Town Centre), including important items such as network temperatures;
- A watching brief should be established for existing and potential new build sites that may become useful energy assets in the future

Appendices

Appendix A. List of development coming forward as received from LBL _____	43
Appendix B. Map of development coming forward as received from LBL _____	50
Appendix C. London Heat Map Study for LBL. _____	52

Appendix A. List of development coming forward as received from LBL

i. Lewisham Town Centre AAP

ii.

Name	Status	Case Number	Map Ref	Proposed Units	Energy Statement	S106 Agreement	Notes
Lewisham Bridge Primary School	Registered	74507	Marked as 'c'	-	Y	n/a	<p>The alteration and extension of Lewisham Bridge Primary School, Elmira Street SE13, comprising, the construction of 1 two storey and 3 three storey blocks and the demolition of the existing nursery building together with the creation of a multi-use games area, associated landscaping, the provision of 10 car parking and 96 bicycle spaces. (Please note Listed Building Consent Application Ref:- DC/10/74511).</p> <p>Original application withdrawn following local contact with English Heritage who listed the existing school building. New application including the existing building goes to planning committee WC 6th September, officer recommendation is to approve with conditions. It is proposed that the section 106 agreement will be approximately the same as is proposed in the energy statement.</p>
Loampit Vale	Granted	71246	Marked as 'a' and 'b'	788	Y	Y	<p>The construction of eight buildings ranging from five to twenty-four storeys, incorporating balconies and terraces, comprising 788 residential units (including up to 186 affordable), a leisure centre, 1,856m² of commercial floorspace (Use Classes A1, A2, and B1, including 626m² for creative industries), an energy centre, replacement London City Mission facilities, public and private amenity space, together with associated landscaping, bin stores, 866 cycle, 26 motorcycle and 181 car parking spaces on ground and first floor levels, associated highway works, plant and servicing.</p>
Thurston Industrial Estate 1	Granted	65251	1	412	Y	Y	<p>The construction of a 2 to 17 storey building, incorporating balconies/terraces, on the site of Thurston Road Industrial Estate, Jerrard Street SE13, comprising up to a total of 6,771 sq.m² non-food retail space (Use Class A1), 5 units of flexible commercial (Use Class B1)/live/work space, 4 units of flexible retail/commercial (Use Classes A1/A2/B1) space, 406 dwellings comprising 108 one bedroom, 256 two bedroom and 42 three bedroom self-contained flats/maisonettes, together with associated landscaping, provision of a delivery yard, loading bay, stores, bin stores, 415 cycle, 4 motorcycle and 235 car parking spaces comprising 117 retail spaces and 118 residential spaces on ground and upper ground floor levels, with courtyard garden above, associated highway works, plant and servicing.</p>

i. Lewisham Town Centre AAP

ii.

Name	Status	Case Number	Map Ref	Proposed Units	Energy Statement	S106 Agreement	Notes
Thurston Industrial Estate 2	-	-	2	-			No interest
Thurston Industrial Estate 2a	Refused	73350	2a	-	N	N	Application was refused. One of the reasons for refusal was that there was no renewables offer.
Thurston Industrial Estate 3	-	-	3	-			Only rough ideas, no meaningful discussions or proposals.
Thurston Industrial Estate 4	Pre-App	-	4	-			Pre-app with 62 units at 52-54 and 187 units at Sherwood Court.
Thurston Industrial Estate 5	Granted	Part of Lewisham Gateway	5	-			New Bus Layover Site. Originally granted as part of the Lewisham Gateway Site. However, starting work will trigger the S106 payments, therefore a separate application is being prepared to keep it separate and progress before the rest of the Gateway.
Molesworth Street Surface Car Park	-	-		-			No interest
Model Market	-	-		-			No interest - However it is closing on August 1st and hence will be available as a site.
Engate Street	-	-		-			No interest
262-274 Lewisham High Street	Granted	64180	As titled	40	n/a	n/a	The demolition of existing buildings on the site of 262-274 Lewisham High Street SE13 and the construction of a part four/part five/part six/part eight storey building comprising a ground floor retail unit (Use Class A1), 7 studios, 14 one bedroom, 17 two bedroom and 2 three bedroom units, together with associated landscaping, the provision of refuse stores and cycle spaces.
Watergate School	-	-		-			Discussed as possible gypsy and traveller site, but unlikely to be used for this.
Former Ladywell Police Station	Granted	66133	As titled	45	Y	Y	The demolition of the service garage and cell blocks at the former Lewisham Police Station, 2 Ladywell Road SE13 and the alteration and conversion to provide 2 one bedroom and 6 two bedroom self-contained flats, together with the construction of a part two/part three/part four/part five storey building to the rear, incorporating balconies comprising 8 one bedroom, 24 two bedroom and 5 three bedroom self-contained flats, ancillary office, associated landscaping and servicing, provision of a

i. Lewisham Town Centre AAP
ii.

Name	Status	Case Number	Map Ref	Proposed Units	Energy Statement	S106 Agreement	Notes
							refuse storage tank/service room, electricity sub station, 46 bicycle spaces and one wheelchair user parking bay with access onto Ladywell Road.
							thermal water heating was included in the report approved by planning committee.
1 Wearside Road	Refused	72747		-	N	N	The demolition of the existing warehouse at 1 Wearside Road SE13 and the construction of a building up to four storeys comprising 6 one bedroom, 6 two bedroom, 3 three bedroom and 1 four bedroom self contained flats and 1 bedroom bungalow to the rear of the site, together with the provision of a bin store and bicycle store. Incomplete Application.
Lee High Road - 18-28				-			Pre-app in 2008, but ownership has since changed and all is quiet.
Lee High Road - 32-34	Granted by committee	73063	Lee High Road Sub-area	3	Y	n/a	The construction of a four storey building at 32-34 Lee High Road SE13, comprising retail accommodation (Use Classes A1/A3) on the ground floor and 3 two bedroom self-contained flats on the upper floors.
Lee High Road - 36-56	Granted	62788	Lee High Road Sub-area	22	N	Y	The demolition of existing buildings on the site at 36-56 Lee High Road SE13 and the construction of a part four/part five storey building, plus basement, incorporating decking/terracing to the front and rear comprising 4 commercial units (Use Classes A1/A2) and 1 commercial Unit (Use Classes A1/A2/A3), 4 one bedroom and 18 two bedroom, self-contained residential units, together with associated landscaping, provision of a bin store and 26 bicycle stores.
Lee High Road - 58-64	Pending	73064	Lee High Road Sub-area	14	Y	n/a	The construction of a five storey building at 58-64 Lee High Road SE13, comprising retail accommodation (Use Classes A1/A3) at ground floor level with 2 one bedroom, 10 two bedroom and 2 three bedroom self contained flats on the upper floors.
Lee High Road - 104-120	Granted following	68207	Lee High Road Sub-	57	Y	n/a	The construction of a four storey building, incorporating balconies, on the site of 104-120 Lee High Road SE13,

i. Lewisham Town Centre AAP

ii.

Name	Status	Case Number	Map Ref	Proposed Units	Energy Statement	S106 Agreement	Notes
	appeal		area				comprising a retail store (1,752 m ²) (Use Class A1) on the ground floor and 35 one bedroom, 20 two bedroom and 2 three bedroom, self-contained flats above, together with associated landscaping, provision of an amenity area, service area, bin stores, 74 cycle spaces and 72 car parking spaces with access onto Lee High Road.
Lewisham Gateway	Granted - Outline Approval	62375	As titled	800	Y	Y	<p>The comprehensive mixed use redevelopment of the Lewisham Gateway Site, SE13 (land between Rennell Street and Lewisham Railway Station) for up to 100,000 m² comprising retail (A1, A2, A3, A4 and A5), offices (B1), hotel (C1), residential (C3), education/health (D1) and leisure (D2) with parking and associated infrastructure, as well as open space and water features as follows:</p> <ul style="list-style-type: none"> up to 57,000 m² residential (C3) up to 12,000 m² shops, financial & professional services (A1 & A2) up to 17,500 m² offices (B1) / education (D1) up to 5,000 m² leisure (D2) up to 4,000 m² restaurants & cafés and drinking establishments (A3 & A4) up to 3,000 m² hotel (C1) up to 1,000 m² hot food takeaways (A5) 500m² health (D1) provision of up to 500 car parking spaces revised road alignment of (part of) Lewisham High Street, Rennell Street, Molesworth Street and Loampit Vale and works to Lewisham Road.
72-78 Conington Road	Granted	62620	As titled	270	Y	Y	<p>The demolition of the existing buildings on the site of 72-78 Conington Road SE13 and the construction of a seven to ten storey building, incorporating balconies, comprising 3 commercial units on part of the ground floor, 187 one bedroom, 56 two bedroom and 27 studio self-contained flats, together with associated landscaping and provision of bin stores, bicycle</p>

i. Lewisham Town Centre AAP

ii.

Name	Status	Case Number	Map Ref	Proposed Units	Energy Statement	S106 Agreement	Notes
							stores, 9 motorcycle parking spaces and 50 car parking spaces at basement level with access onto Conington Road.
Venson Site, Conington Road	Granted	72732	As titled	132	Y	Y	The construction of two part 4/part 5/part 6/part 7 storey buildings (Blocks A & B) and one part 5/part 7/part 8 storey building (Block C) containing 132 dwellings, comprising 13 studios, 63 one bedroom, 47 two bedroom and 9 three bedroom self-contained flats, together with associated landscaping, provision of plant, refuse stores and 154 cycle spaces on the Venson Site, Conington Road SE13.
Heathside and Lethbridge	Granted	72554		138			The redevelopment of the Heathside and Lethbridge Estates, Blackheath Hill and Lewisham Road, SE10 seeking outline planning permission (Phases 2-6) for up to 512 square metres of retail floorspace, 768 square metres of community floorspace, an energy centre and 1,054 residential units in buildings ranging from 3 to 17 storeys in height, together with car and cycle parking, associated highway infrastructure, public realm works and provision of open space and detailed planning permission (Phase 1) for the redevelopment of land fronting onto Blackheath Hill for 138 residential units in buildings ranging from 4 to 7 storeys in height, together with car and cycle parking, associated highway infrastructure, public realm works and provision of open space.
Potential Others							
Tescos Site	-	-	-	-			Tescos have shown interest in expanding on the site to the north of the station. This includes the car park.
Ladywell Leisure Centre	-	-	As titled	-	-	-	Ladywell is currently scheduled to close in 2013 (although this may be brought fwd), we would want to dispose of it in a manner to achieve the best possible offer and when we have previously looked at the site we wanted to consider including some of our housing on the eastern edge of the site. Probably as a minimum we would include 12 - 46 Longbridge Way along with the unnamed oblong building which is a Children's nursery. It could, however, take the site back to

i. Lewisham Town Centre AAP

ii.

Name	Status	Case Number	Map Ref	Proposed Units	Energy Statement	S106 Agreement	Notes
							<p>Campshill Road as an eastern boundary and up to Courthill Road as a northern boundary depending on viability and resident consultation. It could be a mixture of new build and refurbishment of the housing stock.</p> <p>I have not heard from Tesco for a long time. I think that they are interested in anything up for grabs. Presumably you would not support a full size store but would allow street fronting retail facing LH St.</p> <p>We are on a learning curve with Loampit Vale regarding distributed heating schemes. I would think that there would be a minimum level of units to make a linkage over the road to a Hospital CHP and a contribution to set up costs viable but I do not know what this minimum is. This would need to be resolved before 2013.</p>
Buildings on Ladywell Road (Playtower and St Mary's Centre)	-	-	-	-			<p>We own the Playtower and are working with a local group of residents and third sector groups on potential asset transfer to them. I don't think we own St Mary's Centre, I believe its owned by the church.</p>
Clarendon Rise	Granted	72244	-	-			<p>Demolition of small temple and construction of larger temple - Under construction</p>
Orchard Estate	-	-	-	-			<p>No evidence of further planned work</p>
Kings Hall Mews (1-13)	Pre-App	-	-	-			<p>Pre-app for a hotel, but is going nowhere as it's of poor design.</p>
Lewisham College	-	-	-	-			<p>Full res scheme is being planned, but no numbers as yet.</p>

Appendix B. Map of development coming forward as received from LBL



Appendix C. London Heat Map Study for LBL.

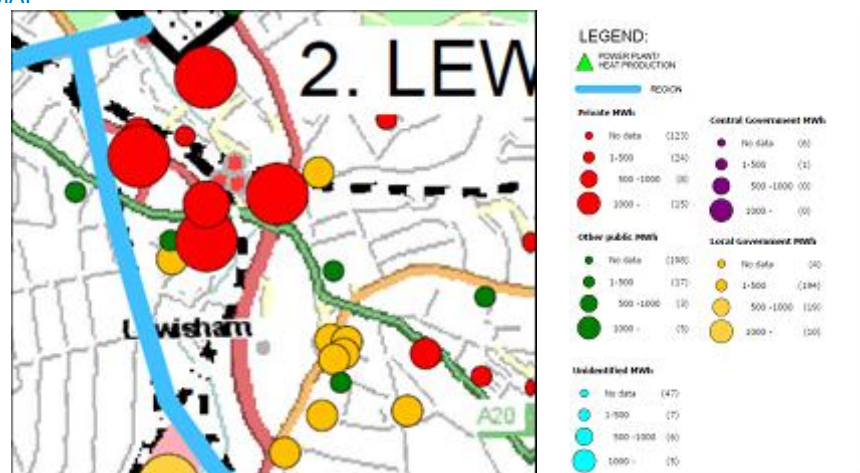
Appendix C of Ramboll Report: District Heating Focus Area Tables Lewisham final.

Area 2 Central Lewisham

Name	Address	Ownership	New dev.	Typology	Heating supply	Fuel source	Fuel consumption from all assets including CHP (MWh/year)	Number of Dwellings	Data source
Loampit Vale (E&W of Elmira Street)		Private	Yes	Private residential (> 149 units or 9,999 m2)			2,963	788	Estimate
Lewisham Gateway		Private	Yes	Private residential (> 149 units or 9,999 m2)			1,856	800	Estimate
Connington Road		Private	Yes	Private residential (> 149 units or 9,999 m2)			1,842	490	Estimate
Loampit Vale (W of Jerrard Street)		Private	Yes	Private residential (> 149 units or 9,999 m2)			1,527	406	Estimate
Loampit Vale (E of Jerrard Street)		Private	Yes	Private residential (> 149 units or 9,999 m2)			812	350	Estimate
LEWISHAM BRIDGE	ELMIRA STREET	Local government	No	Education facilities		Natural gas	484		
Loampit Vale Railway Strip		Private	Yes	Private residential (> 149 units or 9,999 m2)			226	60	Estimate
Granville Park CEL	100 GRANVILLE PARK	Local government	No	Local government estate		Natural gas	164		
CENTURY HOUSE	FLAT 1 ARMOURY ROAD LONDON	Private	No	Multi-address buildings				58	LDA
LEWISHAM POLICE STATION	43 LEWISHAM HIGH STREET	Other public	No	Police stations					
LEWISHAM CHRISTIAN CENTRE	VIAN STREET	Other public	No	Churches					
Total							9,874		

Source: London Heat Map Study For London Borough of Lewisham, Ramboll May 2010.

DeMAP



Source: London Heat Map Study For London Borough of Lewisham, Ramboll May 2010.