

Renewable Energy and Low Carbon Development Study

London Borough of Enfield

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Executive Summary

Executive Summary

1. Introduction

This Renewable Energy and Low Carbon Development Study was undertaken as part of the evidence base for the Local Development Framework (LDF). It is intended to support the reduction of carbon dioxide (CO₂) emissions from residential and non-domestic buildings in Enfield and increase in the supply of energy from renewable and low carbon sources.

The aims of the study are as follows:

- Identify the renewable and low carbon energy resources in the Borough;
- Assess the feasibility and viability of setting targets aimed at delivering decentralised renewable and low carbon energy in new and existing buildings;
- Propose planning policies which are supported by a sound evidence base;
- Identify delivery vehicles and funding sources to enable the opportunities to be realised; and
- Suggest mechanisms for implementing and monitoring the proposed policies.

2. Policy Context

International, European and national policy commit the UK to reducing its impact on climate change and increasing the supply of energy from renewable and low carbon sources. These commitments are reflected in existing and proposed national and regional policy and need to be translated into local policy and action.

Planning has a significant role to play in meeting these commitments by understanding the local potential for renewable and low carbon technologies, identifying suitable locations for renewable and low-carbon energy technologies and supporting infrastructure and setting standards for new development.

The Supplement to Planning Policy Statement 1 and Planning Policy Statement 22 (2004) define the role of planning in the response to climate change and the development of renewable and low carbon energy supplies.

Enfield Council has a broader role to lead and facilitate action across the Borough. It enforces the provisions of the Building Regulations and is responsible for promoting energy efficiency in the existing building stock as well as providing financial incentives and support. In addition, the Council has a duty to manage the climate change impacts of its own estate and services.

The 2004 and 2008 Planning Acts, PPSs and other policy and legislation empower local authorities to fulfil this role. The Well-being Power, introduced in the 2000 Local Government Act, is particularly significant, enabling local authorities to “do anything they consider likely to promote the economic, social and environmental well-being of their area unless explicitly prohibited elsewhere in legislation.”

The proposed updates to Building Regulations planned for April 2010, 2013 and 2016 will incorporate increasingly stringent targets relating to energy consumption and CO₂ emissions. These proposals lead to a zero carbon requirement for new homes and schools in 2016, government estate in 2018 and non-residential building in 2019.

The London Plan sets requirements for developments to deliver energy efficiency improvements, efficient delivery of energy and the on-site generation of renewable energy. It places significant weight to the use of Combine Heat and Power systems and Decentralised Energy Networks in major developments. The Draft Replacement London Plan, published in October 2009, broadly keeps the same approach to reducing CO₂ emissions from new buildings but proposes to move away from mandatory reductions from on-site renewables to improvements over Building Regulations. This would give developers greater flexibility in meeting the targets as well as making it easier to check compliance.

Enfield's Proposed Submission Report for the Core Strategy has strategic objectives for mitigating the impacts of climate change and delivering sustainably constructed new homes. These policies are intended to provide the basis on which to set more specific policies within development plan documents and supplementary planning documents.

3. Existing Energy Demands and CO₂ Emissions

The London Energy and CO₂ emissions inventory (2003) estimates the total CO₂ emissions from Enfield to be 1,328,568 tonnes per year, which equates to around 5 tonnes CO₂ per person per year. This is slightly lower than the London average and lower than the average in the UK. The biggest component is domestic energy consumption, which represents around 42% of all CO₂ emissions in the Borough. Given that the private housing stock represents 84% of all dwellings, this is potentially the single most important sector for addressing the energy consumption and CO₂ emissions. Data from the Energy Saving Trust (EST) estimates that between 37% and 54% of houses within each ward in Enfield can be classified as ‘under insulated’, having less than 100mm loft insulation and/or unfilled cavity walls.

As part of the study the existing energy demands from buildings have been calculated using benchmarks and modelling to map fossil fuel and electricity demand and CO₂ emissions (See Maps in Section 3 of the Technical Report). The highest heat demands are concentrated around areas of commercial and industrial activity and large public buildings, but when looking at density of heat demand, the highest concentrations correspond with areas of dense housing and high retail and industrial uses. High concentrations of electricity consumption were found to

correspond with areas of high commercial activity, particularly Enfield Town, Southbury, Palmers Green and Southgate.

4. Future Development Plans

New development in the Borough is to be concentrated in four key areas: North East Enfield, Central Leaside, Enfield Town and the area around the North Circular Road. Within each of these Strategic Growth Areas a Place Shaping Priority Area has been defined, these are Ponders End, Meridian Water, the area around Enfield Town Station and New Southgate respectively.

The Core Strategy proposes 13,480 new dwellings up to 2030, with the majority of these to be delivered within the four Place Shaping Priority Areas. New provisions of health facilities, schools and commercial development have also been identified and are also primarily planned within the Place Shaping Priority Areas.

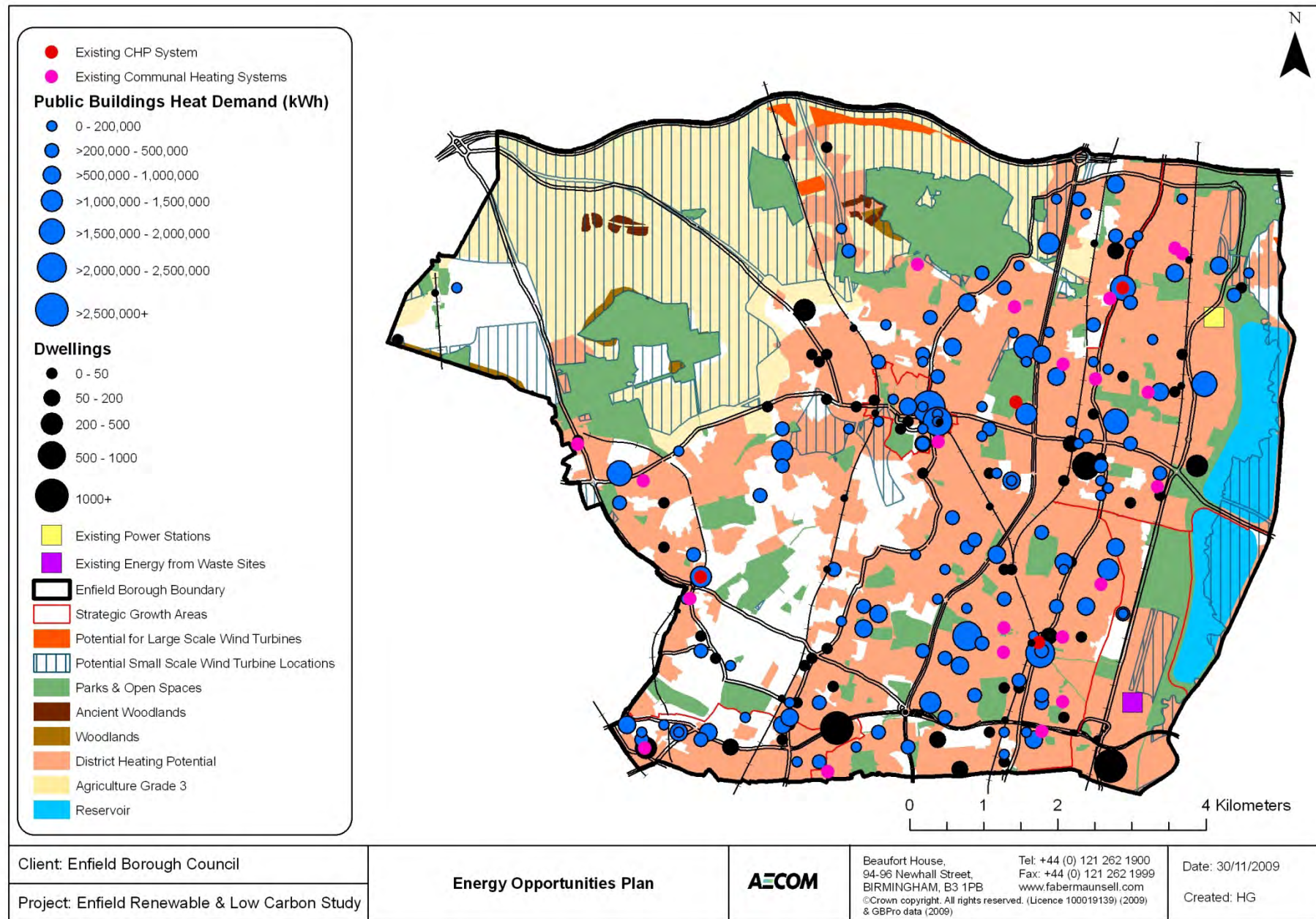
5. Energy Opportunities and Constraints

An energy opportunity plan has been produced as a planning resource which will allow assessment and prioritisation of delivery of opportunities.

The analysis has concluded that the scale of potential and types of technologies that are likely to be viable varies across the Borough. The southern and eastern areas of the Borough, which have a higher density of heat demand, present a significant opportunity to deliver district heating networks, both for the new and existing development. A few sites have been identified in the north and eastern edges of the Borough as being suitable for large scale wind turbines. The northern and western areas have opportunities to develop biomass resources.

Opportunities to utilise waste heat or energy from waste could be developed by working closely with EOn and the North London Waste Authority as well as the London Development Agency and other local authorities involved in the energy masterplan for the Upper Lee Valley Opportunity Area, together with planning policy to enable and encourage connection to adjacent development. There are also opportunities for sub-regional energy infrastructure as part of the wider Upper Lee Valley growth area, which is being taken forward by the LDA.

The four Strategic Growth Areas identified in the Core Policy have significant potential to deliver district heating schemes associated with strategic development sites. The North East Enfield and Central Leaside Strategic Growth Areas also have the potential to use wind resources. All opportunities are delivery dependant; the resource potential in itself does not contribute to targets. Further work will be required to explore feasibility and develop potential projects or strategies to take them forward.



Map 1: Energy Opportunities Plan (EOP) for Enfield

6. Opportunities for Applying Environmental Rating Systems

The 'Code for Sustainable Homes' (CfSH) is a rating system for new residential dwellings that assesses a number of different environmental impact and rates buildings on a scale of 1 to 6. The closest equivalent system for non-residential buildings is known as BREEAM (Building Research Establishment Environmental Assessment Method), which rates buildings on a scale from 'Poor' to 'Outstanding'. The study assesses the potential to apply these standards to all new developments in the Borough.

Work undertaken by Cyrill Sweett and AECOM on behalf of the Government has investigated the technical and financial implications of meeting the different levels of the CSH. Based on this work we have concluded that applying a requirement to achieve Levels 5 or 6 would result in significant increase in costs. Costs associated with the BREEAM assessment methodology are less well established, however the evidence suggests that achieving an Excellent (or higher) rating represents a significant increase in costs relative to a 'Very Good' (or lower rating).

The study concludes that applying CSH or BREEAM would help to deliver the objective of sustainably designed new buildings. However, going beyond CSH Level 4 and BREEAM Very Good however would require a more detailed assessment to test the financial and technical implications.

It is anticipated that BREEAM will be replaced by a 'Code for Sustainable Buildings' at some point in the future and proposed changes to the CSH methodology were published in December 2009 to reflect expected changes to the Building Regulations.

7. Policy Testing

Existing Development

The impact of applying a consequential improvement policy for existing homes has been tested by reviewing the potential number of applications that would be affected. We then applied improvement measures based on a sample of existing homes in Enfield taken from EST's HEED database. Existing commercial properties were not tested since the Building Regulations has the scope to address these.

The study shows that there is a significant potential to deliver CO₂ savings for relatively little cost, depending on the measures required. The average estimated CO₂ saving per dwelling is 1.36 tonnes at an average cost of £900 for the proposed improvement measures (excluding external wall improvements). This could result in a cumulative reduction in CO₂ emissions of 1,000 tonnes a year.

Given the importance of addressing the existing private housing stock to deliver reduced energy consumption and CO₂ emissions (as detailed in section 3), the study concludes that this represents a significant opportunity for the Borough.

New Development

The impact of the policy options for new development has been tested by considering how the energy strategies that may be proposed by typical developments are likely to demonstrate compliance with a selection of possible policies. The model developed for this study compares a range of technology options and selects the cheapest option which will comply with the target in question. The impact of each policy, in terms of technologies selected, CO₂ emissions saved and cost per unit of development, depends on which year a development comes forward for planning permission and which energy opportunities are available.

New Residential Buildings

There is only a relatively small difference in the CO₂ savings associated with the base case policy of compliance with Building Regulations and the targets that go further, including more stringent policies of compliance with the current London Plan, particularly when put into context against the total emissions from the entire building stock within the Borough.

The proposed changes to Building Regulations, up to and including the introduction of the zero carbon requirement for homes and other buildings, is a significant driver and is likely to result in a significant increase in costs for developers.

The analysis indicated that the tested targets only result in a relatively small decrease in CO₂ emissions beyond what would be delivered by the Building Regulations and the additional costs are also relatively minor because of the limited time lapse before they are on a par with building regulations. However, the current and replacement London Plan policies would promote the use of district heating infrastructure sooner than Building Regulations. This would assist in the long term to address the existing building stock as well as providing a network for new buildings to connect to, which will be particularly important when the zero carbon requirements are in place.

For residential developments, there are feasible options for complying with all policies tested. Against Building Regulations, prior to 2016, residential dwellings were found to comply by using micro- generation systems (combining one or more of solar water heating, energy efficiency and photovoltaics (PV)). Against the replacement London Plan policy, decentralised energy systems using biomass or gas CHP were found to be the favoured options during the same period. This suggests that the higher targets could promote the use of district energy systems.

The use of biomass is favoured due to the relatively low costs compared to alternative options. However, the entire Borough has been declared an Air Quality Management Area (AQMA) and therefore the acceptable use of biomass will depend on the location of the development and the ability of the developer to demonstrate that the system will not adversely affect air quality.

The on-site carbon compliance element of the zero carbon requirement post-2016 is likely to be met by the use of highly energy efficient design and biomass or gas CHP systems in combination with one or more of biomass heating and PV.

Most of the major development sites will support the use of gas CHP, however the smaller sites (less than 100 dwellings) for which a CHP system is unlikely to be viable are likely to require biomass heating systems to comply with the higher CO₂ reduction targets as well as, where necessary, the ability to connect to a district heating system.

Our modelling indicates that where residential developments are able to connect to an existing district heating network, powered by waste heat from another source such as a large power station, this could deliver significant CO₂ emissions at a relatively low capital cost. This infrastructure may need to be provided by the Council, possibly in partnership (see section 9), the supplier of heat or a third party, but the developer could be asked for a contribution towards the costs. Although this represents a very cost effective solution, there are no networks currently in place in Enfield and the opportunity for connection to the EOn power station or the Edmonton Incinerator require a heat demand to be created to justify the infrastructure and plant requirements.

When appropriately installed and sited, small wind turbines (15kW) have the potential to deliver higher CO₂ savings than all other technological options selected, for a lower cost, although this option will only be feasible in limited locations due to spatial constraints.

Large residential developments in suitable locations may find that investment in a large wind turbine is a cheaper option for achieving the zero carbon requirement post 2016. However, due to the requirement for an 800m distance between turbines and the nearest residential property, few if any residential developments may be able to install one on-site and opportunities to install a turbine on adjacent land is also likely to be limited.

Financial viability of the solutions required to meet the policies tested will depend on a range of factors which are beyond the scope of this study to determine. These include land and market values of properties at the time of the planning application. The findings presented in this report should therefore be compared alongside the Affordable Economic Housing Viability Assessment and the Housing Market Assessment.

New Non-Residential Buildings

Our analysis indicates that some non-residential developments on a constrained site would struggle to achieve the zero carbon requirement from 2019 onwards, based on the current definition of zero carbon for dwellings. However, our model is based on flat rate CO₂ emissions, whereas the proposals for Building Regulations and the new London Plan is to adopt an aggregate approach for non-residential buildings, where some building types have higher requirements than others in order to deliver the targeted saving across all building types.

Because this is still out for consultation and the details have not yet been defined, we have not been able to model this at this point in time.

The technologies that might be proposed on energy constrained sites are similar for all types of non-residential development considered in this analysis. Because the scale of development and the relative heat and electricity demand differs for an office compared to a workshop or storage facility, the percentage CO₂ savings that these technologies could deliver varies.

Subject to air quality constraints, biomass heating is likely to be the preferred option for complying with all proposed targets, as the capital cost is relatively low and it is able to deliver a high contribution to CO₂ savings. A combination of advanced energy efficiency and PV could achieve similar CO₂ emissions reductions, but is significantly more expensive. Connection to an existing district heating network would offer the cheapest route to compliance but, as previously discussed, this option is not currently available.

For smaller non-residential developments, small wind turbines have the potential to deliver high CO₂ savings, although they will only be feasible in limited locations due to constraints and spatial requirements. Larger developments, particularly in North East Enfield or Central Leaside, may be able to accommodate large scale wind turbines, which would aid compliance especially for the more stringent policy requirements post 2019.

Further details of the policy testing, including some site based case studies, can be found in Section 7 of the Technical Report.

8. Policy Recommendations

Based on the assessment of energy opportunities and constraints in the Borough and the results of the policy testing, the study has proposed a number of policies that could be applied by the Council. These policies are outlined below along with a summary of the justification; further detail is contained within Section 8 of the Technical Report.

Proposed Policy 1: Support for decentralised low and zero carbon technologies in line with the energy opportunity plan

Enfield Borough Council are seeking to reduce CO₂ emissions and increase the supply of decentralised renewable and low carbon energy with the Borough. Applications for all types of decentralised renewable and low carbon energy will be considered favourably by the Council. The Energy Opportunities Plan shows the potential application of different technology solutions. Planning applications for new development will need to demonstrate how they contribute to delivery of the current Energy Opportunities Plan.

The Council recognises that different energy technologies and CO₂ reduction strategies will suit different parts of the district and different types of development. To reflect this three “energy opportunity areas” have been defined.

- District Heating
- Wind
- Energy Constrained

Where possible, the Council will work with developers to help deliver energy opportunities beyond the development boundary.

Policy Justification

It is proposed that the Energy Opportunities Plan act as the key spatial plan for energy projects in Enfield, underpinning the policies related to the delivery of energy efficiency and renewable and low carbon energy generation as well as prioritising the infrastructure on which money should be spent. It should be used to inform corporate strategies and investment decisions taken by the local authority and local strategic partnership (see Section 9 and Appendix 3) and should be readily updated to reflect new opportunities and changes in feasibility and viability.

The policy recognises that different areas and development types will have different opportunities for achieving CO₂ reductions. For example, developments in energy constrained areas will have fewer opportunities for delivering CO₂ reductions cost effectively than those in areas with distinct energy opportunities such as district heating or wind. Similarly, small developments are likely to have fewer opportunities.

The energy opportunity area approach is designed to help applicants determine which technologies are likely to be most suited to a given area. However, to reflect the fact that regulation may change and the applicability of new and existing technologies may vary over time, the Council will be prepared to discuss proposals that deviate from the Energy Opportunities Plan and Energy Opportunity Areas with applicants at the pre-application stage.

Proposed Policy 2: Reduction in emissions from new development

In order to minimise the impact of new development in the Borough, all new development will be expected to use energy efficiently and to incorporate decentralised renewable and low carbon technologies to deliver CO₂ reductions above the level required by Building Regulations current at the time of development. Developers should explore innovative ways of funding these measures, including support from third parties and the community and/or a financial payment into a Carbon Fund, which will be used by the Council to deliver projects identified in the Energy Opportunities Plan.

All developments will be expected to achieve improvements beyond Building Regulations in line with the London Plan. Where this is not feasible developments will be required to contribute to a buyout fund for the CO₂ emissions that cannot be offset on site.

The London Plan requires all new buildings, both residential and non-residential, to achieve an additional reduction on the residual CO₂ emissions after Building Regulations compliance. This can be achieved through a combination of energy efficiency measures, on-site renewable and low carbon energy technologies and directly connected heat or power (not necessarily on-site).

The policy testing has demonstrated that the proposed London Plan policy will deliver higher CO₂ savings and provides a greater incentive for developers to install on-site district heating infrastructure than relying on Building Regulations alone or small improvements upon it. It is more flexible than the previous London Plan policy which restricted developers to using renewable energy.

However, to reflect the fact that some developments may be more constrained and the targets may not be achievable on all sites, developers would have the opportunity to pay into a fund, with contributions dependent on a levy or tariff that could be linked to the CO₂ emitted per square metre of floor area over the building lifetime of 30 years. Three possible fund options exist: Section 106; the Community Infrastructure Levy; or allowable solutions. Further work will be needed once the Government confirms details of how each of these will work.

Proposed Policy 3: District Heating Opportunity Areas

Enfield Council supports the development of district heating networks within the Borough and recognises the important role that new development can play in delivering these systems and developing capacity.

The Council will expect all large residential and mixed use developments to consider installing CHP and a site wide energy network. This will be the preferred solution for the delivery of heat unless it can be shown that such a system would not be viable. To improve viability and feasibility, applicants should engage with the Council, third parties and communities. The design and layout of site-wide networks should consider the future potential for expansion into surrounding communities. They should provide capped off connections which can be used to connect to networks beyond the site boundary in future. Where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre to serve existing or new development.

The Energy Opportunity Plan shows the areas in which district heating and CHP is deemed to be viable on the basis of heat density. Additional information such as the London Heat Map and the location and heat demands of potential anchor loads can provide additional information to support an assessment of an area's viability. Development within these areas will be deemed to have the potential for future heat network connection and as a result will be required to be compatible with a future heating network.

Policy Justification

The government and the GLA have recognised the importance of district energy networks and CHP systems in order to reduce CO₂ emissions, especially in dense urban areas. The Energy

Opportunities Plan has shown that there is a significant opportunity in the Borough. Developments within district heating opportunity areas will need to carry out an assessment of the potential to deliver a district heating network. Developers can meet the requirements by installing a site-wide network, connecting to an off-site network or, where these are not possible, enabling the development to connect in the future.

The policy requires larger more strategic new developments to install their own network, which can later be connected up to a larger network. This has the benefit of reducing CO₂ emissions in new development and contributing to the longer term objective of addressing emissions from the existing building stock. A specific set of criteria will be used to define the district heating priority areas. (See section 8.4.2 of the Technical Report for more details)

Proposed Policy or Guidance 4: Consequential improvements to existing residential properties

This policy could be included as part of a suitable development plan document or the Development Management Plan. Elements of it might also be suited to an SPD.

The Council recognises the importance of improving the energy performance of the existing building stock and strongly encourages the uptake of energy efficiency and renewable and low carbon technologies as part of building refurbishments.

Planning applications for changes to existing domestic dwellings will need to be accompanied by a completed 'energy checklist' to identify if there are any reasonable improvements that could be made to the energy performance of the existing dwelling. If measures are identified applicants will be encouraged to undertake these.

Improvements will include, but not be restricted to: loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers. The measures will be required to provide a reasonable rate of return on the investment through reduced utility bills and the total cost should be no more than 10% of the total build cost.

Policy Justification

The purpose of the policy is to reduce CO₂ emissions from existing buildings. Since consequential improvements for non-domestic buildings are covered by Building Regulations this policy focuses solely on housing.

The policy applies to all householder applications for planning permission to extend or materially alter a home. The approach aims to make the most of any straightforward opportunities for improvement to the property. This includes loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers.

The checklist approach is simple – if any of the measures on the list are applicable, pay for themselves in energy cost savings in less than seven years and their combined cost does not exceed 10% of the cost of the building works, they are required. If none of the measures on the list fit the bill, none are required. Measures discussed in Chapter 9 should be considered in terms of their effectiveness in helping to reduce the capital costs to residents.

Our initial assessment suggests that, based on the assumptions we have used for the rate of applications received and the scope for the efficiency measures proposed, up to 1,000 tonnes CO₂ could potentially be saved each year.

Proposed Policy 5: Wind power

The Council recognises that wind power can play an important role in reducing CO₂ emissions and will positively consider applications for wind turbines which are, in the view of the Council, designed and located appropriately.

Three principal opportunities for the use of wind power have been identified:

- Large scale wind turbines delivered by commercial developers;
- Small or large scale wind turbines delivered by community groups, co-operatives and individuals;
- Small or large scale wind systems delivered alongside new developments.

Policy Justification

The government's Renewable Energy Strategy expects a significant proportion of renewable electricity to be delivered from onshore wind. If the stringent targets are to be achieved then all available opportunities will need to be taken.

Wind is one of the most cost effective renewable energy technologies but this is highly dependent on the size of the turbine. Despite there being good wind speeds across all parts of the Borough it is recognised that commercial opportunities for turbines are likely to be limited by the constraints highlighted in the Technical Report. However, opportunities for individual large or smaller turbines exist across the Borough and, where these meet set criteria (see Section 8.6.2 of the Technical Report) they will be encouraged.

Developers within wind opportunity areas will be expected to show that they have fully considered the potential to deliver a reduction in the development's CO₂ emissions beyond Building Regulations requirements using a wind turbine or turbines on-site. Where no opportunities exist on-site applicants should demonstrate that they have considered off-site opportunities. Close engagement with the Council and communities will be essential and different ownership models should be considered as a way of gaining support.

Proposed Policy 6: Environmental design standards

All developments should be designed to reduce their impact on the environment and improve wellbeing of occupants. Where appropriate, all development will be required to demonstrate that these issues have been considered by undertaking a BREEAM or Code for Sustainable Homes assessment (using the most up to date assessment methodology available).

In line with Core Policy 4, all new housing development should seek to exceed Code for Sustainable Homes Level 3. All new non-domestic developments will also be required to achieved BREEAM Very Good or higher (or equivalent rating of an alternative or updated scheme). Developments in areas with more opportunities or with a strategic importance for delivering buildings with improved environmental standards may be required to meet higher targets.

Policy Justification

The application of BREEAM and the CSH can help to deliver development that reduces its impact on the environment. The cost implications of achieving CSH Level 3 and BREEAM Very Good are relatively small since the most significant costs are normally in the achievement of credits in the energy section. The mandatory energy standard for CSH Level 3 will be required through Building Regulations. In many cases, developments meeting Proposed Policy 2 would already be doing enough to meet the mandatory energy standard for CSH Level 4. BREEAM does not have any mandatory standards but, in complying with the policies outlined above, developments would achieve a significant number of credits to contribute towards the overall score.

There is a degree of flexibility in the other credits in both schemes and, although this study has not investigated all the possible constraints in detail, it is assumed that CSH Level 3 and BREEAM Very Good should be able to be achieved for new development on all sites in the Borough.

Development in the strategic growth areas could be required to meet higher standards, such as CSH Level 4 and BREEAM Excellent. All residential development in these areas is likely to include district heating systems and be meeting the requirements of Policy 2, and therefore the additional technical design and cost implications of moving from Level 3 to 4 would be minimal. However, specifying CSH Levels 5 or 6 (as they are currently defined) would be significantly more expensive and technically challenging and would require a site-based assessment to be undertaken. There is also a significant difference between BREEAM Very Good and Excellent and therefore setting this standard would need to be assessed before it is applied.

9. Delivery & Funding

There are a wide range of delivery mechanisms that can be employed to support planning for energy. Not all will be suitable for Enfield and mix will be needed to encompass all of the energy opportunities. This report provides the context for making those decisions. Further work, discussions and advice will be needed to make them happen. As a first step we recommend that Enfield Council explores further the potential for using Carbon Trust Low Carbon Building Strategic Design Advice money to undertake the following next steps:

Provide the necessary leadership and skills

- The Council must take strategic leadership role together with Enfield Strategic Partnership to ensure the necessary political and stakeholder buy-in. This will involve using this study inform preparation of relevant strategies, including the climate change strategy and North London Waste Plan. A stakeholder workshop and presentations to the Climate Change Board were undertaken as part of this study.
- It must develop skills across the Council and its partners.

Priority actions and projects

- The Council needs to set out a clear framework which gives relative certainty. Action should be prioritised at strategic locations, council and public sector property and assets, such as Meridian Water, New Southgate, Ponders End and Enfield Town.
- Initiatives to support the proposed residential energy efficiency retrofit policy should be designed to reduce the financial burden on households.
- The Council should work with eligible partners to develop a micro-generation retrofit strategy based on the opportunities presented by the Low Carbon Building Programme.
- A set of priority district heating and waste heat schemes should be drawn up by the Council and its partners and further feasibility work carried out. This should be based on factors such as financing options, planning, liaison with stakeholders including the LDA, phasing and type of development. Initial feasibility work could be funded by Strategic Design Advice or European Local Energy Assistance (ELENA) , with later project finance options including the issuing of bonds to residents and businesses or the new London Green Fund. Options for designation as a district heating priority area include:
 - Opportunities for incremental delivery, such as by requiring energy infrastructure to be installed as part of area improvements, such as the North Circular housing improvements and new development.
 - Proposed improvements to the public realm as part of the Ponders End Central development area and Middlesex University and High Street developments should be seen as a key opportunity for installing a district heating network.
 - Priority should be given to assessing the feasibility of installing a district heating network as part of improving accessibility in Central Leaside and North East Enfield
 - The area around Enfield Town Station Priority Area offers the chance to plan a network that links new development with the Civic Centre and retail along the high street.
 - Sites that include new buildings with significant heat demands (anchor loads) or energy centres as part of the development will make ideal district heating candidates.

- Opportunities for utilising waste heat from the power station should be maximised by undertaking a feasibility study. This should consider: opportunities to connect public sector anchor loads, new development and the very high private heat loads that exist nearby.
 - Opportunities for utilising waste heat from the Edmonton incinerator are limited at present, but in the future could supply new development at Meridian Water.
 - Areas of hard to treat homes and buildings, such as those with solid walls or conservation areas.
- Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of establishing a Local Development Order in order to add certainty to the development process and potentially speed up delivery.
- The London Development Agency (LDA) is currently assessing the feasibility of an energy masterplan for the Upper Lea Valley area to inform the Opportunity Area Planning Framework (OAPF) currently being prepared by the Greater London Authority (GLA). Enfield and its partners should involve the appropriate people from the LDA in further work, especially on the North East Enfield and Central Leaside strategic growth areas.
- Beyond the large scale wind opportunity areas identified in the energy opportunities plan opportunities should be explored for isolated turbines in the commercial areas to the south of Enfield power station or near to Edmonton incinerator. The Council and its partners should identify delivery opportunities, considering available financial mechanisms, publicly owned land and community involvement and ownership.
- Opportunities for biomass, biofuels and biogas should be explored with partners in neighbouring authorities and the wider regions.
- The Council and its partners should undertake further work to explore the role for the local authority to link housing development to energy supply delivery.

Delivery vehicles and funding

- The Council and its partners need to establish an appropriate form of delivery vehicle or vehicles to pursue the key energy efficiency and supply opportunities. Further work will be needed to understand what is suitable for Enfield but will need to consider the potential for establishing an Energy Service Company (ESCo), partnerships and joint ventures.
- Funding mechanisms should be identified and applied first to priority schemes, co-ordinated through the appropriate delivery vehicle. These could include:
 - Delivery of whole house and street-by-street energy efficiency improvements and retrofit of micro-generation technologies.

- Setting up a carbon fund, possibly using the Community Infrastructure Levy (CIL). This should be used to pay for projects identified in the energy opportunities plan, including large or small wind turbines off-site in the wind opportunity areas. Further work will need to be undertaken to establish the extent of the opportunities.
- Developing a plan to deliver allowable solutions to ensure funding from new development is directed towards the best solutions in a coordinated way.

Communities are likely to play a crucial role in the delivery of energy infrastructure. However, to be successful further work will be needed to explore how communities function within Enfield.

Potential Projects

The report proposes a number of projects that could be taken forward in the short, medium and long term

Short Term (next 1 – 3 years)

- *Ponders End District Energy Feasibility Study*
- *Meridian Water Energy Infrastructure Strategy*
- *Scoping of potential delivery vehicles, powers and funding*

Medium Term (next 3 - 10 years)

- *Energy Infrastructure Strategies for other Place Shaping Priority Areas*
- *Implementation of energy infrastructure at Ponders End*
- *Engage with EOn and NLWA and other stakeholders*
- *Agree approach to delivery and funding of infrastructure schemes*

Long Term (10+ years)

- *Establishment of Borough-wide Energy Infrastructure and connections to the Wider Upper Lee Valley*

10. Monitoring and Enforcement

The study proposes the following potential options for monitoring the uptake of low and zero carbon technologies across the Borough:

- The creation of a database to capture the details of low and zero carbon technologies implemented in the Borough, including:
 - Location and details of district and communal heating schemes;
 - Location and system specification of micro-generation systems; and
 - Location and specification of community scale systems such as large-scale wind turbines.

This database could then be used to report against London-wide and national targets for renewable energy generation.

- Regular updates of the Energy Opportunities Plan and the wider set of opportunity and constraints maps to take account of new development and other changes that might affect the information presented. The updated maps would also be able to represent the details included in the database described above.
- Using the model created for this study the Council could undertake an ongoing monitoring programme of CO₂ emissions from buildings within the Borough.
 - Update the survey data for existing residential and commercial development;
 - Updating the projected new development;
 - Including improvement measures to existing dwellings; and
 - Including new development and associated renewable and low carbon solutions as they are implemented.



Introduction

1 Introduction

1.1

Overview

AECOM (formerly Faber Maunsell) has been commissioned by Enfield Borough Council to undertake a Renewable Energy and Low Carbon Development Study, in order to support the reduction of carbon dioxide (CO₂) emissions from residential and non-domestic buildings in the Borough and an increase in the supply of energy from renewable and low carbon sources. The study is part of the evidence base for the Local Development Framework (LDF).

The objectives of the study were to:

- Understand renewable and low carbon energy resources, in relation to both new and existing developments as well as wider opportunities
- Assess the feasibility and viability of setting targets for decentralised, renewable and low carbon energy in new development
- Propose planning policies which are supported by a sound evidence base
- Identify delivery vehicles and funding sources to enable the opportunities to be realised
- Indicate how the proposed approach can be implemented and monitored

1.2

The Need for a Renewable and Low Carbon Energy Study

Planning Policy Statement 1: Delivering Sustainable Development (PPS1) (2005) emphasises the need to promote more sustainable development. The PPS1 Supplement expects local authorities to encourage the uptake of decentralised, renewable and low carbon energy generation through the LDF.

The PPS1 Supplement states that planning authorities should have “*an evidence-based understanding of the local feasibility and potential for renewable and low-carbon technologies*”. It goes on to explain that, by drawing on the evidence base and with consistency in housing and economic objectives, planning authorities should:

“(i) set out a target percentage of the energy to be used in new development to come from decentralised and renewable or low-carbon energy sources where it is viable. The target should avoid prescription on technologies and be flexible in how carbon savings from local energy supplies are to be secured;

(ii) where there are particular and demonstrable opportunities for greater use of decentralised and renewable or low-carbon energy than the target percentage, bring forward development area or site-specific targets to secure this potential; and, in bringing forward targets,

(iii) set out the type and size of development to which the target will be applied; and

(iv) ensure there is a clear rationale for the target and it is properly tested.”

The PPS1 Supplement states that in preparing Local Development Framework (LDF) Core Strategies, planning authorities should:

“Consider identifying suitable areas for renewable and low-carbon energy sources, and supporting infrastructure. Care should be taken to avoid stifling innovation including by rejecting proposals solely because they are outside areas identified for energy generation and...

Expect a proportion of the energy supply of new development to be secured from decentralised and renewable or low-carbon energy sources.”

This reflects a growing recognition of the crucial role the local authorities must play in delivering low carbon communities and the challenges identified above. The Government's draft Heat and Energy Saving Strategy (May 2009) sets out the need for a more co-ordinated approach to streets or neighbourhoods to deliver significant improvements in energy performance. It is anticipated that local authorities will be at the heart of this. This is endorsed by a recent Audit Commission report (October 2009) into the role of local council in reducing domestic CO₂ emissions¹, which emphasises that *“councils can use their influence, legal powers and resources to:*

- Lead – encouraging local communities and public and private sector organisations to take action on domestic energy by developing a clear strategic vision, facilitating partnership working, providing information, advice and support and championing energy issues;
- Oblige – using powers within the planning system to promote the development of more sustainable homes and increase the supply of low-carbon and renewable energy; enforcing Building Regulations; and using the Housing Health and Safety Rating System (HSRS) to improve private sector homes; and
- Subsidise – funding measures in council homes and using financial incentives – such as council tax rebates, and direct funding, for example – home improvement grants or loans to promote take-up of measures to improve energy efficiency and supply low-carbon and *renewable energy*.”

Planning has an important part to play in making this a reality, particularly in providing the evidence and resource assessments, policies and targets that underpin wider local authority CO₂ reduction strategies.

¹ Audit Commission (October 2009) ‘Lofty Ambitions: The Role of Councils in Reducing Domestic CO₂ Emissions: Local Government’



Policy Review

2 Policy Review

2.1 Introduction

There is a comprehensive range of legislation and policy at various scales which supports the development and implementation of decentralised low carbon and renewable energy policy and targets. This chapter presents a summary of the key existing and emerging national, regional and local policies as well as other regulations and drivers.

2.2 National

2.2.1 *The Climate Change Act (2008)*

The Climate Change Act sets a legally binding target for reducing UK carbon dioxide (CO₂) emissions by at least 26% on 1990 levels by 2020 and at least 80% by 2050. To deliver this act, planning policy in future years is likely to introduce further measures to support development of a low carbon and renewable energy supply.

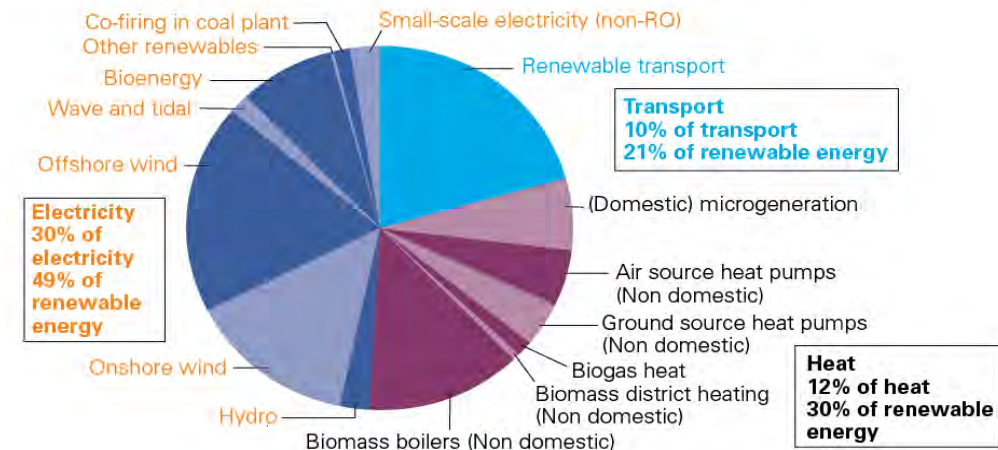
2.2.2 *UK Renewable Energy Strategy (July 2009)*

The UK Renewable Energy Strategy (White Paper)² describes how the UK will meet its legally binding target to supply 15% of all of the energy it uses from renewable sources by 2020. This target is anticipated to be achieved by using renewable energy technologies to supply:

- Over 30% of our electricity
- 12% of the heat we use
- 10% of energy for transport

² The UK Renewable Energy Strategy (DECC, July 2009)

Illustrative mix of technologies in lead scenario, 2020 (TWh)



Source: DECC analysis based on Redpoint/Trilemma (2009), Element/Pöyry (2009) and Nera (2009) and DfT internal analysis

Figure 1: Diagram showing the projected renewable energy resources by 2020

The strategy includes the following actions to help achieve these targets:

- *Planning process:* establishing a new planning process for nationally significant infrastructure projects (as introduced in the Planning Act 2008, see below); support for English regions to develop evidence-based strategies for achieving 2020 renewable energy targets; developing skills and providing resources to support swifter development and implementation of regional and local energy planning policy; helping to resolve environmental impacts of renewable energy technologies and address spatial conflicts with other uses such as radar and navigation.
- *Establishing the Office of Renewable Energy Deployment,* to work with other Government departments and stakeholders to remove barriers in the planning system, strengthen the supply chain and stimulate investment.
- *Financial mechanisms:* extended Renewables Obligation for large scale renewable electricity generation; amended Renewable Transport Fuel Obligation; Renewable Heat Incentive and Feed-In-Tariffs to pay a guaranteed premium for each unit of renewable heat or small-scale renewable electricity generation.
- *Investing in emerging technologies:* supporting offshore wind, marine energy and advanced biofuels; investing in the Severn Estuary tidal power project.

2.2.3

Draft Heat and Energy Saving Strategy

The Draft Heat and Energy Saving Strategy was published for consultation in February 2009. It aims to ensure that emissions from all existing buildings are approaching zero by 2050.

The Draft strategy proposes a new focus on district heating in suitable communities, removal of barriers to the development of networks, and encouragement of combined heat and power and better use of surplus heat through carbon pricing mechanisms. It also refers to extending the Building Regulations to require energy saving measures to be carried out alongside certain

types of building work on existing buildings, and proposed a new voluntary code of practice with the building trade on energy efficiency and low carbon energy.

It also suggests a new way of coordinating improvements to homes and communities, house-by-house and street-by-street. This would take the form of a 'whole house' package for all existing homes by 2030, which would provide energy saving measures such as insulation, and renewable heat and electricity as appropriate. It would also offer information and advice to help people make changes to save energy and money, and new means of financial support to allow the cost of investing in energy savings and renewable energy for homes to be offset by future savings on energy bills.

The summary of responses to the consultation (published in September 2009) indicates broad support for the Draft strategy, with emphasis on the need to support those in fuel poverty, coordinate measures targeted at householders and ensure that financing mechanisms are clear and easy to use. Some of the proposals in the Draft Heat and Energy Saving Strategy have been taken forward in the Low Carbon Transition Plan and related documents, while DECC has announced an intention to publish further proposals but no date has yet been given for this.

2.2.4

Zero Carbon Homes and Non-Domestic Buildings Consultation (2008) (and subsequent announcements)

The Zero Carbon Homes and Non-Domestic Buildings consultation seeks to clarify the definition of zero carbon that will be applied to new homes and buildings through the building regulations.

Currently, the proposed residential Building Regulations correspond to the Dwelling Emission Rate (DER) targets set out in the Code for Sustainable Homes, for levels 3, 4 and 6 (see Figure 3). Level 5 of the Code is a 100% reduction in the DER, meaning that all energy required for lighting, heating, cooling and ventilating the home produces net zero emissions over a year. The DER target is a mandatory element within the Code for Sustainable Homes. The Code additionally seeks to reduce energy use and CO₂ emissions through non-mandatory elements covering building fabric, internal and external lighting, drying space, energy labelled white goods, low or zero carbon technologies, cycle storage and provision for a home office. Non-domestic buildings are covered by various versions of BREEAM, which address similar topics. The Government has indicated that non-domestic buildings will be required to be zero carbon by 2019, again implemented through the building regulations.

The government announced in July 2009 that the Zero Carbon Definition will follow the methodology outlined in the 2008 Consultation:

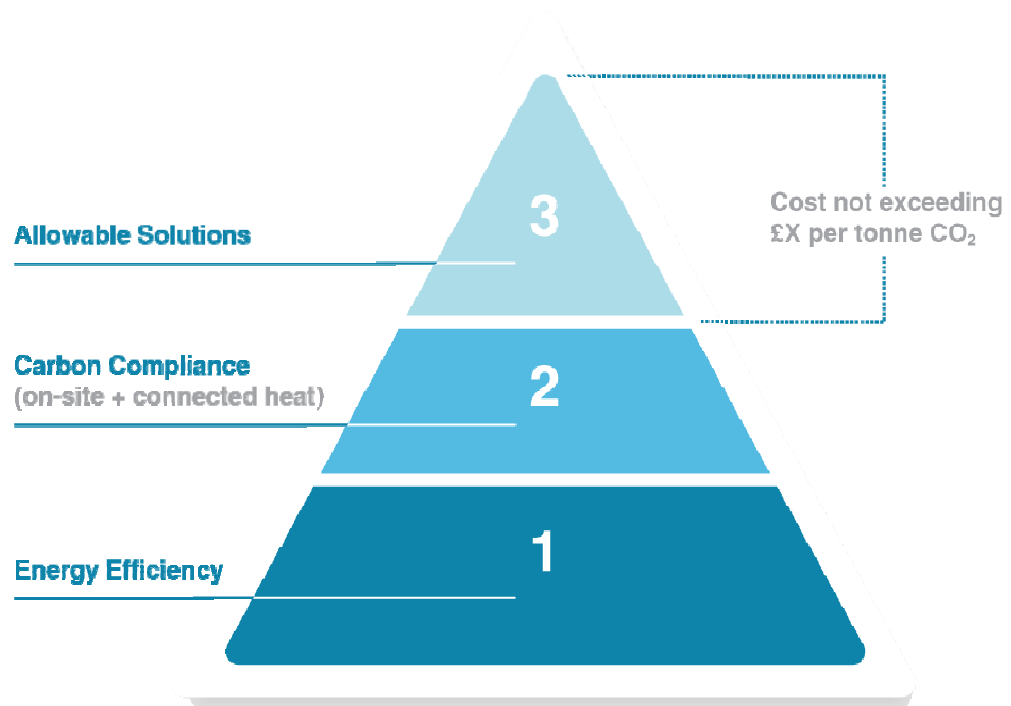


Figure 2: The Government's proposed methodology for delivering Zero Carbon buildings

This approach proposes that zero carbon should be achieved through three steps, Energy Efficiency (covering the building fabric), Carbon Compliance and Allowable Solutions. The energy efficient requirements are not yet fully defined but a Task Group from the Zero Carbon Hub has proposed that this cover only space heating and cooling from building fabric elements using an energy consumption metric (kWh/m²/year).

The Carbon Compliance requirement has been set so that, in combination with the Energy Efficiency improvements (Step 1), it will deliver a total reduction of 70% compared to the 2006 Building Regulations Target Emission Rate (TER). This will require either more fabric or other energy efficiency measures, onsite low or zero carbon energy technologies or connection to low carbon sources of heat or electricity.

Allowable Solutions will cover the remaining carbon emitted from home for 30 years. These have been listed to include:

- Additional Carbon Compliance
- Energy efficient appliances
- Advanced building control systems
- Exports of low carbon or renewable heat
- Investments in community heat infrastructure

2.2.5 *PPS: Planning and Climate Change – Supplement to PPS1: Delivering Sustainable Development (2007)*

The Climate Change PPS requires regional planning bodies to:

- Consider how the spatial strategy will support any regional targets on climate change (paragraph 12);
- Consider the potential to build more efficient energy supply and increasing contributions from renewable and low-carbon energy sources into new and existing development (paragraph 13);
- Provide a framework for sub-regional and local planning to focus substantial new development on locations where energy can be gained from decentralised energy supply systems, or where there is clear potential for this to be realised (paragraph 13); and
- Ensure opportunities for renewable and low-carbon sources of energy supply and supporting infrastructure, including decentralised energy supply systems, are maximised (paragraph 13).

As part of Local Development Framework Core Strategies, the Climate Change PPS states that planning authorities should:

- Consider identifying suitable areas for renewable and low-carbon energy sources, and supporting infrastructure. Care should be taken to avoid stifling innovation including by rejecting proposals solely because they are outside areas identified for energy generation (paragraph 20); and
- Expect a proportion of the energy supply of new development to be secured from decentralised and renewable or low-carbon energy sources (paragraph 20).

The PPS presents further opportunities at the local level. Local Development Orders (LDO) can be applied by planning authorities to extend permitted development rights across whole local authority areas or to grant permission for certain types of development. Although there is little experience of local planning authorities having used LDOs the PPS suggests that the Government is keen on them being used stating that: “planning authorities should give positive consideration to the use of Local Developments Orders to secure renewable and low-carbon energy supply systems” (paragraph 21).

In selecting the suitability of sites, the PPS adds that planning authorities should take into account the extent to which existing or planned opportunities for decentralised and renewable or low-carbon energy could contribute to the energy supply of development (paragraph 24).

Planning authorities should have an evidence-based understanding of the feasibility and viability of low-carbon technologies to supply new developments (paragraph 26). They may

need to work with industry to make their own assessments. The PPS requires development plans to set out a target percentage of energy to be used in new developments to come from decentralised, low carbon energy sources (paragraph 26). These targets should consider the low-carbon energy potential of particular development areas, but also potential within the existing stock. They should also consider the potential for other existing or proposed decentralised energy networks to connect to a wider network (paragraph 27). This should be discussed with relevant stakeholders, including the local planning authorities.

2.2.6 *The Planning and Energy Act (2008)*

The Planning and Energy Act came into force on 13th November 2008 and enables local planning authorities to set requirements for energy use and energy efficiency in local plans. While adding little to the provisions of the Climate Change PPS, the Act sets in statute the role of planning bodies in setting energy targets.

2.2.7 *The Recent Planning Acts (1990, 1991, 2004 and 2008)*

Planning and Compulsory Purchase Act 2004 places sustainable development at the heart of the planning system. Implementation of the Act is guided by Planning Policy Statements (PPS) covering a range of issues. In addition to the Climate Change PPS outlined above, those of particular relevance are:

- PPS3 (housing) sets out policies on increasing housing supply and density.
- PPS11 (Regional Spatial Strategies).
- PPS12 (Local Spatial Planning)
- PPS22 (Renewable Energy)

More recently, the Planning Act 2008 received Royal Assent on 26th November 2008. This has introduced a new planning approval process for “nationally significant infrastructure projects”, which for energy projects would mean schemes over 50MW. Such projects will be required to obtain development consent from the new “Infrastructure Planning Commission”, but will be exempt from the current requirements to obtain planning permission and other statutory approvals defined by section 33(1) of the Planning Act. Policy for the purposes of the Planning Act will be set out in National Policy Statements (section 5 (1-2)). No national Policy Statement have yet been published, however, once they are in place, decisions will be made by the Infrastructure Planning Commission (IPC).

Projects within the scope of “nationally significant infrastructure project” are defined in section 14 and include the construction of or extension of a generation station (section 14(1) (a)) and the installation of electricity lines above ground (section 14(1) (b)). District heating networks are not currently within this scope although other types of pipeline are included.

The Act also introduced the Community Infrastructure Levy (CIL). Section 205(2) of the Act details that the overall purpose of CIL is to ensure that costs incurred in providing infrastructure to support the development of an area can be funded (wholly or partly) by owners or developers of land.

2.2.8

Additional national policy and legislation

In addition, the following specific policy and legislation may be used to support the development of sustainable energy infrastructure:

- Local Government Act, 2000, introduced the power of wellbeing which enables local authorities to “*do anything which they consider is likely to achieve*” improvement of the economic, social or environmental well-being of their area. This could include public sector participation in special purpose vehicles to deliver sustainable energy services (such as EScO), co-ordinate investment and property investment;
- Strong and Prosperous Communities – The Local Government White Paper, 2006, emphasises the role of local authorities as ‘*strategic leaders and place-shapers*’, making better use of Local Strategic Partnerships (LSP), Local Area Agreements (LAA) and the new performance framework to tackle climate change;

The changes to national and subsequently local policy and decision-making processes that new legislation and Draft strategies will undoubtedly bring, will serve to strengthen the role for planners and local authorities in delivering decentralised low carbon and renewable energy. A clear and important direction of travel has been defined, which provides useful context for the following chapters.

2.3

Regional

The following policy and guidance documents have informed the regional policy review:

- The London Plan: Spatial Development Strategy for Greater London (Consolidated with Alterations since 2004), February 2008;
- London Plan Supplementary Planning Guidance on Sustainable Design and Construction, (May 2006);
- Climate Change Action Plan (2007);
- A New Plan for London: Proposals for the Mayor’s London Plan (2009).

2.3.1

The London Plan

2.3.1.1 Policy 4A.3 Sustainable design and construction

‘The Mayor will, and borough should, ensure future developments meet the highest standards of sustainable design and construction and reflect this principle in DPD policies. These will include measures to:

- Reduce carbon dioxide and other emissions that contribute to climate change
- Supply energy efficiently and incorporate decentralised energy systems (Policy 4A.6), and use renewable energy where feasible (Policy 4A.7)’

2.3.1.2 Policy 4A.1 Tackling climate change

‘The Mayor will, and borough should, in their DPDs require developments to make the fullest contribution to the mitigation of, and adaptation to climate change and to minimise emissions of carbon dioxide.

The following hierarchy will be used to assess applications:

- Using less energy, in particular by adopting sustainable design and construction measures (Policy 4A.3)
- Supplying energy efficiently, in particular by prioritising decentralised energy generation (Policy 4A.6), and
- Using renewable energy (Policy 4A.7).

Integration of adaptation measures with mitigation to tackle climate change will be sought through the approach set out in Policy 4A.9.

These contributions should most effectively reflect the context of each development – for example, its nature, size, location, accessibility and operation. The Mayor will and boroughs should ensure that development is located, designed and built for the climate that it will experience over its intended lifetime’.

2.3.1.3 Policy 4A.4 Energy assessment

‘The Mayor will, and boroughs should, support the Mayor’s Energy Strategy and its objectives of improving energy efficiency and increasing the proportion of energy used generated from renewable sources.

The Mayor will, and boroughs should, require an assessment of the energy demand and carbon dioxide emissions from proposed major developments, which should demonstrate the expected energy and carbon dioxide emission savings from the energy efficiency and renewable energy

measures incorporated in the development, including the feasibility of CHP/CCHP and community heating systems. The assessment should include:

- Calculation of baseline energy demand and carbon dioxide emissions
- Proposals for the reduction of energy demand and carbon dioxide emissions from heating, cooling and electrical power (Policy 4A.6)
- Proposals for meeting residual energy demands through sustainable energy measures (Policies 4A.7 and 4A.8)
- Calculation of the remaining energy demand and carbon dioxide emissions.'

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

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

Boroughs should ensure that all new development is designed to connect to the heating and cooling network. The Mayor will and boroughs should work in partnership to identify and to establish network opportunities, to ensure the delivery of these networks and to maximise the potential for existing developments to connect to them.'

2.3.1.5 Policy 4A.6 Decentralised Energy: Heating, Cooling and Power

'The Mayor will and boroughs should in their DPDs require all developments to demonstrate that their heating, cooling and power systems have been selected to minimise carbon dioxide emissions.

The need for active cooling systems should be reduced as far as possible through passive design including ventilation, appropriate use of thermal mass, external summer shading and vegetation on and adjacent to developments. The heating and cooling infrastructure should be designed to allow the use of decentralised energy (including renewable generation) and for it to be maximised in the future.

Developments should evaluate combined cooling, heat, and power (CCHP) and combined heat and power (CHP) systems and where a new CCHP/CHP system is installed as part of a new development, examine opportunities to extend the scheme beyond the site boundary to adjacent areas.

The Mayor will expect all major developments to demonstrate that the proposed heating and cooling systems have been selected in accordance with the following order of preference:

- Connection to existing CCHP/CHP distribution networks

- Site-wide CCHP/CHP powered by renewable energy
- Gas-fired CCHP/CHP or hydrogen fuel cells, both accompanied by renewables
- Communal heating and cooling fuelled by renewable sources of energy
- Gas fired communal heating and cooling.'

2.3.1.6 Policy 4A.7 Renewable Energy

'The Mayor will, and boroughs should, in their DPDs adopt a presumption that developments will achieve a reduction in carbon dioxide emissions of 20% from on site renewable energy generation (which can include sources of decentralised renewable energy) unless it can be demonstrated that such provision is not feasible.'

2.3.2 *London Plan Supplementary Planning Guidance on Sustainable Design and Construction (2006)*

Further guidance on the standards expected by the Mayor of London is provided in the London Plan's Supplementary Planning Guidance on Sustainable Design and Construction (2006), however much of this document is superseded by the requirements of the more recent London Plan.

2.3.3 *Climate Change Action Plan (2007)*

The Mayor of London has committed to "work with national and local government towards a target to reduce the capital's emissions by 60 per cent from their 1990 levels by 2025". This target was established by the Mayor's Climate Change Action Plan (2007), which set out actions to contribute to achieving this target for existing homes, existing commercial and public sector buildings, new development, transport and energy supply.

The following actions are of particular relevance to this study:

- Improving energy efficiency in housing, via the Green Homes Programme. Specific initiatives include an offer of subsidised loft and cavity wall insulation, free advice on energy saving measures, energy audits and project management services, training for installers and upgrades to existing social housing.
- Improving energy efficiency in the commercial and public sector, through the Better Buildings Partnership aimed at encouraging commercial landlords to upgrade their buildings, and a green organisations 'badging' scheme for tenants to encourage and recognise efforts to reduce emissions by changing staff behaviour and improving building management.
- Requiring high standards of energy efficiency and renewable energy use in new developments, through the London Plan and the Mayor's role in planning (see below), and setting an example in public sector led developments including London Development

Agency projects. Emissions savings achieved through new build are included in the figures for housing and the commercial and public sector, above.

- Reducing emissions from transport. Some of the actions proposed in this area are relevant to this study, including planning developments and providing the infrastructure to reduce car use and enable travel by public transport, walking and cycling, and providing refuelling infrastructure for alternative fuelled vehicles.
- Increasing the proportion of London's energy supplied from decentralised, renewable and low carbon sources to a quarter by 2025 and a majority by 2050. The plan focuses particularly on combined cooling, heat and power, energy from waste, promoting on-site small and medium renewable energy, and pursuing large scale renewable energy installations, including wind, wave and tidal power in the Thames Estuary. It also supports carbon sequestration.

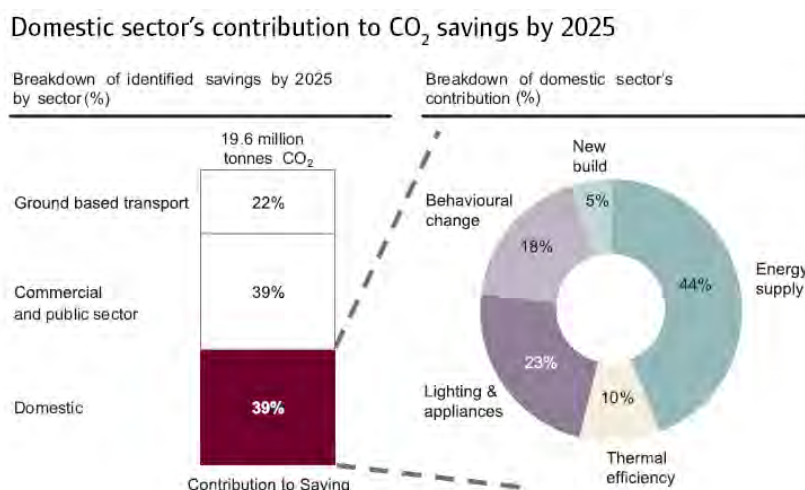


Figure 3: CO₂ savings expected from the domestic sector by 2025

2.3.4

Proposals for a new London Plan

The current Mayor of London has published A New Plan for London: Proposals for the Mayor's London Plan (2009)³. This describes initial proposals for a new London Plan, which will be prepared for adoption during the winter of 2011-2012 and is intended to set the framework for development in London over the next 20-25 years. It reiterates the commitment to reduce emissions by 60% by 2025 and states that the London Plan can contribute to this by ensuring that emissions from new developments are minimised and enabling development of sustainable energy sources. It proposes to retain, but strengthen, many of the climate change and energy policies of the London Plan (2008). In addition, it proposes to:

- Consider introducing a hierarchy of preferred cooling options for new developments
- Stimulate the uptake of renewable energy and outline London's potential capacity for renewable energy [generation]

³ <http://www.london.gov.uk/mayor/publications/2009/05/london-plan-initial-proposals.jsp>

- Consider requiring new development in London to achieve the highest levels of the Code for Sustainable Homes for energy performance
- Strongly support development of alternative fuel infrastructure, including for electric vehicles and hydrogen
- Support the provision of energy infrastructure to ensure a resilient, reliable and sustainable supply

2.4 Local

2.4.1 *"Enfield's Future": A Sustainable Community Strategy For Enfield 2009-2017*

The Sustainable Community Strategy will lead the LDF priorities and development of the Core Strategy and Area Action Plans. The LDF will be the spatial expression of the Community Strategy's vision of:

'A healthy, prosperous, cohesive community living in a Borough that is safe, clean and green.'

2.4.2 *Enfield Core Strategy Proposed Submission Report, December 2009*

Enfield is currently in the process of producing their Local Development Framework. The most important within the suite of documents is the Core Strategy, which sets out the Council's strategy for planning in Enfield. The Core Strategy is currently at its proposed submissions stage.

Strategic Objective 2:

'To promote a sustainable pattern of development integrating infrastructure and housing, reducing the Borough's carbon footprint, minimising the need to travel and protecting the Borough's green belt and biodiversity. To mitigate and adapt to the impacts of climate change, promoting energy efficiency and renewable sources of energy including exemplar schemes in the Upper Lee Valley area...'

Strategic Objective 4:

This objective addresses new homes and provides weight to the objective of delivering low carbon development:

'To facilitate the provision of sustainably constructed new homes of exemplary space and design standards to meet the aspirations of local people...':

2.4.3 *The Local Area Agreement: "Building Futures, Changing Lives for Enfield"*

The ambition, as set out in the LAA, is to ensure that 'In 2026 Enfield will have a strong sense of place and identity. It will be a place that people are proud to call home and want to invest in.

It will be a prosperous, sustainable Borough, maximising its strategic position relative to two of the Government growth areas and the UK's main economic driver, Central London. Development in Enfield will meet the needs of the present and add to the ability of future generations to meet their needs.'

The Appendix to this document confirms a Council target for a CO₂ reduction from Local Authority operations by 6% from baseline levels by 2010/2011.

2.5 Other emerging and changing regulation, targets and standards

2.5.1 *The Building Regulations – Part L Conservation of Fuel and Power (2006 and proposed alterations)*

Currently, the proposed residential Building Regulations correspond to the Dwelling Emission Rate (DER) targets set out in the Code, for levels 3, 4 and 6. Level 5 of the Code is a 100% reduction in the DER, meaning that all energy required for lighting, heating, cooling and ventilating the home produces net zero emissions over a year. The DER target is a mandatory element within the Code for Sustainable Homes. The Code additionally seeks to reduce energy use and CO₂ emissions through non-mandatory elements covering building fabric, internal and external lighting, drying space, energy labelled white goods, low or zero carbon technologies, cycle storage and provision for a home office. Non-domestic buildings are covered by various versions of BREEAM, which address similar topics.

Building Regulations first started to turn its focus on reducing CO₂ emission in the 2002 revisions of Part L (Conservation of Fuel and Power). Revisions to Part L 2006 brought the UK Building Regulations in line with the EU's Energy Performance of Buildings Directive (EPBD). The 2006 revisions to Part L required a 23.5% saving over the 2002 standards for fully naturally ventilated spaces and 28% savings for mechanically ventilated and cooled spaces.

Following consultation, the Government's Building A Greener Future: Policy Statement announced in July 2007 that all new homes will be zero carbon from 2016. The Government indicated in their recent '*Zero Carbon for New Non-Domestic Buildings Consultation on Policy Options*' Report (November 2009) that non-domestic buildings will be required to be zero carbon by 2019, with the public sector leading the way with schools by 2016 and other central Government estate from 2018. Again this will be implemented through the Building Regulations.

The focus has now turned to the final definition of zero carbon and the suitable intermediary step changes in requirements in 2010 and 2013. Until 2013 the standard is likely to continue to be set with reference to those sources of emission (space, water heating and lighting) that are contained in the 2006 regulations and to offer the option of adopting Low and Zero Carbon (LZC) technologies. The step to zero carbon in 2016 is likely to include emissions from other

sources (principally electrical appliances), which would result in the need for significant renewable generation capacity as well as other LZC systems⁴.

In December 2008 the Government published Definition of Zero Carbon Homes and Non-Domestic Buildings: Consultation consulting on the definition of zero carbon homes and in particular an approach based on:

- high levels of energy efficiency in the fabric of the home
- a minimum level of carbon reduction to be achieved onsite or through directly connected heat; and
- a list of (mainly offsite) allowable solutions for dealing with the remaining emissions (including from appliances)

The following diagram sets out, with respect to carbon emissions, the improvements upon 2006 standards that are proposed for implementation in 2010, 2013 and 2016. These equate to the energy performance standards in the Code for Sustainable Homes Levels 3, 4 and 6 respectively.

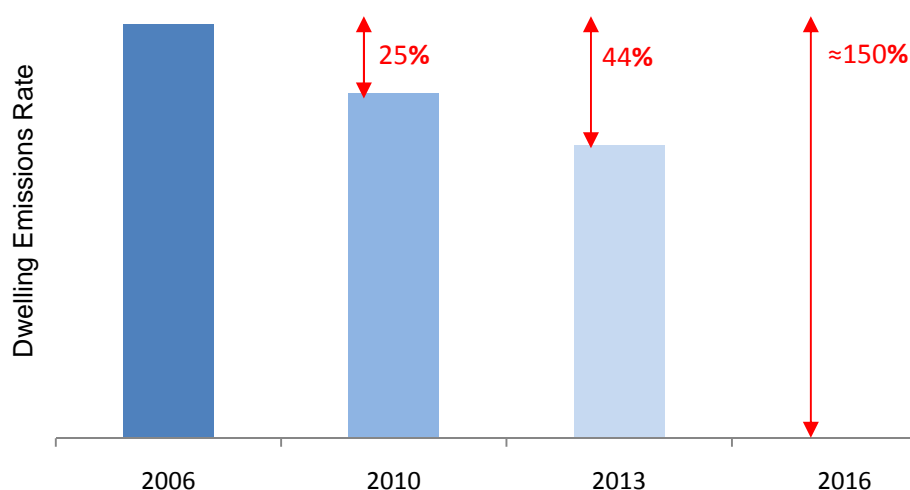


Figure 4: Relative reduction in emission rates from new domestic dwellings in the proposed Building Regulations for 2010, 2013 and 2016 compared to current (2006) Building Regulations.

Evidence demonstrating that the building complies with these criteria is required by building control both at design stage and at completion. The final “as built” calculation must be based on the building as constructed, incorporating any changes to the performance specifications that have been made during construction as well as the measured air permeability, ductwork leakage and fan performance as commissioned.

The government announced in July 2009 that the Zero Carbon Definition will follow the methodology outlined in the 2008 consultation with the Carbon Compliance element set at 70%

⁴ Building Regulations Energy efficiency requirements for new dwellings. A forward look at what standards may be in 2010 and 2013, Department for Communities and Local Government, July 2007

of regulated Emissions (the DER). The energy efficient requirements are not yet defined and a Task Group it to be set up to examine and advise on the energy efficiency metrics and standards. Allowable Solutions will cover the remaining carbon emitted from home for 30 years. These have been listed to include:

- Additional Carbon Compliance
- Energy efficient appliances
- Advanced building control systems
- Exports of low carbon or renewable heat
- Investments in community heat infrastructure

2.5.2

Code for Sustainable Homes

The Code for Sustainable Homes is an environmental assessment system for new housing in England which was introduced in April 2007 based on BRE's EcoHomes scheme. The Code assesses a development against a set of criteria under nine key categories.

The Code awards a rating to each dwelling type within the development based on a scale of Level one to six (denoted by stars) (Table 1). The rating depends on whether the dwellings meet a set of mandatory standards for each level, as well as an overall score (Table 1).

Code Levels	Minimum Entry Requirements		Total score out of 100
	Energy Improvement over TER	Water litres/person/day	
Level 1 (★)	10%	120	36
Level 2 (★★)	18%	120	48
Level 3 (★★★)	25%	105	57
Level 4 (★★★★)	44%	105	68
Level 5 (★★★★★)	100%	80	84
Level 6 (★★★★★★)	Zero Carbon	80	90

Table 1: Minimum requirements for the six levels under the Code

Mandatory requirements exist under the following credits:

- Energy (see Table 1)
- Water (see Table 1)
- Embodied Impacts of Construction Materials;
- Surface Water Runoff;

- Construction Site Waste Management;
- Household Waste Storage Space and Facilities.

The credits achieved for each dwelling type are then multiplied by the environmental weighting factor for each category to calculate the number of points achieved.

2.5.3

BRE Environmental Assessment Method (BREEAM)

BREEAM (BRE Environmental Assessment Method) is an environmental assessment system for non-domestic buildings in England which was established in 1990. Separate BREEAM schemes cover specific building types such as offices, industrial, retail, schools and healthcare buildings but “Bespoke BREEAM” can be used for other building types. BREEAM seeks to minimise the adverse effects of new buildings on the environment at global and local scales, whilst promoting healthy indoor conditions for the occupants. The environmental implications of a new building are assessed at the design stage and again following completion, and compared with good practice by independent assessors.

Buildings are awarded a specific rating. The rating depends on how many environmental credits are achieved under each section and their relative environmental importance. An overall BREEAM rating of Pass, Good, Very Good, Excellent or Outstanding is awarded, depending on the overall number of credits achieved. The current BREEAM 2008 came into force on 1st August 2008. A Post Construction Review of the building carried out by a licensed BREEAM assessor is now a mandatory part of the BREEAM assessment.

2.5.4

Changing and emerging legislation

The following emerging documents and policies which are all expected to be available or updated within the next year:

- Final South East Regional Spatial Strategy (Plan)
- Updates to the London Plan and its accompanying Mayoral Strategies
- UKCP09 – predicted climate impacts for the UK released June 2009
- Further information from Communities and Local Government on the Code for Sustainable Homes
- A New PPS combining the PPS on Climate Change and PPS22 (Renewable Energy)
- Heat and Energy Saving Strategy
- Zero Carbon Strategy

2.6

Review of other Local Authority low carbon and renewable energy targets

Various local authorities have established targets for local decentralised and renewable or low carbon energy production. Some of these were developed before the supplement to PPS1 on Climate Change was published in 2007 and do not fully meet the requirements of the PPS.

As outlined below, Dover now has robust evidence on which to base policy targets. It focuses heavily on on-site policies. By contrast, Southampton City Council's policy targets the broader energy opportunities, such as connection to District Heating.

2.6.1

Dover District Council

Faber Maunsell and EDAW (both now AECOM) were commissioned to develop an evidence base and make recommendations for decentralised and renewable and low carbon energy targets to be included in the Core Strategy (Submission Document 2009). The following recommendations have been put forward:

Core Strategy – Policy DM3 changed to:

“All new developments are required to meet Code for Sustainable Homes standards or equivalent. New developments are required to meet Code level 3 with immediate effect (from granting of permission), at least Code level 4 from 1st April 2013 and at least Code level 5 from 1st April 2016.

All new non-residential developments over 1000m² gross are required to meet BREEAM Very Good or equivalent with immediate effect (relevant versions cover offices, retail, industrial, education and healthcare).

Development Contributions SPD (or future Community Infrastructure Levy):

For new developments that cannot meet the carbon and water reduction targets in DM3 onsite and for new non-residential developments of less than 1000m² gross, applicants must achieve commensurate energy and water savings elsewhere in Dover District.

The actions or sums paid must achieve the difference between the onsite performance of the development and the immediate, 2013 and 2016 energy and water standards expected for developments. Dover District will publish updates concerning details of the energy and water efficiency schemes that will be eligible and the cost per tonne of CO₂ and per m³ of water saved. Applicants must prove they cannot meet requirements onsite through an open book accounting approach to show the development would not go ahead.

Core Strategy – new policy:

“Planning conditions will be applied to all domestic and commercial extensions and conversions to require cost effective energy and water efficiency measures to be included, aiming for no net increase in energy or water demand from the property.”

There are also a number of strategic allocation policies which take into consideration particular opportunities and constraints of the site and local area.

2.6.2

Southampton City Council

“All developments, either new build or conversion, with a floorspace of 500 m², or one or more residential units (based on the size of the final development footprint), will be required to incorporate decentralized and renewable or low-carbon energy equipment to reduce predicted CO₂ emissions by at least the percentage values for each type of development stated in the ‘Requirements for reductions in CO₂ emissions’ table’. Where specific opportunities exist, development will be required to connect to existing Combined Heat and Power (CHP) systems or make equivalent CO₂ savings through other on-site renewable or low-carbon energy measures.”

Development Type	Low Rise Residential	4 Storey + Residential	Schools/ Colleges	Offices	Light Industrial
Minimum CO ₂ emission reduction required	20%	15%	15%	15%	12.5%

2.6.3

Milton Keynes City Council

Sustainable Construction Policy D4, from the Local Plan (2005):

All new development exceeding 5 dwellings (in the case of residential development) or incorporating gross floorspace in excess of 1000 sq m (in the case of other development) will be required to include the following:

- (i) Energy efficiency by siting, design, layout and buildings’ orientation to maximize sunlighting and daylighting, avoidance of overshadowing, passive ventilation;
- (ii) Grouped building forms in order to minimize the external wall surface extent and exposure;
- (iii) Landscape or planting design to optimise screening and individual buildings’ thermal performance;
- (iv) Renewable energy production e.g. external solar collectors, wind turbines or photovoltaic devices;
- (v) Sustainable urban drainage systems, including rainwater and waste water collection and recycling
- (vi) Significant use of building materials that are renewable or recycled;
- (vii) Waste reduction and recycling measures;
- (viii) Carbon neutrality or financial contributions to a carbon offset fund to enable carbon emissions to be offset elsewhere.

2.6.4 *Merton Borough Council*

"The council will encourage the energy efficient design of buildings and their layout and orientation on site. All new non residential developments above a threshold of 1,000m² will be expected to incorporate renewable energy production equipment to provide at least 10% of predicted energy requirements."

This policy was adopted in 2003. It is expected that the policy will be extended to cover all development in Merton, to include residential. Consultation on the LDF will consider whether it is also appropriate to increase the percentage of the policy up to a 20% requirement.

2.6.5 *Uttlesford District Council*

Policy ENV15 - Renewable Energy of the Local Plan (2005) states:

Small scale renewable energy development schemes to meet local needs will be permitted if they do not adversely affect the character of sensitive landscapes, nature conservation interests or residential and recreational amenity.

Policy DC 14 - Renewable Energy of the Proposed LDF Core Strategy (Preferred Options stage 2009):

Renewable energy and low carbon technologies will be supported for single buildings and neighbourhoods where the benefits outweigh any other relevant local and wider environmental, economic, social and other considerations.

2.6.6 *Woking Borough Council*

The key requirements of Policy SE2 from the Local Plan (1999) are:

- All types of development should incorporate energy efficiency best practice measures in their design, layout and orientation;
- At least 10% of the energy that will be required by all commercial and residential development must be generated from renewable sources on site; and
- On larger developments (over 5,000m² floorspace) combined heat and power (CHP) should be provided.

2.6.7 *Kirklees Council*

Policy 11.3 LDF Core Strategy (Preferred Options stage 2009)

Assets supporting the production and networking of renewable energy will be protected. Public funds and developer contributions will be directed to improving the infrastructure required to deliver comprehensive renewable heat and power networks.

Policy 11.4 - Energy efficiency

All new developments, major refurbishments and significant extensions will be required to meet, as a minimum, either the requirements of the Code for Sustainable Homes or a BREEAM assessment, where carbon savings will be evaluated at current levels for the Code.

2.6.8

Croydon Borough Council

EP16 of the Replacement Unitary Development Plan (2006) states:

The Council will encourage all developments to incorporate renewable energy, but will require proposals for non-residential developments exceeding 1,000m² gross floorspace, and new residential developments comprising 10 or more units, whether new build or conversion, to incorporate renewable energy production equipment to off-set at least 10% of predicted carbon emissions, except where:

- a) the technology would be inappropriate;
- b) it would have an adverse visual or amenity impact that would clearly outweigh the benefits of the technology; and
- c) renewable energy cannot be incorporated to achieve the full 10%.

Where the 10% requirement cannot be achieved on major developments, a planning obligation will be sought to secure savings through the implementation of other local renewable energy schemes.

2.7

Lessons Learned: Ensuring the development of a robust evidence base

The data used to inform the evidence base will contain significant technical detail that may only be of limited direct interest to planners. However, a certain level of detail is necessary to underpin policy and targets so it is important that complex data is presented in such a way that planning officers can make informed decisions based upon it.

The spatial analysis undertaken as part of an evidence base will identify specific opportunities for particular energy technologies and promoting CO₂ reductions. We will bring this together into an 'energy opportunities plan' (EOP). An EOP is essentially a diagram that shows spatially where particular energy opportunities exist (it is described in more detail in section 5). This spatial understanding will inform the scope of planning policies and setting of targets. However, the ideal solutions may not fit neatly into the private developer-led planning applications that

trigger the use of these policies or targets. Delivering a town centre district heating network, for example, may begin by linking up existing civic-owned buildings as well as individual planning proposals. Planning policy and targets in the traditional sense are poorly placed to facilitate this. The EOP will also help us to identify non-planning delivery mechanisms where necessary in addition to planning policies.

A key aim of this evidence base, therefore, should be to inform wider action and investment decisions across the local authority area (or beyond). In terms of delivery this means identifying those stakeholders who are best placed to take each opportunity forward. Planning policy and targets will be ideal for some schemes, but Enfield Council and their stakeholders (including Local Strategic Partnerships) will be better placed to deliver, or facilitate the delivery of more complex proposals that cut across wider areas, particularly those that link new and existing communities (i.e. non development specific). Delivery mechanisms are explored in more detail in section 9.

2.7.1

Early stakeholder engagement

It is important to define the role of stakeholder engagement in setting energy targets and to agree whether this should be carried out during the preparation of the evidence base or afterwards. For example, the evidence base may be the first step in focussing the aims of Enfield's Climate Change Board who, with the involvement of business and other stakeholders, can help identify local opportunities and constraints. The value of early and broad stakeholder engagement has been established in a range of studies (such as *Stakeholder Engagement in Regional Planning*, prepared by the TCPA for ODPM in 2004) over a number of years. The conclusions from these have influenced PPS11 and 12. High quality engagement can help:

- Use the strategy as an early warning for key stakeholders to reduce resistance, improve understanding of their various needs and barriers, and of 'cross-cutting' benefits.
- The ability of the energy strategy to build social capital through building skills and generating income streams, demonstrable leadership through visible systems and fostering stakeholder ownership.
- Improve understanding how energy supply issues present actual barriers to broader behavioural change in the area.

As part of this study a workshop was held at the Council offices on 1st December 2009 to disseminate the early stage results and gather information and feedback from a range of key stakeholders. The attendees included various officers from different departments across the Council, housing associations, developers, architects, consultants and representatives from the London Development Agency and North London Waste Authority. More details of the attendees and feedback from the event is included in Appendix D of this report. In addition, both the early stage results and final conclusions of this study were presented to the Enfield Climate Change Board on 2nd November 2009 and 2nd March 2010 respectively.

The opportunities associated with low carbon and renewable energy targets need not be constrained to the realm of spatial planning. The Dover study (undertaken by AECOM) acknowledges the role of National Indicators in improving corporate performance. An integrated approach to these targets and related issues is needed to maximise local opportunities, which may cross geographical boundaries and require wider collaboration for effective and efficient delivery. The greater extent to which different parts of local government and other strategic partners come together to produce and manage an evidence base and to use it to influence planning and corporate level policy and target setting, the more effective the strategy's implementation is likely to be.

2.7.2

Cross-border cooperation

Some methodologies examine both area wide and site-specific targets for an area, which is a good approach, helping to ensure local opportunities are fully exploited. The PPS1 Supplement encourages local authorities to look beyond geographical boundaries and to seek opportunities to integrate new and existing development. A study for the Association of Greater Manchester Authorities, which is currently being finalised by AECOM, is taking steps to integrate new and existing development and to highlight links between planning and delivery. The ten local authorities that constitute AGMA co-operate on a number of issues, both statutory and non-statutory, where there is the possibility of improving service delivery by working together. There is growing evidence of partnership working at the local level, though this appears to be uncommon in completed low carbon and renewable energy studies to date.

Two of the strategic development areas in the Borough are within the Upper Lee Valley Opportunity Area

2.7.3

Improving the existing stock

Revision 2020 (Government Office for the South West & the South West Regional Assembly) tested different development scenarios to model future demand from new and existing building stock. The Dover study strongly conveyed the importance of improving the existing stock and used two funding scenarios to demonstrate this. This approach is particularly important in areas that are not expecting to undergo significant growth in the near future, and may have poorly performing existing stock. The PPS1 Supplement reiterates this and seeks to identify ways in which planning, which traditionally has had an uneasy relationship with the existing stock due to its focus on new build, can bring new and existing communities together.

It is clear that evidence gathering exercises need to base their resulting energy strategies around the particular opportunities afforded by different parts of the authority area. The AGMA study's use of 'character areas' to identify similar areas in terms of land uses, densities, tenures and so on (as proposed by *Community energy: urban planning for a low carbon future*) is particularly helpful in enabling us to better understand the opportunities that are suited to different types of community. Character areas can also be invaluable in helping define appropriate and location-specific delivery mechanisms. For example, a public private

partnership ESCo may help to deliver a city centre district heating system whereas local authority based grants using Salix funds may be more appropriate to suburban communities. These approaches are discussed further in section 9.

2.7.4

Defining robust targets

In Development Plan Documents (DPD) there are likely to be three types of energy opportunity: existing development; new development; and strategic community-wide interventions. Figure 3 sets out some of the mechanisms and partners that are likely to be required to deliver the change, along with the range of planning policies, for each energy opportunity. Section 9 describes the relationship between planning policy and delivery mechanisms for each energy opportunity in detail.

Energy Opportunity	Delivery Mechanism	Likely Delivery Partner	Planning Policy
Existing development	LA support for microgeneration Powers of Wellbeing Local Development Orders	Local authorities Local Strategic Partners Home / building owners ESCo	Consequential improvements
New development	Building regulations CIL and S106 Local Development Orders Conditions to LA land sales Allowable Solutions	Local authorities Local Strategic Partners Energy developers Housebuilders/ developers/ RSLs ESCo	Increment on target emission rate Full Code target Policies for strategic sites Design and layout
Strategic community-wide interventions	Powers of Wellbeing CIL Local Development Orders Public sector policy and targets Allowable Solutions	Local authorities Local Strategic Partners Energy developers Housebuilders/ developers/ RSLs ESCo Community organisations	Generation target Supporting/criteria policy Install DE Connect to DE Set aside land Design and layout

Figure 5: Overview of delivery mechanisms, partners and planning policy for energy opportunities



Existing CO₂ Emissions Data and Baseline Information

3 Existing CO₂ Emissions Data and Baseline Information

3.1 Introduction

The following section provides the context to this study, presenting the current energy demands and CO₂ emissions from the existing building stock within Enfield.

3.2 Existing Energy Consumption and CO₂ Emissions Data for Enfield

3.2.1 Energy Consumption

DECC hold records of total energy consumption of different fuels by sector for each region and local authority. The consumption records for 2006 for the London Borough of Enfield are shown in Table 2 below. It demonstrates that the overwhelming proportion of energy consumption in the Borough is derived from fossil fuels.

Fuel	Sector	Consumption (GWh)
Coal	Industry & Commercial	2.0
	Domestic	0.6
	Total	2.6
Manufactured fuels	Industry	0.1
	Domestic	0
	Total	0.1
Petroleum products	Industry & Commercial	109.4
	Domestic	12.2
	Road transport	1600.5
	Rail	0.5
	Total	1722.6
Natural gas	Industry & Commercial	692.5
	Domestic	1,957.1
	Total	2,649.6
Electricity	Industry & Commercial	822.0
	Domestic	559.0
	Total	1381.0
Renewables & waste	Total	86.2
Total		5842.1

Table 2: Energy Consumption in Enfield by fuel and sector(DECC 2006)

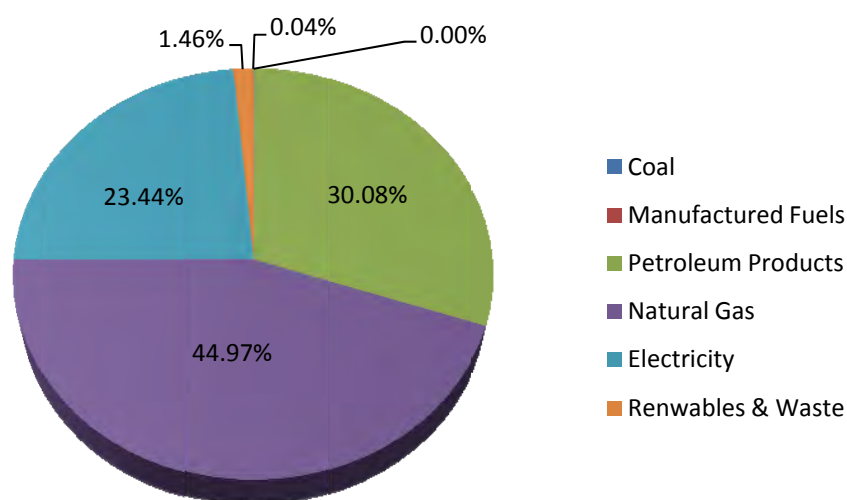


Figure 6: Total final energy consumption for the London Borough of Enfield (DECC 2006)

3.2.2

Baseline CO₂ emissions

The London Energy and CO₂ Emissions Inventory records the estimated CO₂ emissions from different sectors in each Borough, the baseline data for 2003 is shown in Table 3 and Figure 5 below. It demonstrates that over 40% of the CO₂ emissions are derived from the domestic sector.

Baseline CO ₂ emissions for Enfield (2003)				
Industry & Commercial (T per annum)	Domestic (T per annum)	Transport (T per annum)	Total Emissions (T)	Emissions Per Capita* (T)
380,688	556,021	391,858	1,328,568	5.14

*Based on ONS 2006 Mid-year population estimate of 258,300

Table 3: Baseline CO₂ emissions in Enfield by sector (LECI 2003, Defra 2007)

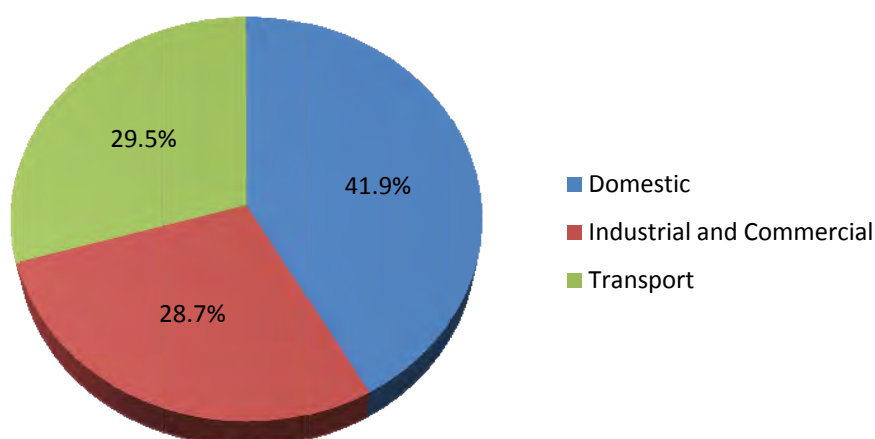


Figure 7: London Energy and CO₂ Emissions Inventory (LECI 2003, Defra 2007)

3.3

Housing Data

3.3.1

Current housing stock

The Office of National Statistics hold information on the tenure of dwellings in each local authority, the data for Enfield is shown in Table 4 and Figure 6 below. The data shown above demonstrates that the vast majority of the housing stock of the Borough is privately owned.

Housing Tenure	Number	Percentage
LA Dwelling Stock	11,578	9.7
RSL Dwelling Stock	7,318	6.1
Other Public Sector Dwelling Stock	131	0.1
Owner Occupied & Private Rented Dwelling Stock	100,352	84.1
Total	119,379	100

Table 4: Tenure of the housing stock in Enfield (Office of National Statistics, 2008)

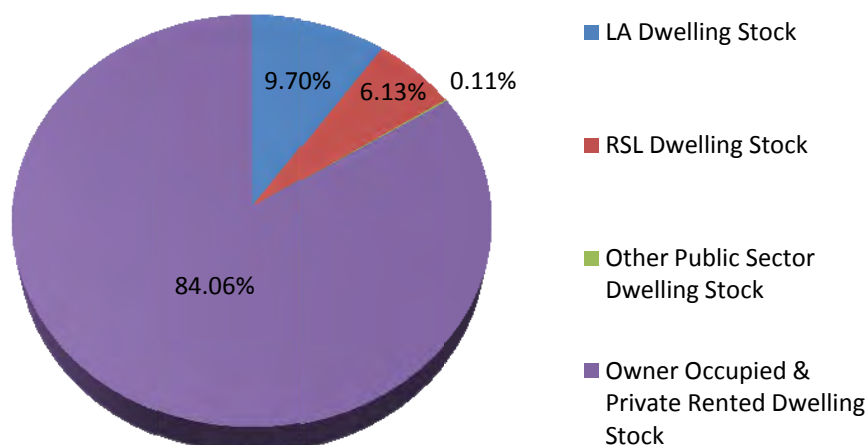


Figure 8: Dwelling Stock in Enfield by Tenure and Condition (Office of National Statistics, 2008)

Annual domestic energy consumption and CO ₂ emissions in Enfield (2003)				
Total energy consumption (kWh/year)	Total CO ₂ emissions (kgCO ₂ /year)	Number of dwellings in Enfield	Average energy consumption per dwelling (kWh/year)	Average CO ₂ emissions per dwelling (kgCO ₂ /year)
2,242,650,536	556,020,910	115,765	19,372.4	4,803.0

Table 5: Domestic energy and CO₂ data (LECI 2003, Defra 2007)

3.4

Calculating the Energy Demands from the Housing Stock

3.4.1

Methodology

The existing energy demands from buildings within the Borough have been calculated to estimate the baseline energy demand for both heat and electricity. The baseline has been modelled using data collected on the numbers of dwellings and the area of commercial buildings within the Borough, and associating these with benchmarks energy demands for different building types.

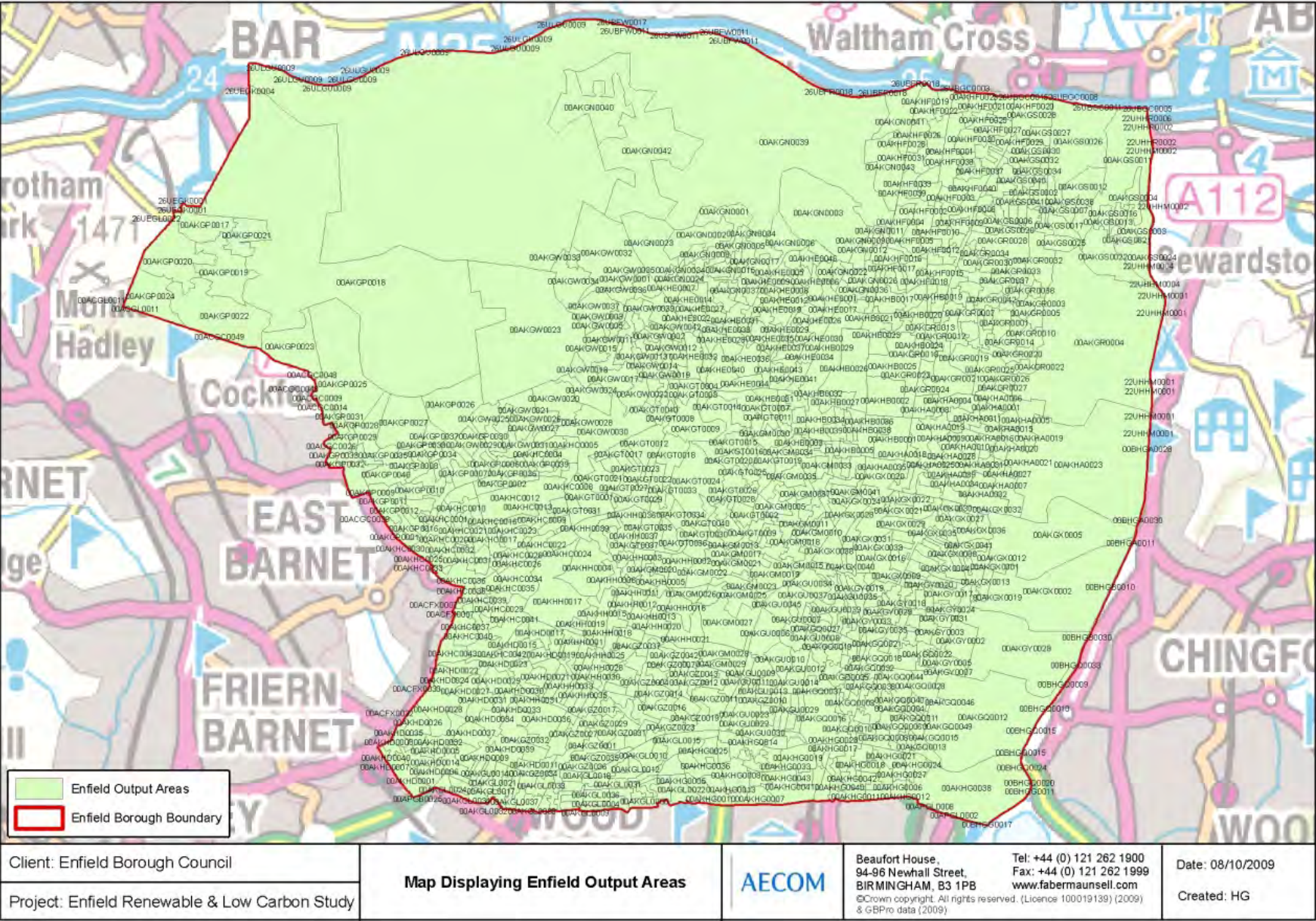
Residential

For existing residential buildings both the age and dwelling type was taken into account as well as differences in building fabric, occupant density and the likelihood of building fabric improvements having been made. The following age bands were used:

- Pre 1918
- 1919-1975
- 1975-2001
- Post 2001

For each age band energy benchmarks for the following building types were developed, using information from the English House Condition Survey (CLG, 2008), to create energy models for the building types (based on previous work undertaken by AECOM): detached; semi-detached; terraced; and flats.

Due to the larger number of flats in new and proposed developments, the benchmark energy demands for new/proposed flats was split into 1, 2 and 3-bed categories. The different age bands and dwelling types resulted in a total of 18 residential building type energy benchmarks. Data for the number of residential buildings in the Borough was taken from the 2001 Census. The Census data gave dwellings numbers for each dwelling type, sorted by Output Area (OA).



Map 2: Enfield Output Areas

The buildings were grouped into three bands to represent typical construction types for each era in line with our pre selected age brackets:

- Pre 1919 – Solid wall construction
- 1919-1979 – Cavity wall construction
- Post 1979 – Insulated buildings

The map was divided in to output areas and the number of units in each age band, within each output area, recorded. The map included some buildings without an associated age category. These were assessed visually to determine their function. In the few cases where the building was for residential purposes, the buildings age and approximate number of units were recorded.

There was some difficulty in determining the exact number of units within each output area because of the Building Class Maps labelling system. The results were validated by comparison to 2001 Census data which included residential completions to date for the area. The total number of residential units in the area was comparable.

Non-residential

Data was collected from the Valuation Office Agency (VOA) for the non-residential existing buildings. This data provided areas of different building types, sorted by postcode. Area data was assigned to one of the CIBSE TM46 energy benchmark categories, and then collated by OA.

This dataset unfortunately does not contain data for all non-residential buildings. Data for pubs, hotels and swimming pools were located using area research and their location positioned using postcodes. These additional use energy demands were added to the VOA data energy demands where possible. Data for public buildings was obtained from the Council and based on data collected from April 2008 to March 2009.

For both the new and proposed and existing non-residential buildings there are 29 different building types used, based on the types included in CIBSE TM46:2008. This includes the following building types:

- | | |
|-----------------------------------|---|
| • General office | • Public buildings with light use |
| • High street agency | • Schools and seasonal public buildings |
| • General retail | • University campus |
| • Large non-food shop | • Clinic |
| • Small food store | • Hospital; clinical and research |
| • Large food store | • Long term residential |
| • Restaurant | • General accommodation |
| • Bar, pub or licensed club | • Emergency services |
| • Hotel | • Laboratory or operating theatre |
| • Cultural activities | • Public waiting or circulation |
| • Entertainment halls | • Transport terminal, e.g. airport |
| • Swimming pool centre | • Workshop |
| • Fitness and health centre | • Storage facility |
| • Dry sports and leisure facility | • Cold storage |
| • Covered car park | |

3.4.2 Baseline Energy Demands

Figure 7 below shows the relative energy demands and CO₂ emissions from different building types within the Borough.

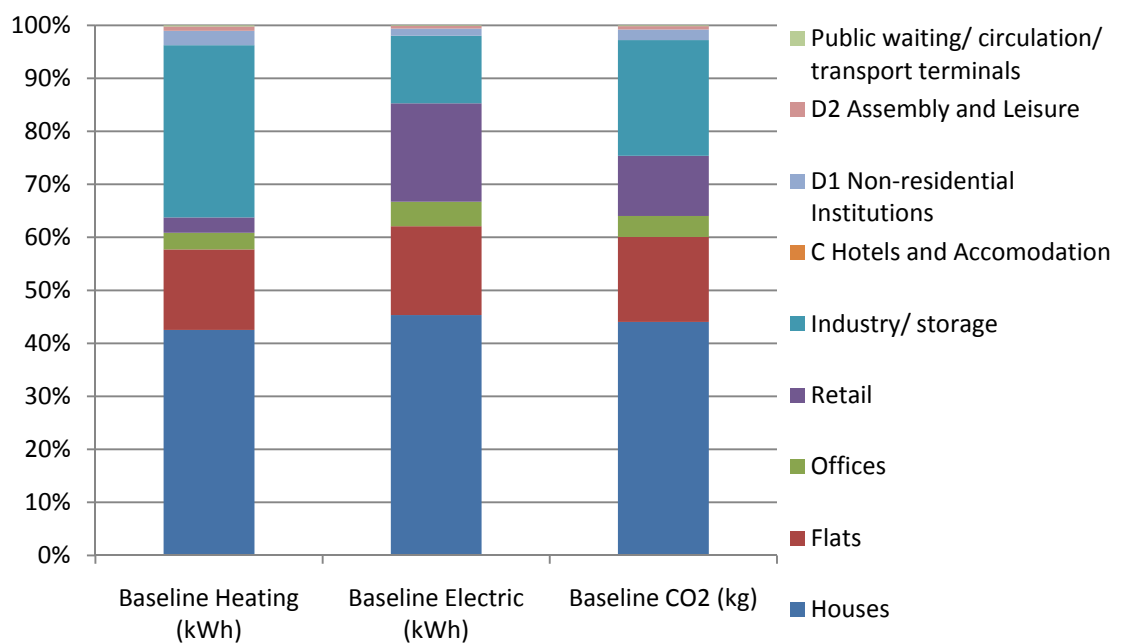


Figure 9: Proportion of energy demand and CO₂ emissions from different building types within Enfield (AECOM analysis)

This data shows that the primary source of the energy consumption and CO₂ emissions from the total building stock in Enfield are derived from residential dwellings (around 60%), with the majority of the remainder resulting from industrial and retail uses.

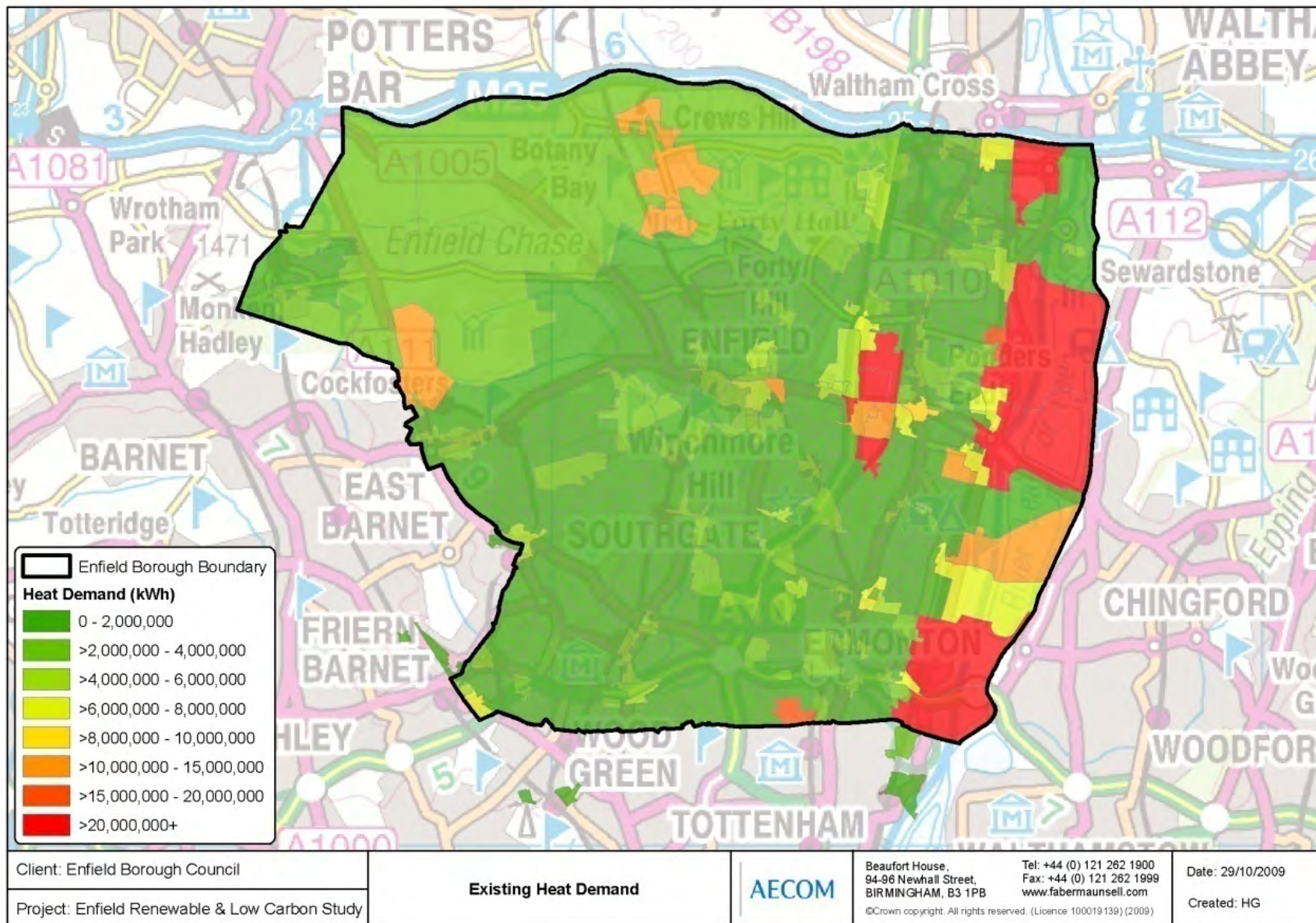
3.4.3 Energy Consumption Maps

Map 2 shows the fossil fuel consumption from buildings across the Borough. High heat demand is concentrated around areas with high commercial, industrial activity and large public buildings.

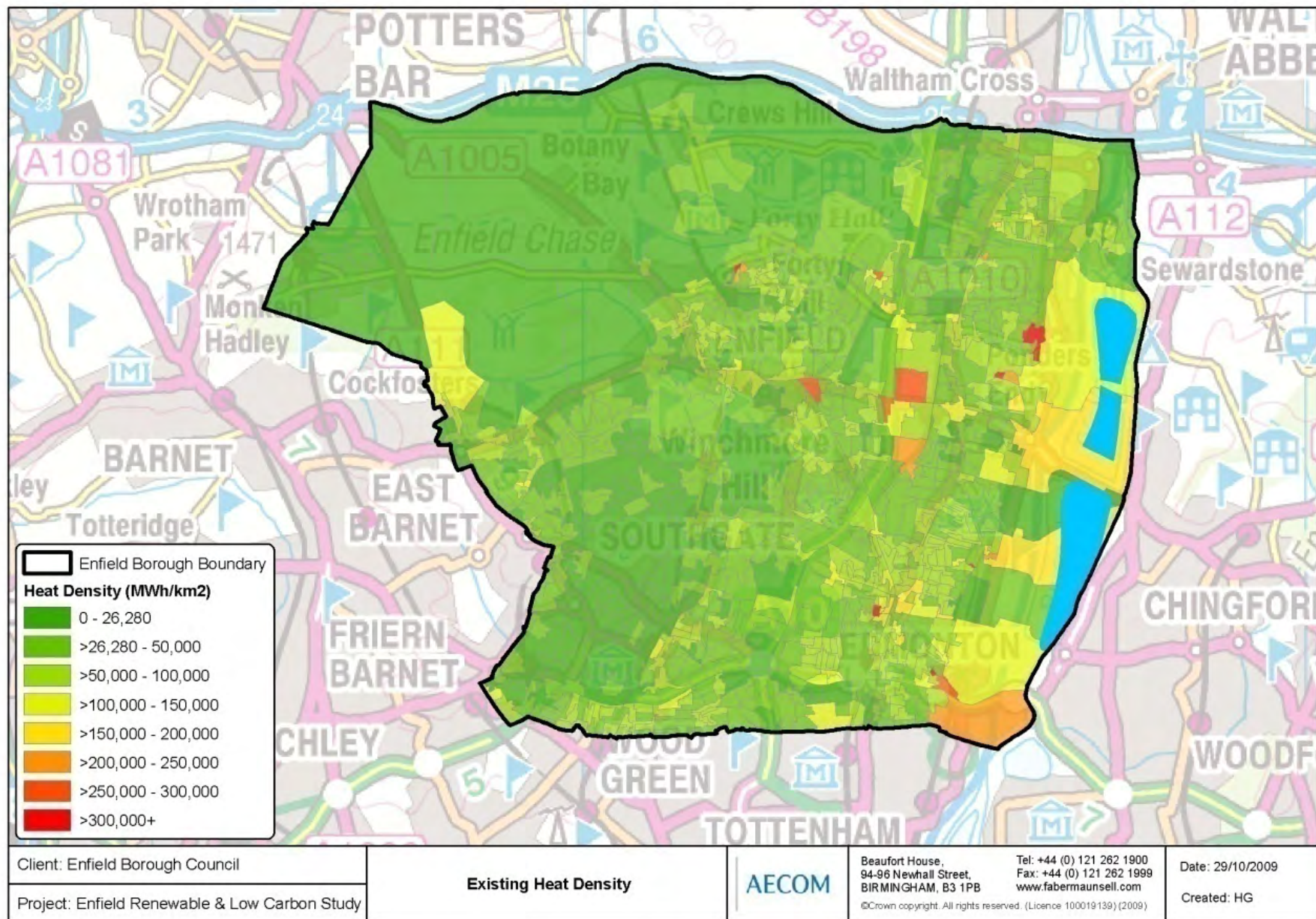
Map 3 shows the density of the heat demand, taking account of the size of each of the output areas, excluding green spaces and water bodies. High heat demands correspond with areas of dense housing and with high retail and industrial uses

Map 4 shows the electricity consumption across the Borough. High concentrations of electricity consumption correspond with areas of high commercial activity, particularly Enfield Town, Southbury, Palmers Green and Southgate.

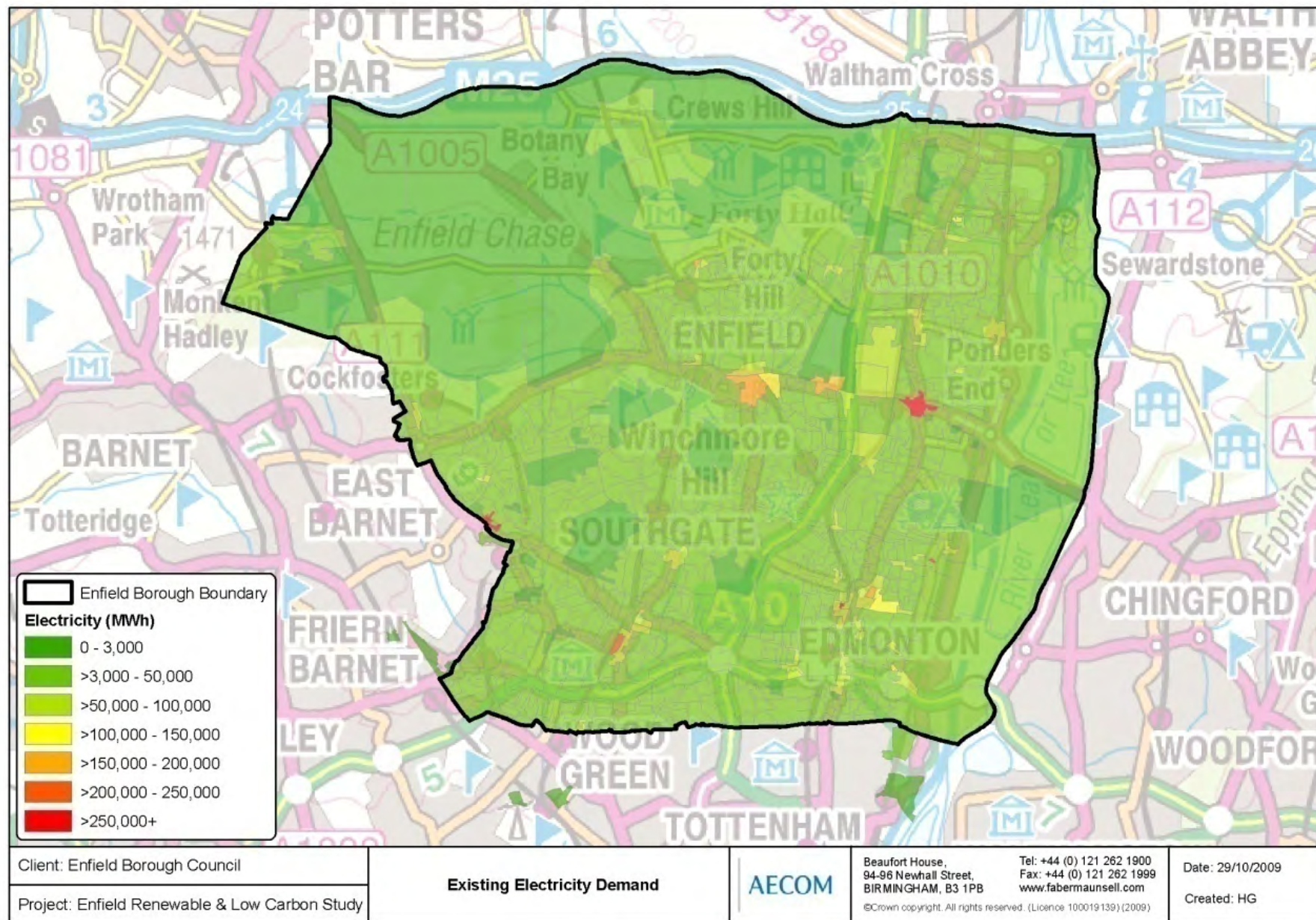
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Map 3: Existing Heat Demand in Enfield



Map 4: Existing Heat Density in Enfield



Map 5: Existing Electricity Demand in Enfield

3.5

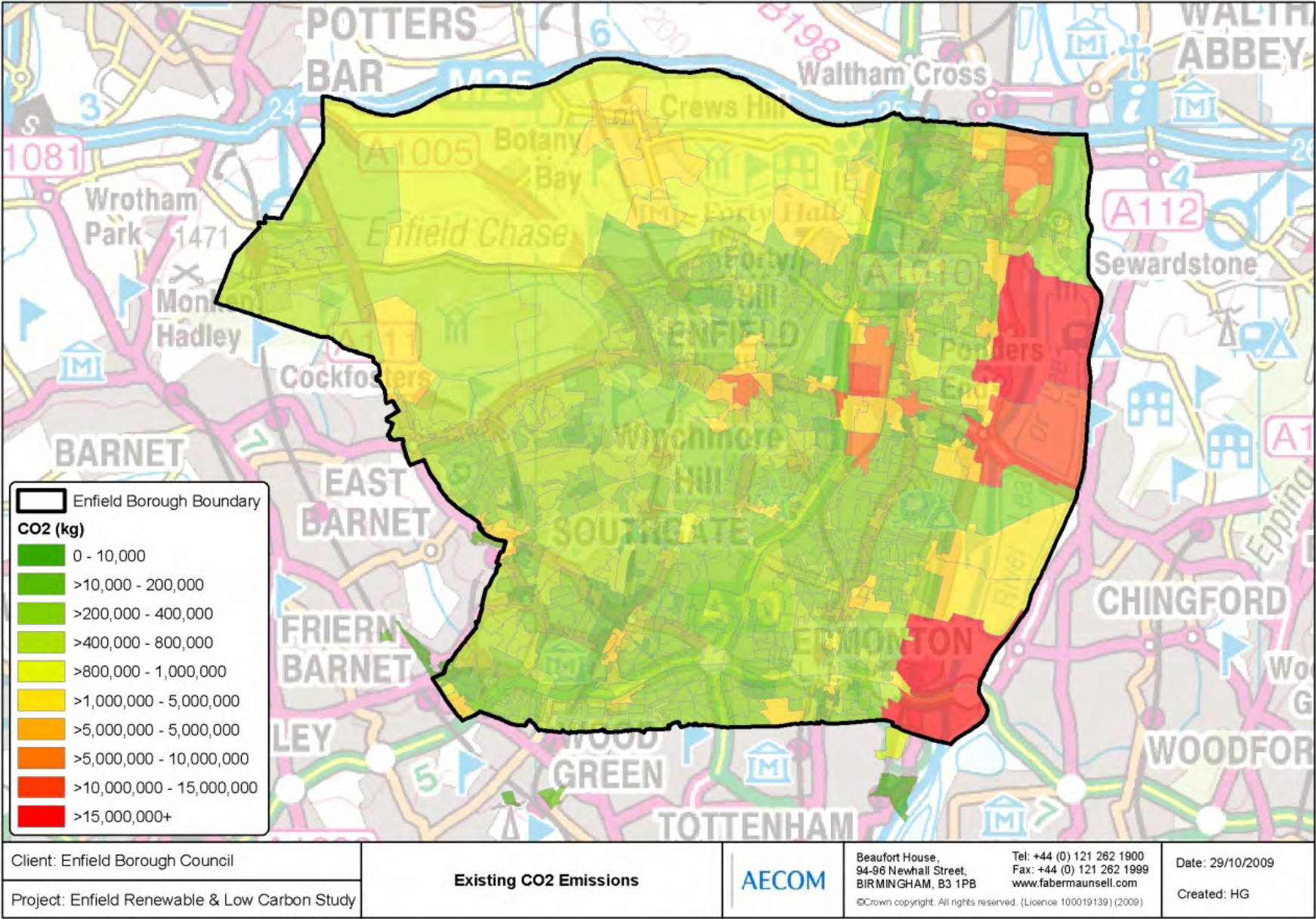
Carbon Dioxide Emissions

Conversion factors for calculating CO₂ emissions are shown in Table 5. These are based on the emissions factors included in the 2006 Building Regulations, Approved Document L2.

Fuel	CO ₂ emissions kgCO ₂ /kWh delivered
Gas	0.194
Grid Supplied Electricity	0.422
Grid Displaced Electricity	0.568
Biomass	0.025
Waste Heat	0.018

Table 6: Conversion factors for CO₂ emissions of fuels (Building Regulations, 2006)

Using these conversion factors the energy consumption data can be converted into CO₂ emissions. Map 5 shows the concentration of CO₂ emissions from buildings across the Borough.



Map 6: Existing CO₂ emissions from the building stock in Enfield

3.6

Existing buildings

Based on the data presented in this chapter it is clear that the privately owned existing housing stock is the single most important sector for addressing the energy consumption and CO₂ emissions within the Borough.

The Energy Saving Trust defines 'under insulated homes' as those with less than 100mm loft insulation and/or unfilled cavity walls. The HEED database, which is based on a range of sources, shows that between 37% and 54% of houses within each ward in Enfield meet these criteria as shown in Table 6. It must be noted however that the data on which this information is based is very limited, the sample size representing only between 3-8% of the total building stock.

Location	No. of homes in location	No. of homes with data	No. of homes matching criteria	Percentage
Cockfosters	5,397	180	97	53.9%
Edmonton Green	6,667	359	187	52.1%
Winchmore Hill	4,885	194	94	48.5%
Enfield Highway	5,893	314	151	48.1%
Town	6,214	270	127	47.0%
Haselbury	5,492	309	145	46.9%
Lower Edmonton	5,800	388	181	46.6%
Highlands	5,599	245	111	45.3%
Ponders End	5,661	354	159	44.9%
Jubilee	5,311	380	169	44.5%
Southgate	5,938	163	71	43.6%
Chase	5,646	290	122	42.1%
Grange	5,305	191	80	41.9%
Enfield Lock	6,215	322	134	41.6%
Southbury	5,570	311	129	41.5%
Bush Hill Park	5,535	213	88	41.3%
Bowes	4,674	312	126	40.4%
Southgate Green	5,012	201	77	38.3%
Upper Edmonton	6,182	477	179	37.5%
Turkey Street	5,382	369	138	37.4%
Palmers Green	5,146	304	113	37.2%

Table 7: Number and proportion of homes with less than 100mm of Loft Insulation and/or Unfilled Cavity Walls (EST HEED Database accessed on 20/10/2009)

The HEED database also includes information on a range of other key elements of dwellings that can be important in determining the levels of energy efficiency; this data is presented in Table 7. The key findings are as follows:

- Boilers – A large proportion of houses have a condensing or combi-boiler with radiators (60%) although it is not possible to determine how efficient these are. Of the remainder, around 30% could potentially benefit from a replacement boiler and controls and around 5% could benefit from conversion from electric based heating systems to gas or district heating.
- Loft insulation – Around 16% of properties have no loft insulation and a further 30% have less than 100mm according to the data from the sample sets. Loft insulation is relatively cheap and can significantly reduce heat losses. New dwellings would normally be designed with about 300mm insulation.
- External wall insulation – the majority of properties (~60%) have solid walls, for which the insulation properties are unknown (although it is likely that most have little or no insulation). Insulating solid walls can be costly but can deliver significant savings in terms of both energy costs and CO₂ emissions. A significant proportion of properties have cavity walls (30%), of which two thirds are filled. Insulating unfilled cavity walls is a very cost effective improvement.
- Hot water tank insulation – Most properties (~80%) have hot water tank insulation but for those that don't (~20%) this represents a low cost energy efficiency measure
- Glazing – The sample studies indicate that potentially over half of the properties in the Borough have full double glazing but that ~40% have only some or no double glazing.

Further measures such as draft proofing and sealing gaps to prevent reduce the air permeability of dwellings are also likely to be required in many dwellings.

HOMES ENERGY EFFICIENCY DATABASE (HEED) STATUS REPORT

Main Heating System	Energy Supplier	Fuel Poverty Scheme	Home Energy Check	Local Authority	Other Sources	Total	Proportion
Condensing Boiler with radiators	403	2	192	0	6,459	7,056	58.8%
Boiler with radiators	0	616	1,671	0	1,143	3,430	28.6%
Combi Boiler with radiators	0	200	397	0	0	597	5.0%
Back Boiler with radiators	0	153	60	0	0	213	1.8%
Electric Storage Heaters	0	92	204	0	0	296	2.5%
Warm Air	0	23	30	0	10	63	0.5%
Room Heaters	0	103	148	0	0	251	2.1%
Open/Flame Effect Fires	0	14	4	0	0	18	0.2%
Unknown	0	31	37	0	0	68	0.6%
Total	403	1,234	2,743	0	7,612	11,992	

Loft Insulation	Energy Supplier	Fuel Poverty Scheme	Home Energy Check	Local Authority	Other Sources	Total	Proportion
Properties with no loft insulation	0	476	383	0	0	859	16.6%
- less than 25mm	0	82	68	0	0	150	2.9%
- with 25 - 49mm	0	114	159	0	0	273	5.3%
- with 50 - 74mm	0	287	351	0	0	638	12.3%
- with 75 - 99mm	0	232	225	0	0	457	8.8%
- with 100 - 149mm	0	434	231	0	0	665	12.9%
- with 150 - 199mm	0	128	136	0	0	264	5.1%
- with 200 - 249mm	0	69	68	0	0	137	2.7%
- with 250 - 299mm	136	613	51	0	32	832	16.1%
Unknown	0	95	797	0	0	892	17.3%
Total	136	2,530	2,469	0	32	5,167	

External Wall Type	Energy Supplier	Fuel Poverty Scheme	Home Energy Check	Local Authority	Other Sources	Total	Proportion
Solid	0	1,787	1,796	0	0	3,583	59.7%
Stone	0	0	83	0	0	83	1.4%
Timber Framed	0	37	28	0	0	65	1.1%
Cavity	0	326	335	0	0	661	11.0%
Filled Cavity	37	213	202	0	717	1,169	19.5%
Other Construction	0	0	125	0	0	125	2.1%
Unknown	0	17	295	0	0	312	5.2%
Total	37	2,380	2,864	0	717	5,998	

Hot Water Tank Insulation	Energy Supplier	Fuel Poverty Scheme	Home Energy Check	Local Authority	Other Sources	Total	Proportion
No HW Tank Insulation	0	596	180	0	0	776	18.1%
Properties with HWT Insulation	1	1,583	1,420	0	349	3,353	78.2%
Unknown	0	18	141	0	0	159	3.7%
Total	1	2,197	1,741	0	349	4,288	

Glazing Types	Energy Supplier	Fuel Poverty Scheme	Home Energy Check	Local Authority	Other Sources	Total	Proportion
Single Glazing	0	1,141	689	0	0	1,830	33.8%
Double Glazing (Some)	0	0	407	0	0	407	7.5%
51 - 99% Double Glazing (Part)	0	0	372	0	0	372	6.9%
Double Glazing (Full)	0	1,412	1,376	0	0	2,788	51.5%
Unknown	0	12	0	0	0	12	0.2%
Total	0	2,565	2,844	0	0	5,409	

Table 8: Information from the Energy Saving Trust's HEED Database (accessed on 22/10/09)



Future Development Plans

Figure 10: Strategic Growth Areas and Place Shaping Priority Areas in Enfield

4.2 Future Housing Projections

4.2.1 Housing Projections

Core Policy 2 of the Draft Core Strategy confirms the targets for new housing provision:

“exceed the housing target of 3,950 new homes as set out in the London plan for the for the period 2007/8 to 2016/17, annualised as 395 dwellings per year... A new housing target for the ten year period 2011/12 - 2020/21 is due to be published in the revised London Plan and in the indicative capacity is likely to be in the range of 5,600 or 560 dwellings per year... The Council will plan to meet this new target and, for the fifteen year period from 2010/11 to 2024/5, will plan for the provision of approximately 11,000 new homes.

The focus for this housing growth will be Central Leaside and North East Enfield within the Upper Lee Valley Opportunity Area as identified in the London Plan. Elsewhere in the Borough, growth will be planned in areas where physical and social infrastructure already exists or can be improved through planned development, including Enfield Town and along the North Circular Road corridor in the south west of the Borough.

Location & total dwelling numbers [Note, figures have been rounded]	0-5 years (2010/11 - 2014/15)	6-10 years (2015/16 - 2019/20)	11-15 years (2020/21 - 2024/25)	16-20 years 2025/26 - 2029/30 (beyond current Core Strategy time frame)
Central Leaside (Meridian Water) <i>Up to 5,000</i>	100	650	2,250	Up to 2,000
Enfield Town <i>500</i>	200	300	-	-
North Circular <i>1,500 - 2,000</i>	450	550	500	Up to 500
Ponders End and Southern Brimsdown (NE Enfield) <i>1,000</i>	250	750	-	-
Other large sites (≥0.5ha) borough-wide <i>1,030</i>	480	550	-	-
Small sites (<0.5ha) <i>3,950</i>	1,210	1,370	1,370	-
Time frame totals	2,690	4,170	4,120	Up to 2,500
Cumulative totals	2,690	6,860	10,980	13,480

Figure 11: Proposed residential development in Enfield (Core Strategy)

The Mayor of London is negotiating affordable housing targets with all the boroughs. Enfield has agreed a figure of 648 homes to be delivered by 2011 (Mayor's Draft Housing Strategy, May 2009).

Core Policy 3 of the Draft Core Strategy details the requirements for affordable housing:

“The Council will seek to achieve a Borough-wide target of 40% affordable housing units in new developments, applicable on sites of accommodating 10 or more dwellings. Some form of contribution towards affordable housing will be expected on all new housing sites.

Developments of less than 10 dwellings will be assessed in order to determine the level of financial contribution required towards affordable housing off-site...”

Policy 5 of the Draft Core Strategy addresses the contribution of housing types to the new developments throughout the Borough over the plan period and proposes:

- Market housing – 20% 1 and 2 bed flats (1-3 persons), 15% 2 bed houses (4 persons), 45% 3 bed houses , (5-6 persons), 20% 4+ bed houses (6+ persons).
- Social rented housing - 20% 1 bed and 2 bed units (1-3 persons), 20% 2 bed units (4 persons) 30% 3 bed units (5-6 persons), 30% 4+ bed units (6+ persons).

4.2.2

Social Infrastructure Projections

Healthcare

Core Policy 7 demonstrates how the Council is aiming to build upon existing facilities to improve health services and meet the demands of new communities by delivering the following measures:

Phasing	Infrastructure Requirements	
0- 5 years (2010/11 - 2014/15)	<ul style="list-style-type: none"> • Improvements to facilities at Forest Road and Evergreen health care centres to create a Neighbourhood Health Centre at Edmonton Green; 	
	<ul style="list-style-type: none"> • Development of a Neighbourhood Health Centre in the Ponders End area; • Potential expansion of Eagle House Surgery, Ponders End as a spoke facility; • Development of a large spoke practice in Innova Park; • Spoke facility proposed as part of a community hub in Ponders End High Street; 	Sites to be identified in the North East Enfield Area Action Plan.
	<ul style="list-style-type: none"> • Urgent Care Centres located in Chase Farm and North Middlesex hospital sites; 	
	<ul style="list-style-type: none"> • Potential Walk in Centre facility in Arnos Grove/New Southgate area; 	Potential site(s) to be considered in the North Circular Area Action Plan.
6-10 years (2015/16 - 2019/20)	<ul style="list-style-type: none"> • New Neighbourhood Health Centre facility in Enfield Town; 	Site to be identified in the Enfield Town Area Action Plan.
11-15 years (2020/21 - 2024/25)	<ul style="list-style-type: none"> • New spoke facility in Central Leaside (Meridian Water) community hub; and 	Site to be identified in Central Leaside Area Action Plan.
	<ul style="list-style-type: none"> • New Neighbourhood Health Centre facility for south west Enfield potentially in either Southgate or Palmers Green Town Centres. 	Site to be identified in the Site Schedule Document

Figure 12: Proposed healthcare development in Enfield (Core Strategy)

Education

Core Policy 8 demonstrates how the Council is aiming to build upon existing facilities to improve education services and meet the demands of new communities by delivering the following measures:

Phasing	Infrastructure Requirements	Potential Location
0- 5 years (2010/11 - 2014/15)	<ul style="list-style-type: none"> New Oasis Academy Hadley all age school (3 - 18 years) to include: 2 form entry primary; 60 part time nursery places, 8 form entry secondary; and provision for years 12 and 13 (i.e. 6th Form) at former Gas Holder Site, Ponders End; 	Details to be set out in the North East Enfield Area Action Plan.
	<ul style="list-style-type: none"> An aspiration for an all age school on the existing Broomfield Secondary School site; 	Details to be included in the North Circular Area Action Plan.
	<ul style="list-style-type: none"> St Michael's Primary School, Enfield expansion from a 1 to 2 form entry school; 	
	<ul style="list-style-type: none"> Capel Manor Primary School, expansion to include an additional 1 form of entry; 	
6-10 years (2015/16 - 2019/20)	<ul style="list-style-type: none"> Merryhills Primary School, expansion to include an additional 1 form of entry; 	
	<ul style="list-style-type: none"> George Spicer Primary School or Worcesters Primary School, expansion to include an additional 1 form of entry; 	
	<ul style="list-style-type: none"> New 6 form entry secondary school in the south east of the Borough to include provision for years 12 and 13 (i.e. 6th Form); 	Site to be identified in Sites Schedule Document (area for search to be indicated on Proposals Map).
	<ul style="list-style-type: none"> Two new 2 form entry primary schools, including two 60 part time nursery places in Meridian Water; New 6 form entry secondary school in Meridian Water to include provision for years 12 and 13 (i.e. 6th Form); 	Sites to be identified in the Central Leaside Area Action Plan.
	<ul style="list-style-type: none"> Up to 2 forms entry primary provision, including 60 part time nursery places in the area around the north circular in the south west of the Borough; 	Site to be identified in the North Circular Area Action Plan.
	<ul style="list-style-type: none"> Up to 2 forms entry primary places including 60 part time nursery places in the Enfield Town/ Bush Hill park area; and St Anne's lower secondary school to relocate to site in Oakthorpe Road site in Palmers Green. 	

Figure 13: Proposed education development in Enfield (Core Strategy)

4.2.3

Commercial Projections

Industry:

Core Policies 14 and 15 outline the Council's support for protecting existing strategic and locally significant industrial sites.

Offices:

Core Policy 19 states that the Council will protect office development in Enfield Town, New Southgate, encourage growth in these and other Strategic Growth Areas subject to demand.

Retail:

Core Policy 18 states that the Council will aim to protect existing retail uses and seek to deliver the following projected growth:

<u>Floorspace up to 2015</u>	<u>Floorspace up to 2020</u>	<u>Floorspace up to 2025</u>
<u>19,140 sqm</u>	<u>51,600 sqm</u>	<u>85,300 sqm</u>

Figure 14: Proposed retail development in Enfield (Core Strategy)

4.3 Strategic Growth Areas

Core Policy 1: Strategic Growth Areas identifies the four specific areas for the focus of future growth and development in the Borough: Central Leaside; North East Enfield; Enfield Town; and the area around the North Circular Road at New Southgate. A review of the proposals for each of these areas is included below.

4.3.1

North East Enfield

North East Enfield is addressed in Core Policy 40. The main aim for this policy is to enhance the area's reputation as an industrial business location, by retaining existing strategic industrial location, expanding sites and targeting low carbon/green technology industries.

The Draft Core Strategy identifies scope for developing 1,000 new homes in this area with the majority in the Ponders End area, which includes a number of potential development areas including Ponders End Central (comprised of the former Middlesex University, adjacent Queensway employment area, land around Tesco and sites along Hertford Road), Ponders End South Street Campus (South Street, around Ponders End railway station, Alma Estate) and Ponders End Waterfront (Columbia Wharf and at the southern end of Brimsdown). In addition to this a large new health practice is proposed in Innova Park as well as a new Academy in Ponders End.



The AAP Preferred Options report for North East Enfield aims for Ponders End to be an exemplar sustainable community. It highlights the strategic industrial land that will be retained and expanded and provides more details on the housing opportunities in Ponders End.

Generally higher density housing will be expected in Ponders End and areas overlooking open space and waterways. Accessibility is also a key priority in this area.

Three Planning Briefs will be developed for the key areas of Ponders End Central, Ponders End South Street Campus and Ponders End Waterfront.

Summary of development plans	
Existing	Industrial Land
	Residential area with over 40,000 people
	New communities at Enfield Island Village and Innova Business Park (mixed-use)
	Limited connectivity and high deprivation
Aim	Improve infrastructure and movement
	Regeneration
Plans	Improve industrial business potential, attracting high-tech and green sectors
	Enhance local retail centres
	Greener links
	Improved rail links
Ponders End Place Shaping Priority Area	Incorporates Middlesex University site, Columbia Wharf and Brimsdown
	Enhance the existing local centre
	Up to 1000 new homes by 2026
	New academy and community facilities
	Mixed use community at the southern part of Brimsdown to incorporate new mixed use employment, leisure and a residential community at Ponders End Waterfront.

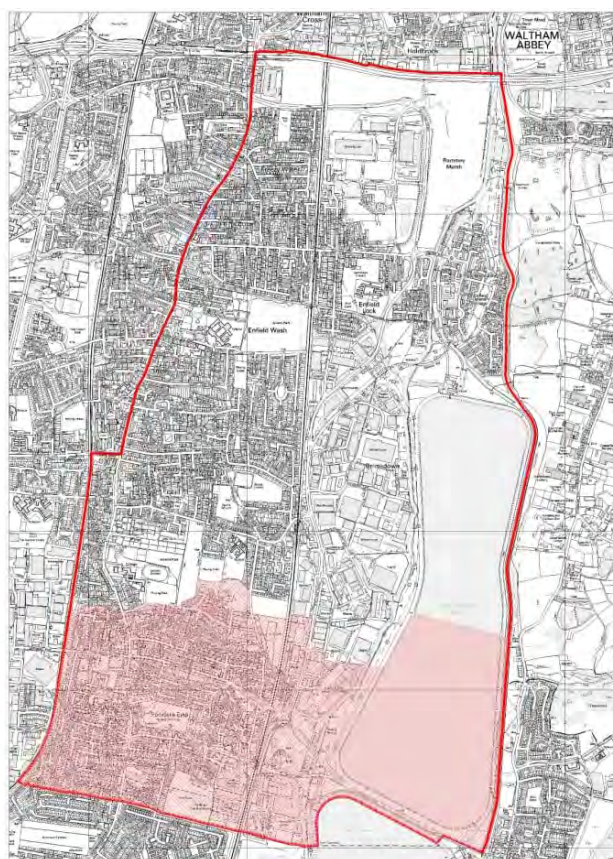


Figure 15: Ponders End Place Shaping Priority Area

4.3.2

Central Leaside

The preferred option stage of the AAP for the Central Leaside Area is currently being progressed by the Council. For the mean time a guide has been taken on the plans for this area based on Core Policy 37 of Enfield's Draft Core Strategy.

Draft Core Policy 37 confirms that the majority of the Central Leaside area will retain its industrial and employment character. A number of strategic industrial locations will be retained and intensified along with a renewal of the building stock and improvement in transport accessibility in order to improve the role these areas play in providing employment. New development will be expected to contribute to these objectives, specifically the improvement in accessibility.

Details on the plans for Meridian Water Place Shaping Priority Area are covered in Draft Core Policy 38. New development is expected to deliver up to 5,000 new homes, 1,500 new jobs along with supporting community infrastructure. Approximately 80% of the area is expected to comprise residential, retail and community uses, with the remaining 20% of the area (no less



than 5.5ha) delivering employment. The aim is to achieve a development that pioneers new environmental technologies. Alongside a number of other key aims the policy has a specific objective to deliver “a development that pioneers new environmental technologies. New housing will aspire to achieve the greatest levels of energy-efficiency, incorporating renewable power and using locally produced energy”.

Summary of development plans	
Existing	Industrial employment areas (Harbet Road Estate and Montagu Industrial Area), large retail stores (IKEA and Tesco)
	Decline in industry with lots of areas not intensively occupied
	Key public facilities including Edmonton Incinerator and Deephams Sewage Works
	Dissected by transport links
	Low residential component
Aim	Develop a new community
Plans	Renew and modernise industrial estates
	Improve transport links
	Increase employment from new and emerging businesses
	Continue key role in waste management and accommodate new facilities
	80% residential, retail and community, 20% employment
	Proposed mixed use development to the area south of North Circular known as Meridian Water
	SFRAs (Levels 1 and 2) undertaken to determine flood risks
Meridian Water Place Shaping Priority Area	Retention of Edmonton Eco-Park as a strategic waste facility
	Create a new community
	Deliver 5000 homes by 2026
	Deliver high quality and energy efficient housing
	New schools and new local centre, offering a new health facility, library, community rooms, police presence and local shops
	Address flood risk
	Higher density development near Angel Road station



Figure 16: Meridian Water Place Shaping Priority Area

4.3.3

The area around the North Circular Road, including New Southgate

Core Policy 44 of the Draft Core Strategy focuses on the North Circular Road including New Southgate and further details are outlined in the Preferred Options Report of the AAP. The aim for this area is deliver environmental and housing improvements as well as new investment. The Council has granted planning permission to Transport for London (TfL) for a Safety and Environmental Improvement Scheme that provides a degree of certainty about the future of the road. In addition over £54 million Government funding has recently been awarded to upgrade and refurbish the TfL owned properties along the North Circular Road. These properties will be transferred to Notting Hill Housing Trust who will invest a further £35 million to refurbish and build new affordable homes on vacant sites. Estimates of new housing may need to be revised following this more detailed work being taken forward as part of the AAP. New homes will provide a mix of size, tenure and affordability to meet the needs of existing and new residents. At the eastern end of the study area, at Cherry Blossom Close, high quality sustainable housing including family and wheelchair accessible homes will provide an exemplar for other developments in the area.

The area of New Southgate has been identified as a place shaping priority area with the aim of improving the existing Ladderswood Estate as well as redeveloping the industrial areas and delivering new residential, social and commercial development. A masterplan for the Western Gateway and wider Ladderswood Estate is currently being progressed by the Council and will consider redevelopment sites, transport, education, community facilities and energy requirements.

Summary of development plans	
Existing	Mainly residential area
	Environmental and deprivation issues
Aim	Improvement of living and working conditions
Plans	Specific emphasis on dealing with noise and air pollution, daylighting and flooding
	1500 to 2000 new homes by 2026, predominantly family sized dwellings
	Redevelopment and refurbishment of existing buildings
	Improve north circular and minimise its impact on new development
	Exemplary sustainable houses (e.g. Cherry Blossom Close)
Strategic Growth Area – New Southgate	Mixed use redevelopment
	Renewal of the Ladderswood Estate
	Creation of a 'Western Gateway' site with employment, retail and commercial uses
	Partial redevelopment of New Southgate Industrial Estate to link with the Ladderswood Estate and focussing on improvements to the quality of the remainder of the estate

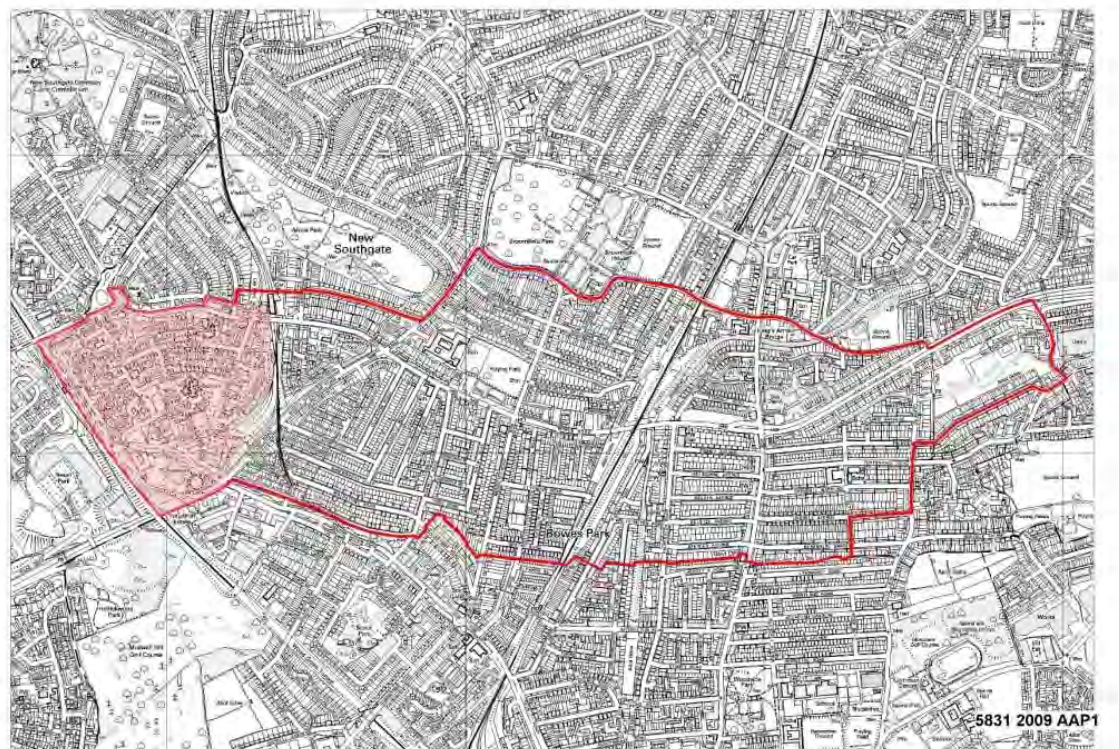


Figure 17: New Southgate Place Shaping Priority Area

Summary of development plans	
Existing	Important shopping, commercial and administrative centre
	Contains a number of development sites
	Eastern area around the station in need of renewal
	Library in process of refurbishment
	Rialto/Gala bingo site due for development
Aim	Protect character while developing the area to meet needs of the Borough
Plans	Higher quality evening environment
	New leisure and civic uses
	Landmark development at Little Park Gardens
	Improved access, open spaces and infrastructure
Strategic Growth Area – Enfield Town	Retail led mixed development
	Improved public transport interchange
	10,000sqm retail, community uses, 500 new homes
	A need for additional education facilities has been identified
	Possible relocation of the railway station further down the tracks, incorporating a bus station from Little Park Gardens
	Respect nearby conservation area

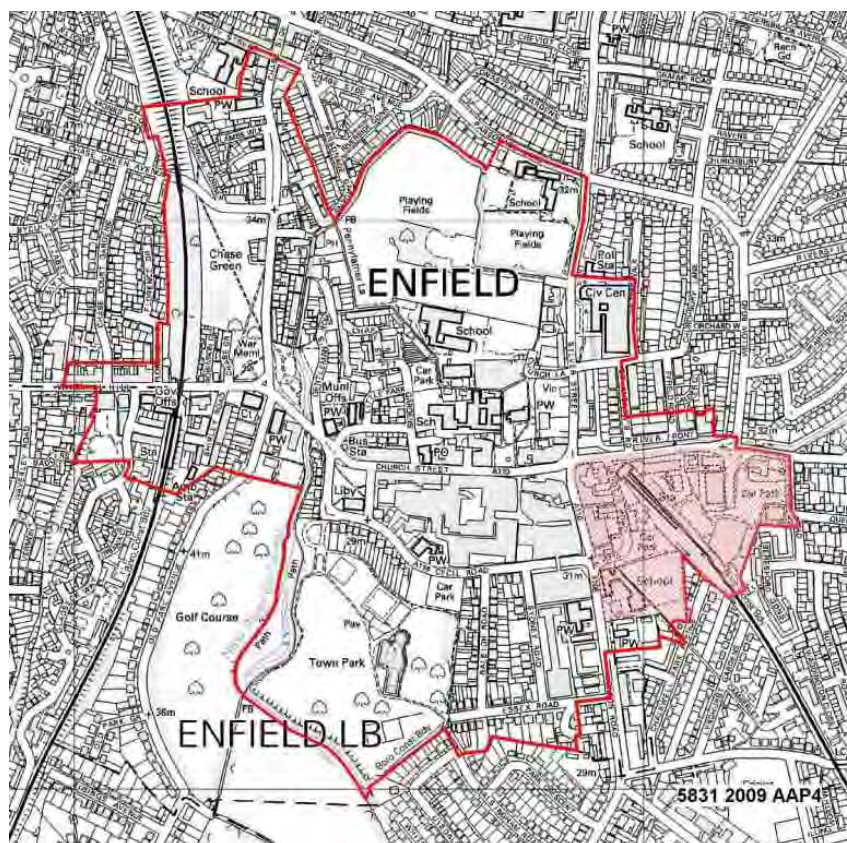


Figure 18: The area around Enfield Town Station Place Shaping Priority Area



Energy Opportunities & Constraints

5 Energy Opportunities and Constraints

5.1 Introduction

This chapter considers the opportunities and constraints to the application of energy efficiency measures, decentralised energy networks and low and zero carbon energy technologies measures, primarily focussing on new development within the Borough.

5.2 Energy Efficiency

5.2.1 *Opportunities and Constraints*

5.2.1.1 Building Fabric and U-values

Heat losses through the external elements of a building depend on the thermal transmittance of the fabric and the area of envelope through which heat loss can take place. New buildings are normally designed with high levels of insulation, with the heat losses expressed in terms of u-values. Existing properties can be retrofitted by adding additional insulation and upgrading windows and doors.

However, for new build properties higher U-values in walls can require much thicker build-ups and improving roof U-values through additional insulation may increase the height of the roof. The increases in roof build up should not have a significant impact on the design; but the increased wall thickness may have an impact on the units' floor areas in some high density development.

The constraints for the uptake of building fabric improvements in existing homes include:

- Desire for uptake by owners/tenants
- Access to tenanted properties
- Type of construction
- Building conservation areas
- Weather conditions (only significant in exposed areas)

5.2.1.2 Air Tightness and Thermal Bridging

These measures are usually associated with new buildings and are the reduction of heat loss by reducing air leakage through gaps in the external fabric of the building; and from transfer of heat out of the external fabric of the building through conductive materials. Existing properties can also be treated to a lesser extent through draft proofing and filling air gaps.

However, the type of construction selected in new building design affects how straightforward it is to achieve improvements in air tightness. In timber construction and other pre-fabricated constructions an air tightness barrier can be incorporated into the panels so that the onsite team only need to seal joints between panels. Structurally insulated panelised systems can also achieve good standards of air tightness more easily. Conventional wisdom suggests that achieving this air tight membrane is more difficult in traditional masonry build, although air leakage rates of less than 3 m³/m²hr @ 50 Pa have been recorded in masonry dwellings. Dwellings with these air permeability levels (3 m³/m²hr @ 50 Pa or below) will require mechanical ventilation in order to achieve adequate controlled ventilation rates.

Reducing thermal bridging is done through considered design and attention to design detailing. Accredited and enhanced construction details allow designers to reduce thermal bridges. The success of reducing thermal bridging is down to the initial designs and care during the construction.

5.2.1.3 Passive design and Overheating

There is a real risk of overheating in many of our existing and new building as we see the effects of climate change and increased summertime temperatures. Overheating risk can be reduced by reducing excessive solar gains, particularly high angle and intensity solar infiltration during the summer months. Measures to address overheating in both proposed and existing buildings include the incorporation of external louvers, shutters, over shading from balconies and the specification of green roofs and walls.

The orientations of the proposed building can assist shading strategies and the use of orientation and sun spaces can provide additional solar gains during the colder winter period. Thermal mass can also be beneficial in controlling temperatures by acting as a buffer to the temperature variations through the day. For traditional construction, external walls will have large areas of external thermal mass. For timber or steel construction, thermal mass can be incorporated into the floors and internal walls. Phase change material (heat absorbed as the materials change phase as temperature, and release the stored heat as the temperatures fall) are being introduced as an alternative to thermal mass. There is potential to incorporate phase change materials into both existing and new buildings.

5.2.1.4 Lighting

Improving the infiltration of natural daylight will help to reduce the use of artificial lighting within the dwellings. The masterplan layout, maximising south facing orientations and limiting overshadowing, internal layouts and window dimensions and specifications, all of which impinge on the levels of daylight within the dwellings, will have an effect on the lifetime energy consumption from the use of artificial lighting. To minimise energy consumption from lighting, dedicated low energy light fittings (i.e. fittings which only accept low energy lamps with luminous efficacy of greater than 40 lumens per circuit Watt) can be installed. Appropriate controls can also be employed to reduce energy consumption. Internally, smart controls can be used which enable all lights to be switched off from a single switch, thereby avoiding lights and

appliances being left on during the night or periods of non-occupancy. External lighting can be controlled using daylight sensors or timers to avoid lights being switched on during daylight hours and PIR sensors should be used for security lighting. This is often the most straightforward measure to address existing properties.

5.2.1.5 Ventilation

Given the requirement for energy efficient and very air tight homes developers are beginning to use mechanical ventilation with heat recovery (MVHR) systems for new dwellings. These systems recover heat from the exhaust air originating from the wet rooms within that dwelling and use this heat to warm incoming fresh air, thus reducing the energy demands for heating. They do use additional electrical energy to operate the fans but if the fan power is low and the efficiency of heat recovery is high then the system should provide a net benefit in terms of reducing CO₂ emissions over the course of a year. The additional benefit of such a system is that it allows very controlled ventilation and enables very low air permeability rates to be specified.

5.2.1.6 Passive House

Passive House is a standard, usually for new build homes, for ultra energy efficient homes that reduce the heating demands to less than 15kWh/m² per year for space heating and cooling. The standard is met by very high levels of insulation, low air permeability and thermal bridging, passive heating and the use of mechanical ventilation with heat recovery.

5.2.2 *Potential for the Borough*

The energy performance standards in new build have increased significantly over the past 10 years and the proposed changes to building regulations suggest that this trend is set to continue. The industry has responded to these changes and most architects, developers, and contractors have experience in delivering the energy efficiency measures described above. Energy efficiency is also usually a cheaper way of delivering CO₂ reductions compared to LZC technologies and is therefore prioritised. The current regulations are proposing mandatory standards

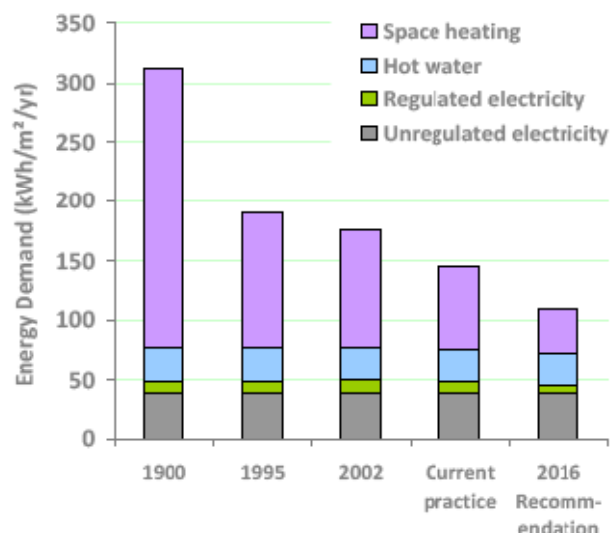


Figure 19: Energy Demand of a semi-detached home built to different building standards assuming a contemporary occupant (Zero Carbon Hub, 2009)

As previously highlighted in Section 4, the existing dwellings in the Borough are responsible for the majority of the energy consumption and CO₂ emissions and there is a significant opportunity to address this through improvements in energy efficiency using the measures described above.

5.3

District/Community Heat and Power Networks

5.3.1

Overview

The energy demand of buildings has traditionally been met by electricity supplied by the national grid, heating supplied with individual boilers and cooling supplied through chillers. The PPS1 Supplement supports the development of networks to supply electricity and heat at a community scale as a way of increasing the efficiency of energy generation and thereby reducing CO₂ emissions. This section discusses the opportunities for establishing such networks in Enfield.

District heating is an alternative method of supplying heat to buildings, using a network of super insulated pipes to deliver heat to multiple buildings from a central heat source. Heat is generated in an energy centre and then pumped through underground pipes to the building. Building systems are usually connected to the network via a heat exchanger, which replaces individual boilers for space heating and hot water. This can be a more efficient method of supplying heat than individual boilers as it can be combined with local power generation and enables the potential to use low and zero carbon fuel sources.

5.3.1.1

Combined Heat and Power

Whenever electricity is generated, heat is produced as a by-product. Usually this heat is rejected or “dumped” to the environment via exhaust gases and cooling water. CHP technology uses an engine to produce electricity and recovers the heat emitted by the engine as a source of energy for space and water heating. CHP generation can be fuelled by many different types

of systems and fuel sources, examples include: Gas turbine engines, Gas engines, Diesel engines Biodiesel/biofuel engines, Biomass engines (steam or gasification), Waste incineration and Anaerobic digestion.

Due to the utilisation of heat from electricity generation and the avoidance of transmission losses because electricity is generated on site, on site gas-fired CHP typically achieves a 35% reduction in primary energy usage compared with power stations and heat only boilers. Systems can also run on renewable sources of fuel such as biomass or biogas, reducing CO₂ emissions by almost 100%. However, while CHP installations deliver high CO₂ savings and save on energy costs, there is a high initial investment required for the plant and infrastructure.

Combined Heat and Power Comparison

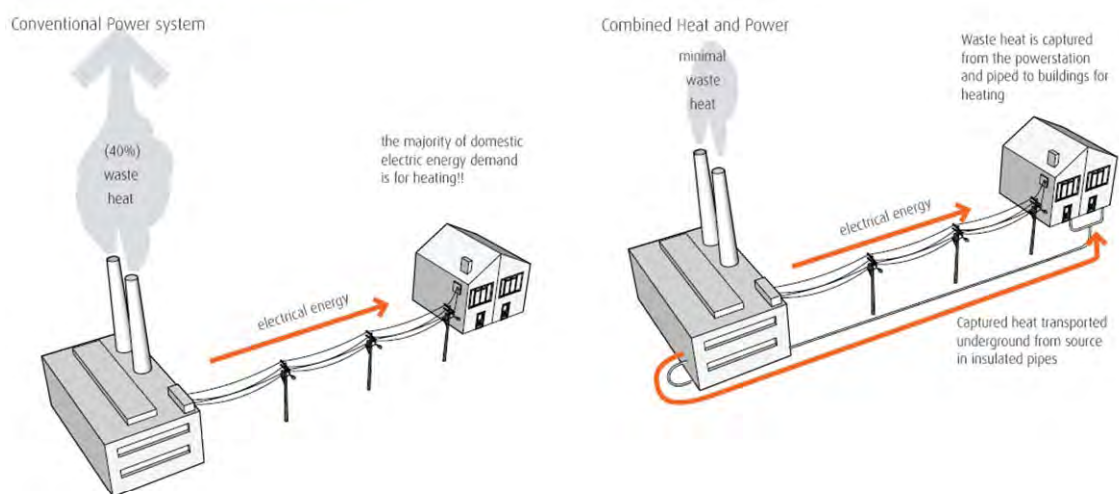


Figure 20: Illustration of the difference between a conventional power distribution system and one using CHP

5.3.2

Opportunities

It is theoretically possible to develop a district heating network with CHP anywhere that there are multiple heat consumers. The economics of such a network are determined several factors, including the size of the CHP engine and annual hours of operation. Ideally, a system would run for at least 4,500 hours per year for a reasonable return on investment. This is around 17.5 hours per day, five days per week, or 12.5 hours every day of the year. CHP is therefore most effective when serving a mixture of uses, to guarantee a relatively constant heat load. High energy demand facilities such as hospitals, leisure centres, public buildings and schools can act as anchor loads to form the starting point for a district heating and CHP scheme. These also use most heat during the day, at a time when domestic demand is lower.

The Energy Saving Trust and Carbon Trust have published a Good Practice Guide⁵, giving guidance on the potential of CHP in the UK. This guide lists the following as the biggest opportunities for CHP community heating implementation in the UK:

⁵ EST Good Practice Guide Community Heating for Planners and Developers, http://www.energysavingtrust.org.uk/uploads/documents/housingbuildings/GPG389_Comm%20Heating%20Mailer%20v11.pdf

- Refurbishments of existing buildings in high populated areas that have high energy use and most likely electric heating,
- Large public sector developments, either refurbishment or new build (these are likely to have a mixture of uses),
- When part of a larger regeneration agenda, where more than one site can progressively connect to the community heating network,
- Small communities that are currently off the gas grid.

The main driver of the cost of a new heat network is the length of underground pipework required. It is therefore preferable to limit the distance between heat customers, by prioritising areas of higher density development. Experience indicates that housing density greater than 55 dwellings per hectare (dph) is desirable, which can be found in areas of flats or terraced housing.⁶

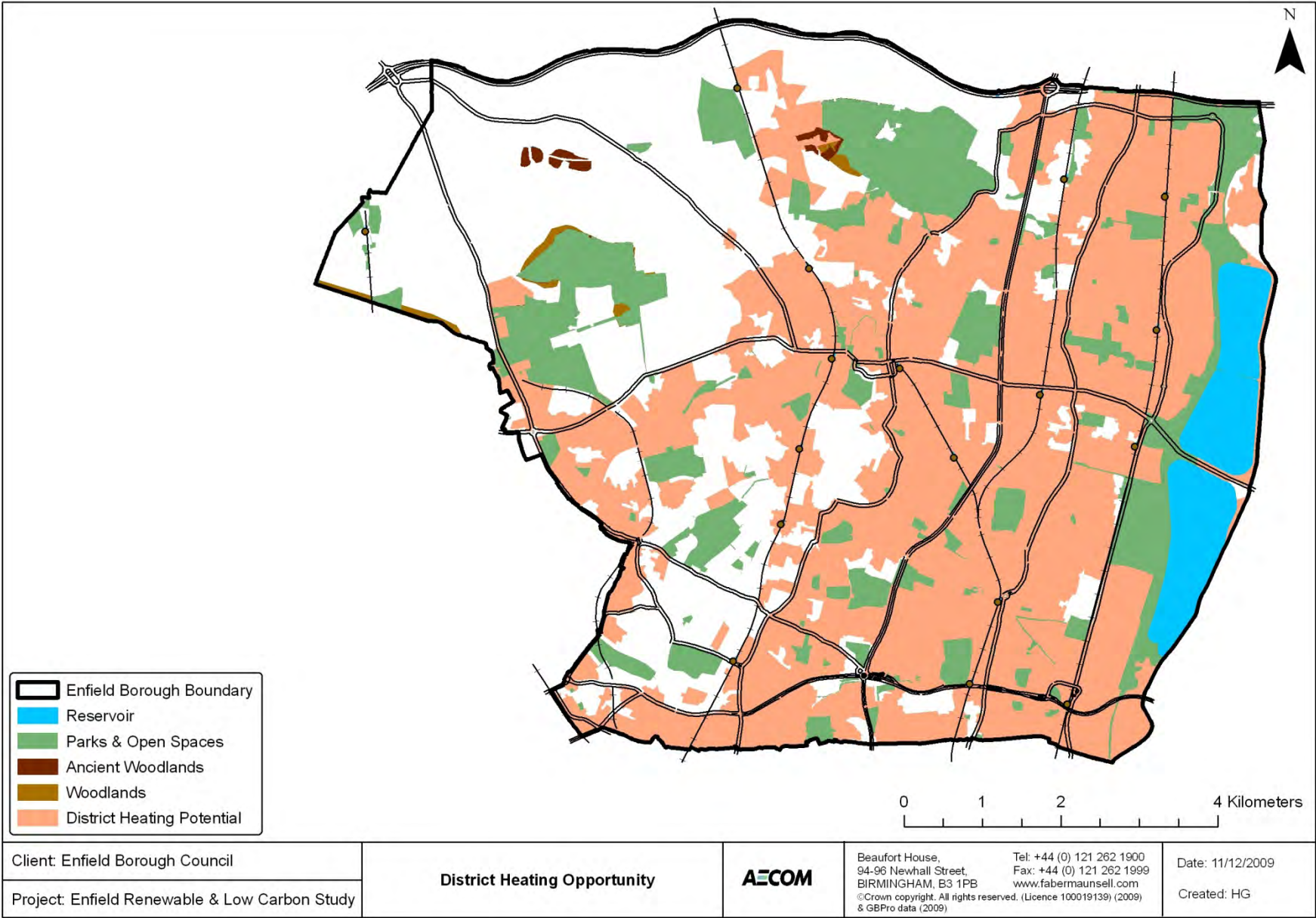
Another contributory factor to the economic viability of CHP is the difference between the cost of electricity and gas, referred to as the “spark gap”. The greater the cost of electricity compared to gas, the more likely a CHP installation is to be viable.

The potential for district heating powered by CHP can be assessed at a high level by setting a threshold heat density above which schemes become viable. Previous research into the economics of district heating and CHP has suggested that a threshold of 3,000 kW/km² can give financial returns of 6%, which is below typical commercial rates of return but greater than the discount rate applied to public sector financial appraisal.⁷

Areas with the potential for district heating systems linked to CHP are indicated in the following map, which shows areas where average heating demand exceeds 3,000 kW/km² (equivalent to annual heating demand of 26,280 MWh/km²)

⁶ Community Heating: A Guide for developers (EST and Carbon Trust, 2003)

⁷ The potential and costs of district heating networks (Faber Maunsell & Poyry, April 2009)



Map 7: Potential for district heating in Enfield

Assessing the feasibility for district heating networks with CHP in new development containing only residential elements can be problematic. As noted above, improving insulation standards mean the requirement for space heating is very low and demand is present during the winter months and so the only constant source of heat demand will be for domestic hot water. New developments would need to be of a reasonable scale to make a dedicated CHP system viable, particularly as the capital costs can be high, but are often key to the initial creation of networks and enabling expansion. Connecting to existing systems is relatively straightforward and can offer a number of benefits to developers and customers, such as reduced plant space requirements and third party management and operation of energy supplies.

The following graphs compare a range of renewable and low carbon heat technologies with gas and electric heating in regards to the cost of heat delivery and cost of CO₂ savings. As shown in the two graphs, although the cost is relatively similar for the CHP options compared to alternative systems, the main benefit of moving to district heating networks is the CO₂ savings that they can deliver. The figures are based on carbon factors that reflect today's grid mix.

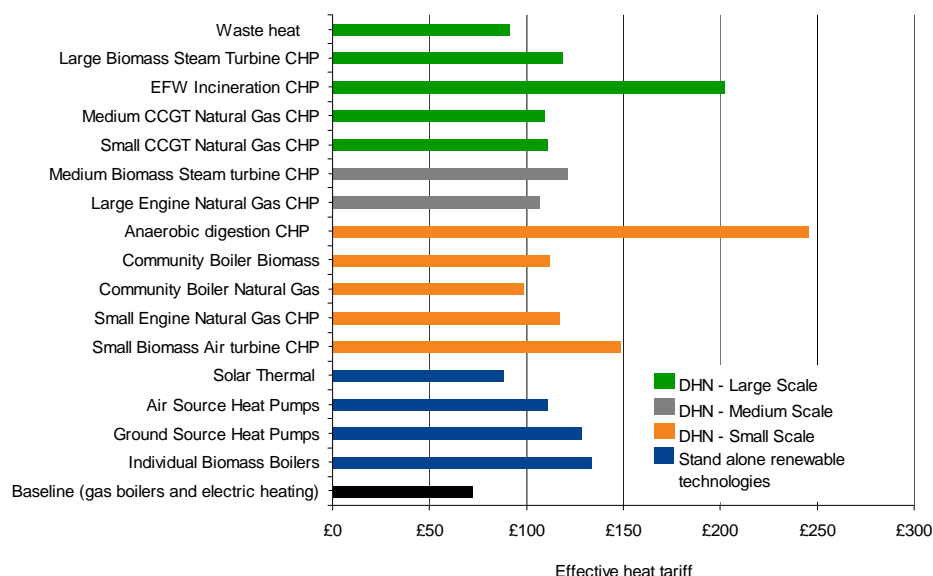


Figure 21: Cost of heat provision by technology in £/MWh, based on current market conditions.

Waste heat is heat obtained at very low wholesale cost from power plants or industrial processes. Community Boiler refers to district heating, DHN in legend refers to District Heating Network. Solar thermal heating provides domestic hot water only. (Source: The potential and costs of district heating networks, Faber Maunsell AECOM and Poyry)

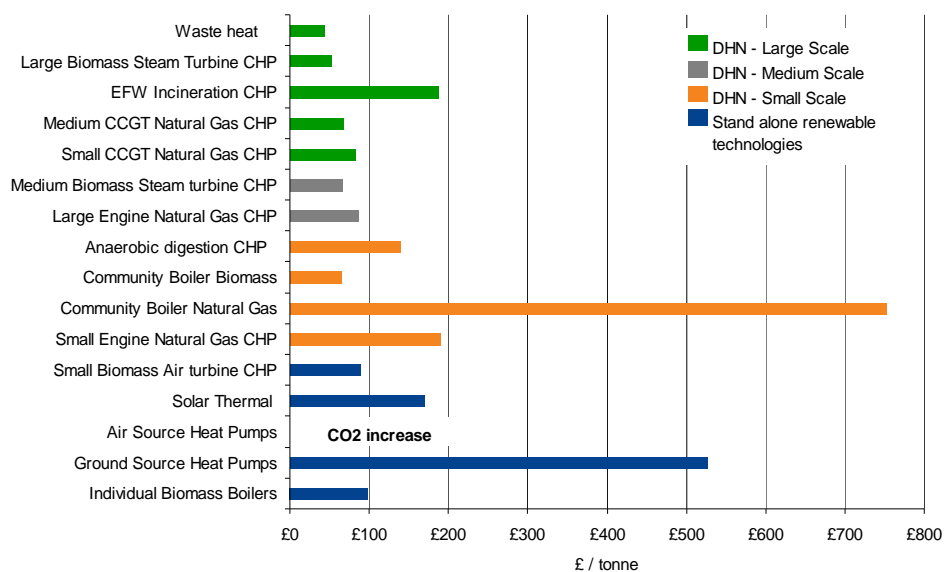


Figure 22: Cost compared to CO₂ saved by heat provision technology, in £/tonneCO₂ saved.

Waste heat is heat obtained at very low wholesale cost from power plants or industrial processes. Community Boiler refers to District Heating, DHN in legend refers to District Heating Network. Solar thermal heating applies to water-heating only. (Source: The potential and costs of district heating networks, Faber Maunsell AECOM and Poyry)

Full infrastructure costs of converting existing homes to district heating can vary from about £5,000 per dwelling for flats, to around £10,000 per dwelling for detached or semi-detached properties. These costs assume no prior district heat network infrastructure in the area and that existing dwellings are fitted with individual heating systems.

The following table provides some indicative costs of providing district heating with CHP to non-domestic buildings.

Dwelling Type	District Heating Infrastructure Cost	District Heating Branch Cost	Heat Interface Unit (HIU) and Heat Meter Cost	Total Cost
Small terrace	£2,135 Based on outline network design and costing	£1,912 Based on outline network design and costing plus additional costs for HIU and metering.	£2,300 HIU, heat meter and installation	£6,347
	£2,135 Based on outline network design and costing	£2,255 Based on outline network design and costing plus additional costs for HIU and metering.	£2,300 HIU, heat meter and installation	
Medium / Large terrace	£2,719 Based on outline network design	£2,598 Based on outline network design	£2,300 HIU, heat meter	£7,617

	and costing	and costing plus additional costs for HIU and metering.	and installation	
Semi detached	£2,719 Based on outline network design and costing	£3,198 Based on outline network design and costing plus additional costs for HIU and metering.	£2,300 HIU, heat meter and installation	£8,217
Converted flat	£712 Assumes that infrastructure costs are split between flats.	£752 Assumes that branch are split between flats	£2,300 HIU, heat meter and installation	£3,764
Low rise flat	£1,500 Estimate	£1,500 Internal pipework	£2,300 HIU, heat meter and installation	£5,300
High rise flat	£1,000 Estimate	£1,500 Internal pipework	£2,300 HIU, heat meter and installation	£4,800

Table 9: District heating costs for homes. The Heat Interface Unit is the exchanger device that replaces the boiler and transfers heat from the district heating network into the home. (Source: The potential and costs of district heating networks, Faber Maunsell AECOM and Poyry)

Type of Area	Total District Heating Network Cost	Heat Interface Unit (HIU) and Heat Meter Cost
City Centre	£8.40 per m ²	£20.00
Other urban area	£16.50 per m ²	£20.00

Table 10: District heating network costs for non-domestic buildings. The Heat Interface Unit is the exchanger device that replaces the boiler and transfers heat from the district heating network into the home. (Source: The potential and costs of district heating networks, Faber Maunsell AECOM and Poyry)

5.3.2.1

Existing CHP systems

Enfield currently has four CHP systems installed in the four large Council-operated leisure centres across the Borough. Details of the specification and status of the 4 systems has been obtained from Enfield Leisure & Culture Services.

Type of Area	System specification	Current Status
Albany Leisure Centre	2 x 40kWe reciprocating gas engines	Operational
Southbury Leisure	80kWe gas turbine	Not operational due to a fault

Centre		with the system
Edmonton Leisure Centre	70kWe reciprocating gas engine (EnerG)	Not operational due to Carbon Monoxide emissions resulting from poor system design.
Southgate Leisure Centre	80kWe reciprocating gas engine	Operational

The correct operation of these systems should deliver significant CO₂ and financial savings (the system at Edmonton was projected to save 118 tonnesCO₂/year).

5.3.2.2

Existing communal heating systems

Existing communal heating systems are often more cost effective and technically straightforward to connect to district heating networks because they already have the internal distribution infrastructure.

Enfield Homes have provided details of the properties they own which currently have communal heating infrastructure, this is shown in the following table:

Enfield Homes Area Designation	Property Name	Type	Boilers	Dwellings served
Edmonton	Cornerways	Not Known	3	Not Known
Edmonton	John Adams House	Care Home	2	39 flats
Edmonton	Len Warren House	Care Home	2	22 flats
Edmonton	Newstead House	Care Home	5	24 flats
Edmonton	Rushleigh House	Care Home	5	46 flats
Edmonton	Scott House	Social Housing?	3	Not Known
Eastern	Alma Road	Social Housing?	4	Not Known
Eastern	Dean House	Care Home	6	30 flats
Eastern	Durrants Lodge	Care Home	2	34 flats
Eastern	Johnby Close	Care Home	2	32 flats
Eastern	211 Ordnance Road	Not Known	2	Not Known
Eastern	Ringlewell Close	Care Home	2	39 flats
Eastern	Westcroft Close	Care Home	2	19 flats
Western	Bliss House	Social Housing?	4	Not Known
Western	Bramley House	Care Home	5	30 flats
Western	Buckfast House	Care Home	6	25 flats
Western	Chaddlewood	Care Home	2	91 flats
Western	Curtis House	Social Housing?	3	Not Known
Western	Edith Simpson House	Not Known	2	Not Known
Western	Elmcroft	Not Known	1	Not Known
Western	Fairweather	Care Home	4	23 flats
Western	Pruda House	Care Home	2	28 flats
Western	6 Rosenheath Walk	Not Known	1	Not Known
Western	William House	Care Home	2	30 flats
Western	8 Woodlands Road	Not Known	2	Not Known

The locations of these properties are shown on the Energy Opportunity Plans in section 5.9.

5.3.2.3 Enfield Power Station

The Enfield power station owned by E-On is a very recent station of 400 MW and is located in the North East of the Borough. The station is a single shaft Combined Cycle Gas Turbine (CCGT) and will have a relatively high electrical efficiency (estimated at circa 45%) but has not been designed for heat extraction.

In theory the station will have circa 400 – 500 MW waste heat, but most of this is at low temperatures of circa 30 – 40 degrees which is too low for use in a DH scheme. This means that any “waste heat” may need to be extracted from the steam cycle which would result in a lower output of the turbine, and thus reduce the plants electrical efficiency. Thus in reality, the heat is not “waste” heat, but low carbon heat. (How low carbon depends on how much the efficiency is reduced with the extraction of heat – typically this is a 5 – 10% reduction in efficiency, this reducing electrical efficiency from 45% to up to 40.5%⁸).

No technical studies have been conducted of the power station to assess the potential for exporting heat, and the impact that this may have on electrical efficiency or costs.

E-On have said that they are keen to explore options for exporting heat to neighbouring areas, and the existing building sector, in particular the public sector, are seen as the most attractive markets, due to the high heat demands and the potential for long-term low risk contracts with public bodies.

Modifying the power station to extract heat would only be viable for larger heat demands, and thus the opportunities for linking the station to new or existing development is limited. However the potential for exporting heat should be considered for large scale or strategic developments which could be sufficient to make modification of the plant a viable option.

In reality, the potential for exporting heat from the power station is probably not dependent or viable for individual developments or sites (unless of very large scales – 1000s homes) but should be examined by the Council for the strategic development across the Ponders End place shaping priority area, potentially with public investment and de-risking. Schemes of this type could include new development, existing homes and businesses, and public buildings.

In summary, the viability of extracting heat will depend on the size of the load, and in reality only large scale schemes would justify plant modification. E-On are keen to explore opportunities for providing heat and potentially acting as an ESCo partner in projects if they are commercially attractive.

5.4 Biomass

Biomass is a collective term for all plant and animal material, it is normally considered a carbon neutral fuel, as the carbon dioxide emitted during burning has been (relatively) recently absorbed from the atmosphere by photosynthesis and no fossil fuel is involved directly. Biomass fuel can take many forms but is most commonly grass or wood which can be a by-

⁸ Note that the efficiency reduction is percentage, and not percentage points.

product of another industry, from the management of trees or from energy crops which are grown and harvested specifically for their energy content. There are two key types, Miscanthus a perennial grass which has very high growth rates and Short Rotation Coppice (SRC), dense plantations of high growth willow or poplar.

In practice, the energy and heat from biomass will have some associated carbon emissions. Energy crops will have embodied carbon dioxide emissions from fertiliser, cutting, drying and transport (for example, waste wood will have external energy inputs from drying, sawing, pelletizing and delivery). Despite this, the carbon emissions associated with biomass are still far below those of conventional, fossil fuel sources. While biomass has a positive impact as a low carbon energy source, increasing the amount of land dedicated to energy crops can have implications for land use, biodiversity, landscape amenity and other environmental and social issues.

Biomass can be used as a fuel for heating individual buildings, thereby replacing standard boilers or as part of larger district heating networks or in conventional thermal plants. Ideally the fuel should be sourced in the locality of the energy plan to minimise energy use and CO₂ emissions associated with transportation. Where biomass cannot be sourced locally, the fuel can be imported from further afield but the CO₂ associated with its transport reduces its abatement potential.

5.4.1

Fuel availability

Biomass resources are likely to be derived from either:

- Arboricultural Waste
- Forestry residues
- Dedicated biofuel crops

Forest residues, whilst abundant, are produced at a cost which varies significantly depending upon market conditions, type of plantation, size, and location. Typical production costs for a range of products is £30 - £45 per tonne, this includes £5 per tonne for transport costs for local supply.

Dedicated biomass or biofuel crops are becoming increasingly attractive as the financial viability improves with the price of fossil fuels. However growing biofuels on land that could be used for producing food is widely considered to be a misuse of resources and therefore good quality agricultural land should be excluded from consideration. As shown in the following table, land grades 3 and below, which are deemed to be less favourable for growing crops, make up a significant proportion of the total agricultural land in the UK and if not used for other purposes could potentially be brought into service to grow bio fuel crops.

	Percentage of agricultural land	Description
Grade 1	3%	Excellent quality agricultural land. Land that produces consistently high yields from a wide range of crops such as fruit, salad crops and winter vegetables.
Grade 2	16%	Very good quality agricultural land. Yields may have some variability but are generally high, some factors may affect yield, cultivation or harvesting.
Grade 3	55%	Good to moderate quality land. Limitations of the land will restrict the choice of crops, timing and type of cultivation, harvesting. Yields are generally lower and fairly variable.
Grade 4	16%	Poor quality agricultural land. Severe growing limitations restrict the use of this land to grass and occasional arable crops.
Grade 5	10%	Very poor quality land. Land that is generally suitable only for rough grazing or permanent pasture.

Table 11: Agricultural land classifications in England and Wales. [Source: Biomass as a renewable energy source, Royal Commission on Environmental Pollution, 2004]

Establishment of dedicated energy crops is estimated to cost approximately £2,000/hectare

Activity	Cost Per Hectare
Ground preparation (herbicides, labour, ploughing and power harrowing)	£133
Planting (15,000 cuttings, hire of planter and team)	£1,068
Pre-emergence spraying (herbicide and labour)	£107
Year 1 management costs (cut back, herbicides, labour)	£112
Harvesting	£170
Local use (production, bale shredder, tractor and trailer)	£378
Total	£1,968

Table 12: Indicative costs of establishing willow SRC energy crops, exclusive of payments from grants or growing on set aside land. Costs for Miscanthus SRC are expected to be broadly comparable (Source: Energy Crops, CALU and Economics of Short Rotation Coppice, Willow for Wales)^{9, 10}

⁹ Economics of short rotation coppice (Willow for Wales, July 2007)

¹⁰ Energy Crops, Economics of miscanthus and SRC production (CALU, November 2006)

A recent analysis of the potential income from both willow SRC and Miscanthus suggested that for medium yield land (i.e. Grade 3), the average annual income would be £187 to £360 per hectare¹⁰. Energy crops are relatively expensive compared to some other biomass fuels but do have the potential to provide very significant volumes of fuel.

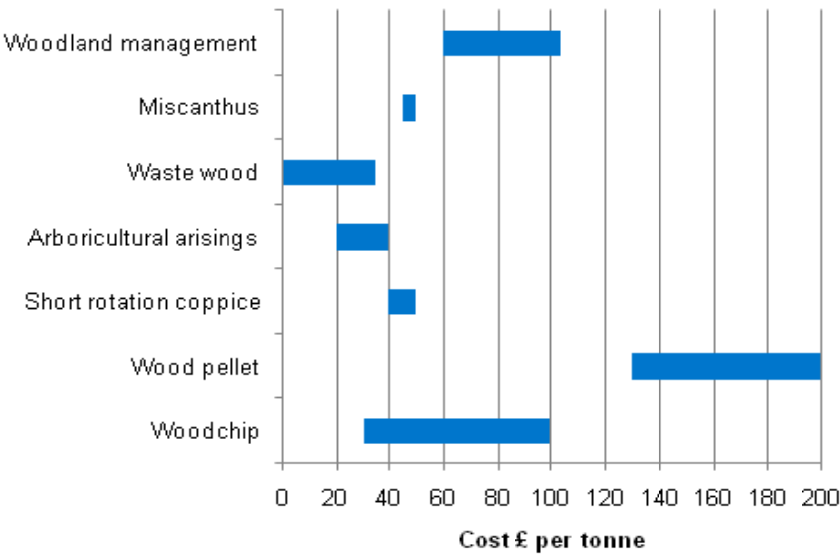
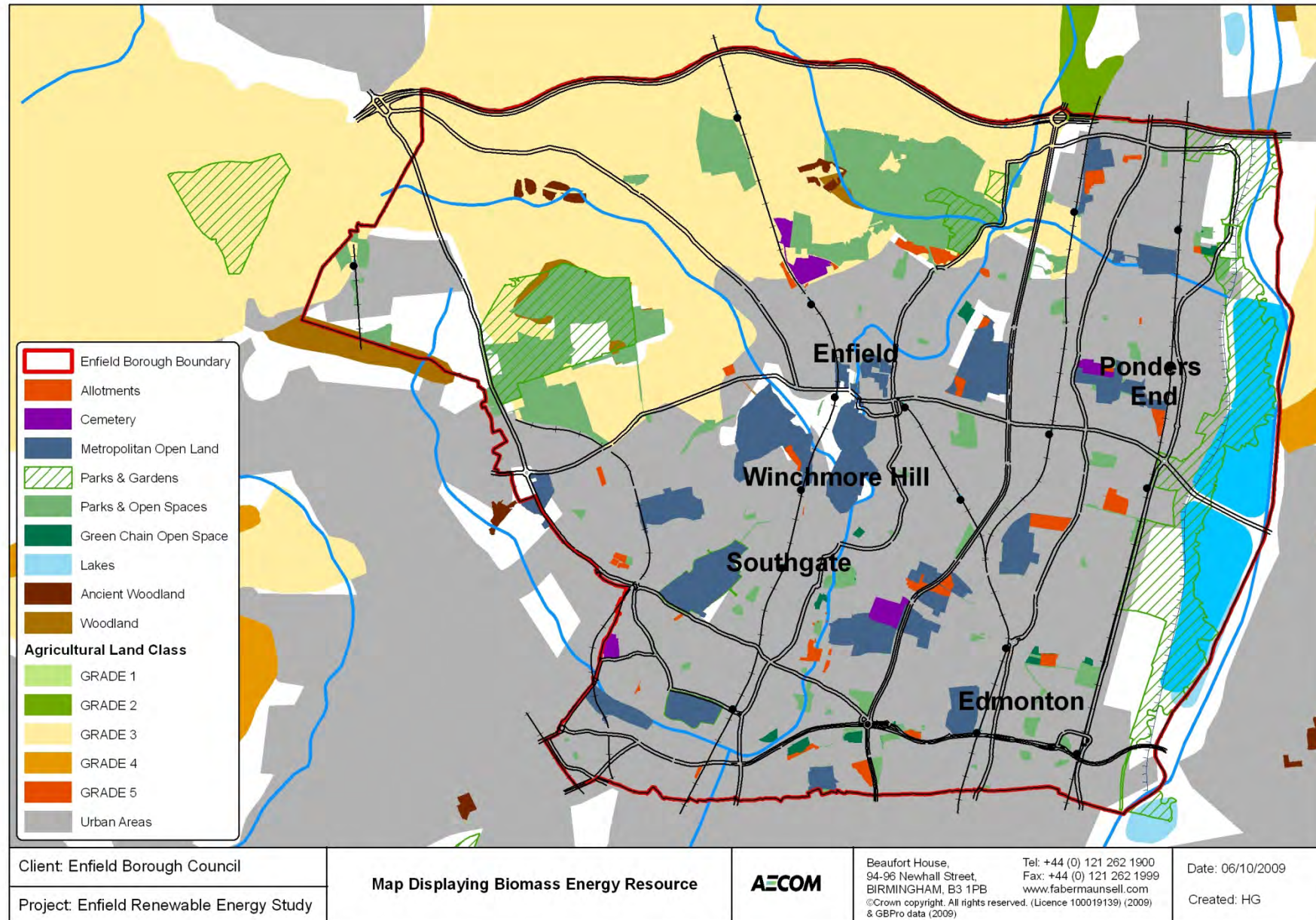


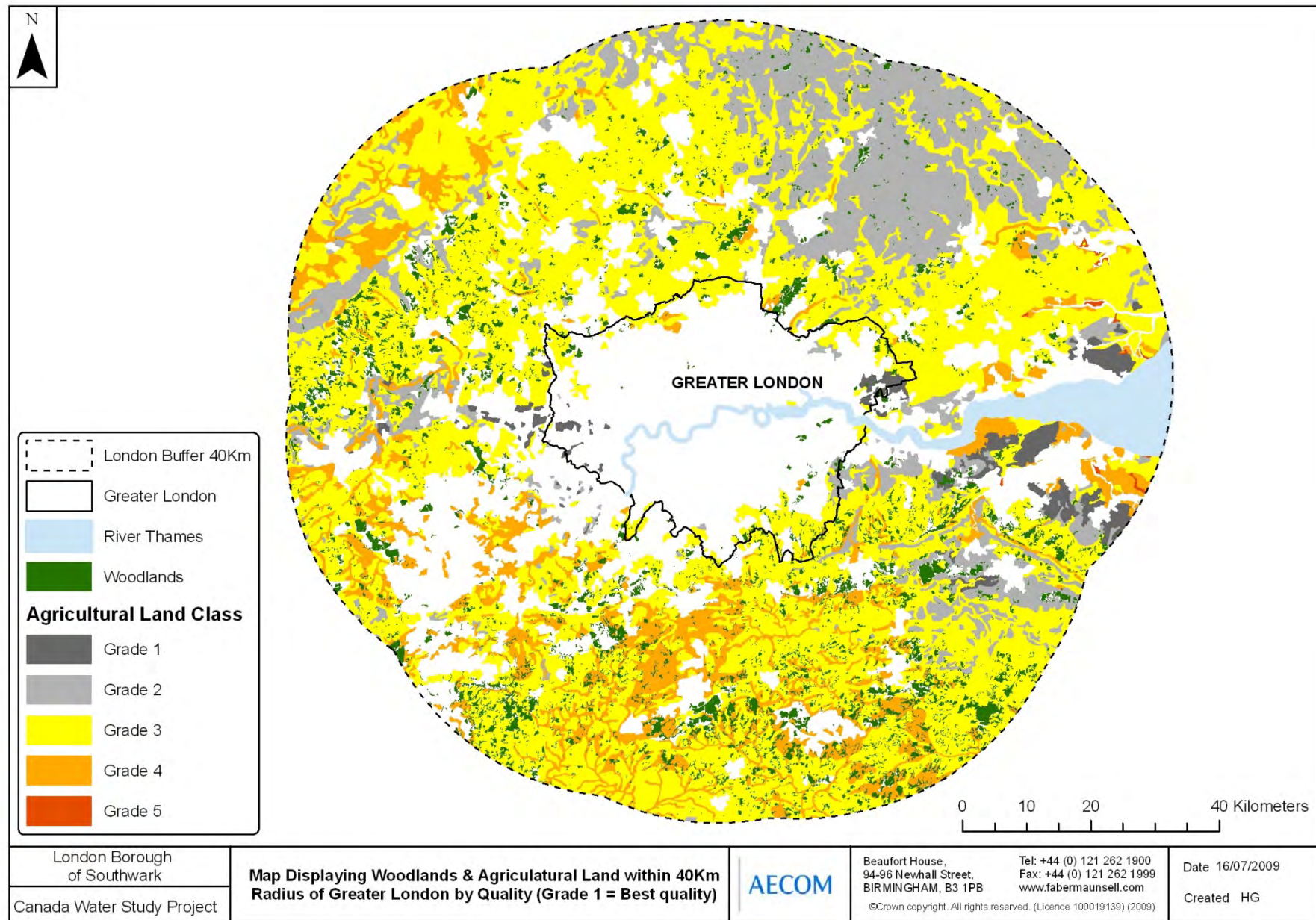
Figure 23: Guideline costs for different biomass fuels. (Source: Biomass heating A practical guide for potential users)

Map 7 shows the potential sources of arboricultural waste in the Borough. Most of the arboricultural services are contracted to Gristwood and Toms Ltd. In regards to agricultural land, the north of the Borough has a large area of Grade 3 agricultural land, defined as having moderate limitations which affect the choice of crops. These areas present the potential for use growing energy crops

Within a radius of 40 kilometres from London there are significant areas of agricultural land in Grades 3 and 4 that could potentially be utilised for biomass, as shown in Map 8.



Map 8: Potential biomass resource in Enfield



Map 9: Potential Biomass resource within 40km of Greater London

5.4.2 *Arboricultural Waste in Enfield*

Enfield Borough Council currently contract all arboricultural work to Gristwood and Toms Ltd. Gristwood and Toms have a site in Shenley Hertfordshire to which they bring all their waste arisings, from their work in Enfield and a number of other London boroughs. Wood waste is chipped as the work is being undertaken and then brought back to Shenley for storage.

Gristwood and Toms currently sell most of their wood chips to the heat and power stations at Slough Heat and Power and Eccleshall Biomass Heat to Energy Station. These large scale operations are able to take chips with a range of heat and moisture content and as such they do not have standardised chip production and do not have the facilities to produce wood pellets. As such the fuel might not currently be suitable for smaller scale systems, although developing a reasonable wood chip standard would not be a difficult task. However, the company recognises the growing potential of the wood fuel market and has stated that it would be interested in supplying fuel to local users.

5.4.3 *Lee Valley Biomass and North London Woodfuel Hub*

The London Development Agency commissioned a study in 2009 to assess the potential for developing solid biomass fuel resources within the Lee Valley Regional Park. The study was undertaken by Ove Arup & Partners Ltd and identified the resource availability and the feasibility of setting up a supply chain.

Following on from this work, the Forestry Commission have instructed Bioregional to investigate the potential to set up a wood fuel hub for North London. This study is due to report in early 2010 but initial investigations have suggested that there is a significant amount of wood fuel already available in the borough that could be made available for local fuel use. Setting up supply chains would be relatively straightforward but would require an adequate demand in order to assure viability. Whether this demand can be created within the north of London is still to be assessed, although feedback from the industry is that there is a shortage of smaller schemes (200-500kW) using wood chips. This may be because the use of biomass boilers has been constrained by air quality issues and that pellets are favoured where systems are used because of spatial constraints.

5.4.4 *Constraints*

Combustion of biomass results in greater emissions of NO_x and PM₁₀ compared to natural gas. Therefore, the use of biomass-based heating and CHP systems could potentially have a detrimental effect on air quality relative to gas-based systems. This will be particularly important in areas where these pollutants are already at critical levels.

The following map shows the Air Quality Management Area declared in Enfield for both NO₂ and PM₁₀ which extends across the whole Borough.

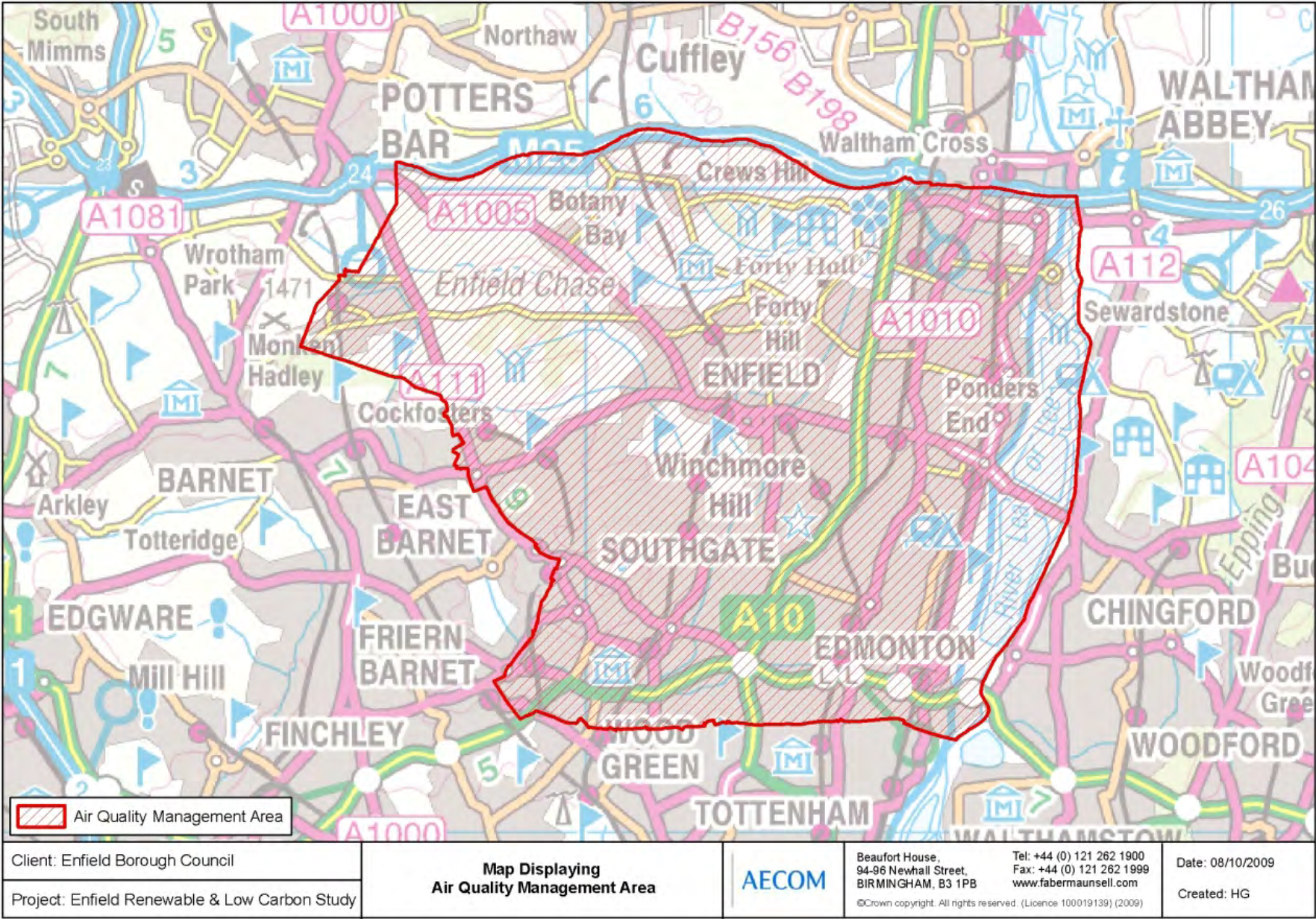
While this represents a potential constraint on the use of biomass, the implications will need to be assessed on a site by site basis because the effects will be based on the exact specification of the system installed.

The Mayor's Draft Air Quality Strategy (October 2009) set out a number of requirements and limitations on the use of Biomass in areas with an AQMA. Policy 8 states that the mayor will use his planning powers to:

- *Ensure all applications which propose biomass boilers within an AQMA include an assessment of emissions against the emissions of a conventional gas boiler*
- *Where large biomass boilers are proposed they should be fitted with the best available emission reduction equipment.*
- *Applications with small biomass boilers (less than 500kW) in AQMAs are considered unsuitable unless they can demonstrate they have no adverse effects on local air quality.*

Although this document is currently out for consultation conversation with representatives from the GLA suggests that the use of biomass will be considered if it can be demonstrated that there is no detrimental impacts on local receptors. There is now an established methodology for demonstrating the impacts of biomass boiler installation. This requires a screening assessment to be first undertaken and if this demonstrates a potential risk, for dispersion modelling to assess the impacts on local receptors.

The use of biomass as an energy source to replace fossil fuels can be a relatively inexpensive route to achieving significant reductions in CO₂ emissions. Given the high targets that new developments are being expected to meet, biomass is likely to be a popular solution for many schemes. It is important therefore that the Council assesses the applicability of biomass on a scheme by scheme basis, with an open attitude for assessing the impacts of air quality.



Map 10: Air Quality Management Areas in Enfield

5.5 Energy from Waste

5.5.1 *Waste Incineration*

Incineration is the process of releasing the energy in waste through combustion at high temperatures. This can reduce the amount of municipal solid waste sent to landfill by 90% and generates useful amounts of heat and electricity. With current technology, around 100,000 tonnes of municipal solid waste can provide 7MW of electricity. Incinerators produce large amounts of waste heat. This can also be a resource though exporting to nearby consumers. Energy from Waste schemes with CHP are now eligible for Renewable Obligation Certificates, providing additional feasibility benefits.

Incineration plants typically operate on large scales and large plants result in a land take which can be many hectares. These are often accompanied by tall stacks which may constitute a significant impact on both landscape character and visual amenity. Incineration plants are regulated by the EU Waste Incineration Directive which sets emissions limits for many substances. Air quality is a material planning consideration and can be an issue of great public concern. Detailed emissions studies will be required along with careful stack design and management.

Incineration plants can handle large amounts of waste requiring regular delivery access, good transport links are important and site traffic should not be constrained to operations during daytime hours only. Because of the quantity of waste handled, incinerators are good candidates for integration with rail and waterway networks.

5.5.2 *Pyrolysis and Gasification*

Pyrolysis and gasification are novel methods for extracting energy from municipal solid waste. Both operate at high temperature in a reduced oxygen environment causing the chemical decomposition of the waste into useful resources. Pyrolysis operates entirely without oxygen. It produces syngas, a liquid and a char fraction. The syngas is used to generate electricity (8MJ/kg) while other chemical compounds are bound in a char, reducing emissions and leaching to the environment; the solid char fraction can be used as a fertiliser. Gasification operates at higher temperatures with some oxygen. It produces a gas along with an ash residue with little calorific value.

These novel thermal treatments current have a small market penetration but are becoming increasingly common, partly due to the EU landfill tax. Costs remain high but are expected to reduce as their development continues. Pyrolysis and gasification have similar site constraints to waste incineration but can have less land area requirements.

5.5.3 *Anaerobic Digestion*

Anaerobic digestion is a biological process for the treatment of organic waste. It separates the biodegradable waste into fractions. The gas produced is methane rich and can be used for energy production. The liquid can be used as a fertilizer and the solid, fibrous fragment can be

used as a soil conditioner; all valuable resources. Any glass, plastic or metal that is in the waste stream gets separated and must be diverted to another waste treatment or to landfill.

Anaerobic digestion has only been applied on a small scale in the UK, processing sludge, agricultural and industrial waste. Large scale facilities are active across Europe and North America, they can accept a greater range of organic feedstocks including parks waste.

Digestion plants are commonly developed on either a small scale, serving a farm or a number of households or on a large scale, providing a centralised facility to treat municipal waste, sludge and industrial waste.

Anaerobic digestion has similar site constraints to waste incineration but can have less land area requirements. In addition odours from decomposing waste can become a nuisance when the process is not properly controlled and the waste is poorly stored. With anaerobic digestion the process is largely enclosed and the odours managed.

The digestion process itself is enclosed, emission to the atmosphere are controlled. There is potential for the release of some biogas and bio-aerosols as they begin the digestion process and when the residues are removed. Air quality implications are expected to be smaller than those for other Energy from Waste technologies.

5.5.4

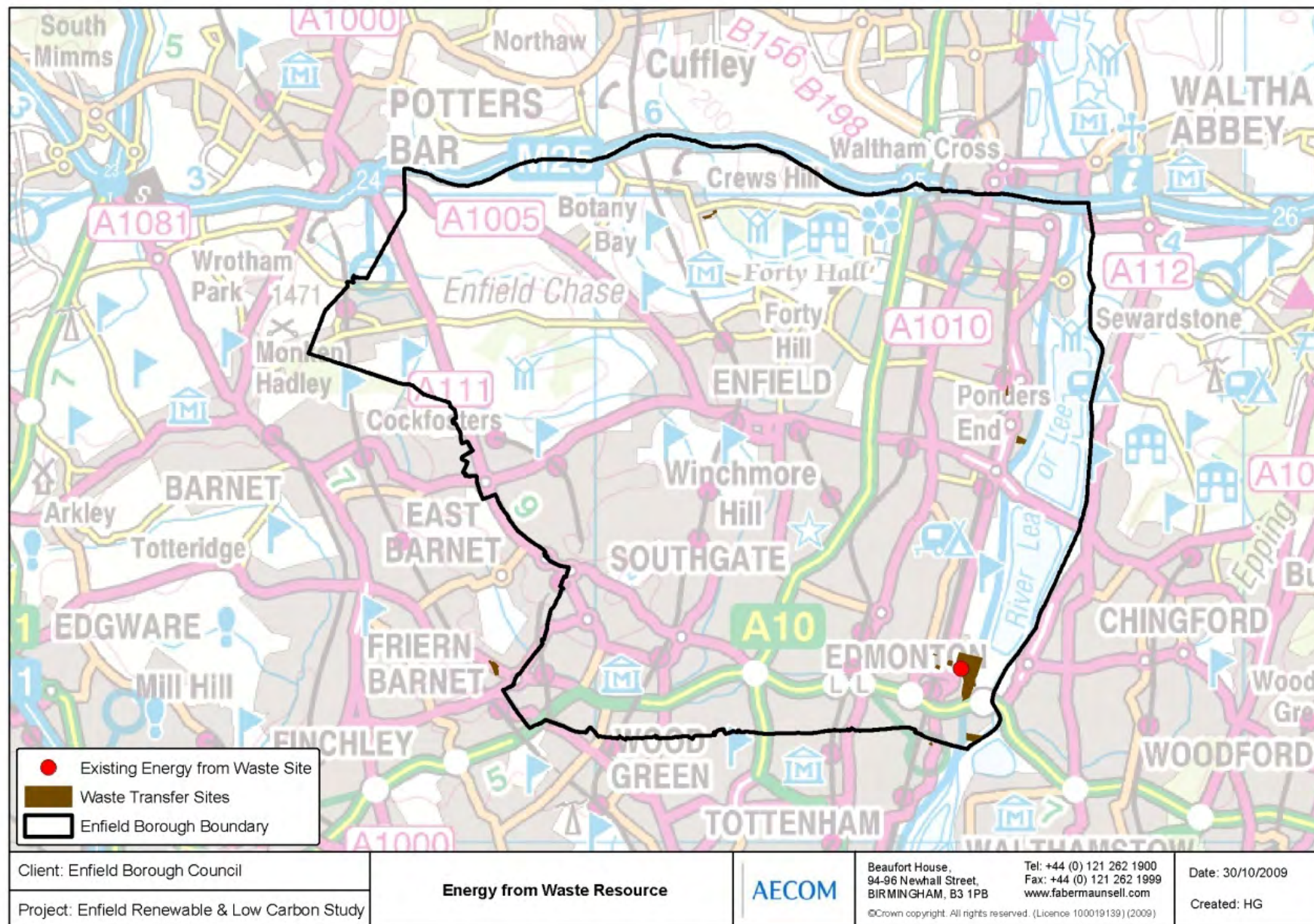
Waste Heat Opportunities

The London Waste site at Edmonton currently houses an incinerator that generates electricity from waste collected from the 7 boroughs that make up the North London Waste Authority. The London Waste Incinerator was built in 1970 to provide 35MW electricity through a steam turbine driven generator. The plant has been updated over its life and is compliant with current Waste Incineration Directive regulations, but is becoming increasingly expensive to update and maintain. The current thought is that the plant will continue to operate until around 2020 when it will probably be replaced. The intention is that the site will remain as some form of waste handling site, potentially with energy from waste facilities, although the form of these is unknown presently. Options being considered for the site at present include the replacement of the steam turbine incinerator at the end of its use with mechanical biological treatment (MBT) and aerobic digestion (AD). The site ownership was split equally between North London Waste Authority (NLWA) (the statutory waste disposal authority for the seven north London local authorities) and SITA (Private Interest), although in a recent announcement, NLWA are in the process of purchasing the 50% SITA share with the result that the plant will be entirely in public ownership. It is understood that a grant application was made a few years ago to install boiler capacity and modify the plant to export heat. However the planning application failed and the scheme was judged to be not commercially attractive.

More recent discussions have been held with Thamesway and the London Development Agency, although the outcome suggests no technical analysis has been made of the potential for heat export. Due to the current plants short lifetime, and uncertain future, it is probable that the short term options for district heating using waste heat from the site are minimal. Although

the presence of the current plant could act as a catalyst for a district heating scheme to be delivered on the neighbouring sites and in the longer term, particularly for larger strategic development in the neighbouring areas, this link might become possible and should be explored..

As shown in map accompanying section 5.3, the London Waste Incinerator is located in an area which has a high potential for the delivery of district heating and is also adjacent to the proposed Meridian Water place shaping priority area.



Map 11: Energy from waste resources in Enfield

NLWA Outline Business Plan (January 2010)

The Authority's proposed procurement strategy divides the procurement into two separate contracts that will be let concurrently with co-terminus expiry, these are:

- The main waste services contract, which includes residual waste treatment facilities, household waste recycling centre (HWRC) infrastructure and material recovery facilities.
- The fuel use contract, which will be for the solid recoverable fuel (SRF) that is the output of the main waste services contract

The Authority's outline business case is based on a technical study, which included a wide ranging analysis of the possible technological options available. The proposed reference project was for mechanical biological treatment (MBT) with anaerobic digestion (AD) producing an SRF to be developed across a number of site in the Authority's ownership. The proposal for the Edmonton site is for a 345ktpa MBT/AD and 112ktpa AD. All new facilities are operational from April 2016. Additional to the new facilities, the operational life of the Edmonton energy facility would be optimised to extend its life to 2020 and the existing 30ktpa composting system will continue as normal.

To treat the SRF produced by the MBT/AD facilities, a CHP SRF facility will be established and operated by a third party, becoming operational in April 2017. During the intervening period, it is proposed that the SRF will either be stored or disposed to landfill. The Authority is not proposing to put forward a site for the SRF user.

Although the reference project has been put forward in the business case, bidders may propose different technologies and also sites. The procurement strategy of two separate contracts, one receiving SRF, however narrows the field of available technologies. The prospect of a bidder proposing mass burn incineration has not been incorporated in the Authority's evaluation criteria.

The timetable for the scheme is as follows:

Publication of OJEU Notice	April 2010
Outline solutions received from bidders	July 2010
Detailed solutions received from shortlisted bidders	December 2010
Submission of final business case	January 2012
Award of Contract	October 2012
Main Waste Contract Facilities (MRF, AD, MBT) Operational	April 2016
Fuel Use Facilities (SRF Plant) Operational	April 2017
Edmonton Incinerator ceases operation	2020

5.6 Micro generation technologies

5.6.1 Overview

5.6.1.1 Photovoltaics

The sun's energy arrives at the earth's surface either as 'direct', from the Sun's beam, or 'diffuse' from clouds and sky. The total or 'global' irradiation is the sum of these two components and, across the UK, the daily annual mean varies between 2.2kWh/m² to 3.0kWh/m² (as measured on the horizontal plane). There is a very significant variation around this average value due to both seasonal and daily weather patterns.

Photovoltaic (PV) systems convert energy from the sun into electricity through semi conductor cells. Systems consist of semi-conductor cells connected together and mounted into modules. Modules are connected to an inverter to turn their direct current (DC) in to alternating current (AC), which is usable in buildings. PV can supply electricity either to the buildings they are attached to or, when the building demand is insufficient, electricity can be exported to the electricity grid.

Different types of PV cell – polycrystalline, monocrystalline, amorphous (thin film) and hybrid – have different efficiencies and require a different area of panel to provide 1 kWp. The carbon saving limit for PV is the size of the available south facing roof area.

5.6.1.2 Solar Water Heating

Solar water heating systems circulate a fluid through solar collectors mounted on the roof or façade of a building to preheat the building's domestic hot water supply. There are two standard types of collector, flat plate and evacuated tube.

Flat plate systems provide a large surface area of a solar absorbent material, either metal or a specifically designed polymer with an absorptive coating, which collects the sun's heat. The absorber transfers its heat to water which passes beneath through a network of tubes. The heated water is held in a storage tank before use. Conventional boilers are often required to boost the water temperature prior to this.

Evacuated tube systems also collect the sun's heat through glass or metal tubes through which water passes. However, the collector is held in a vacuum within an outer glass tube. This reduces the heat transfer from the collector to the atmosphere, greatly improving performance in cold climates where gains are reliant on solar irradiance rather than the ambient air temperature.

While flat plate technology has historically been dominant, recent advances in evacuated tube collector design have achieved near parity in terms of cost per kgCO₂ saved. Generally per m² evacuated tubes are more expensive to manufacture and therefore purchase, but achieve higher conversion efficiencies and are more flexible in terms of the locations they can be used

5.6.1.3 Ground/Air Source Heat Pumps

Heat pumps are often considered to be low carbon rather than renewable energy generation systems since they require electricity to run. By extracting heat or coolth from the ground, air or water bodies, they are usually able to deliver more heat or coolth for the energy used (a ratio known as the Coefficient of Performance (CoP)), compared to conventional systems. They can provide significant CO₂ savings in comparison to standard electrical heating systems, since they require around a third less electricity. However, due to the carbon intensity of the grid, CO₂ emissions from heat pumps are similar to those of an efficient gas heating system. As electricity is currently around four times more expensive than gas, running costs are also comparable with, and can be higher than an equivalent gas system. When providing cooling for non-domestic buildings they can deliver significant CO₂ reductions if the CoP and energy yields are high.

Heat pumps are primarily used to provide space-heating and the best efficiencies are achieved by running systems at low temperatures. For this reason, they are ideally suited for use in conjunction with under floor heating systems. Domestic hot water can also be supplied, however as with air source heat pumps, these systems operate at an optimum temperature of 45°C. Consequently, heating water to 60°C or more drastically reduces their efficiency.

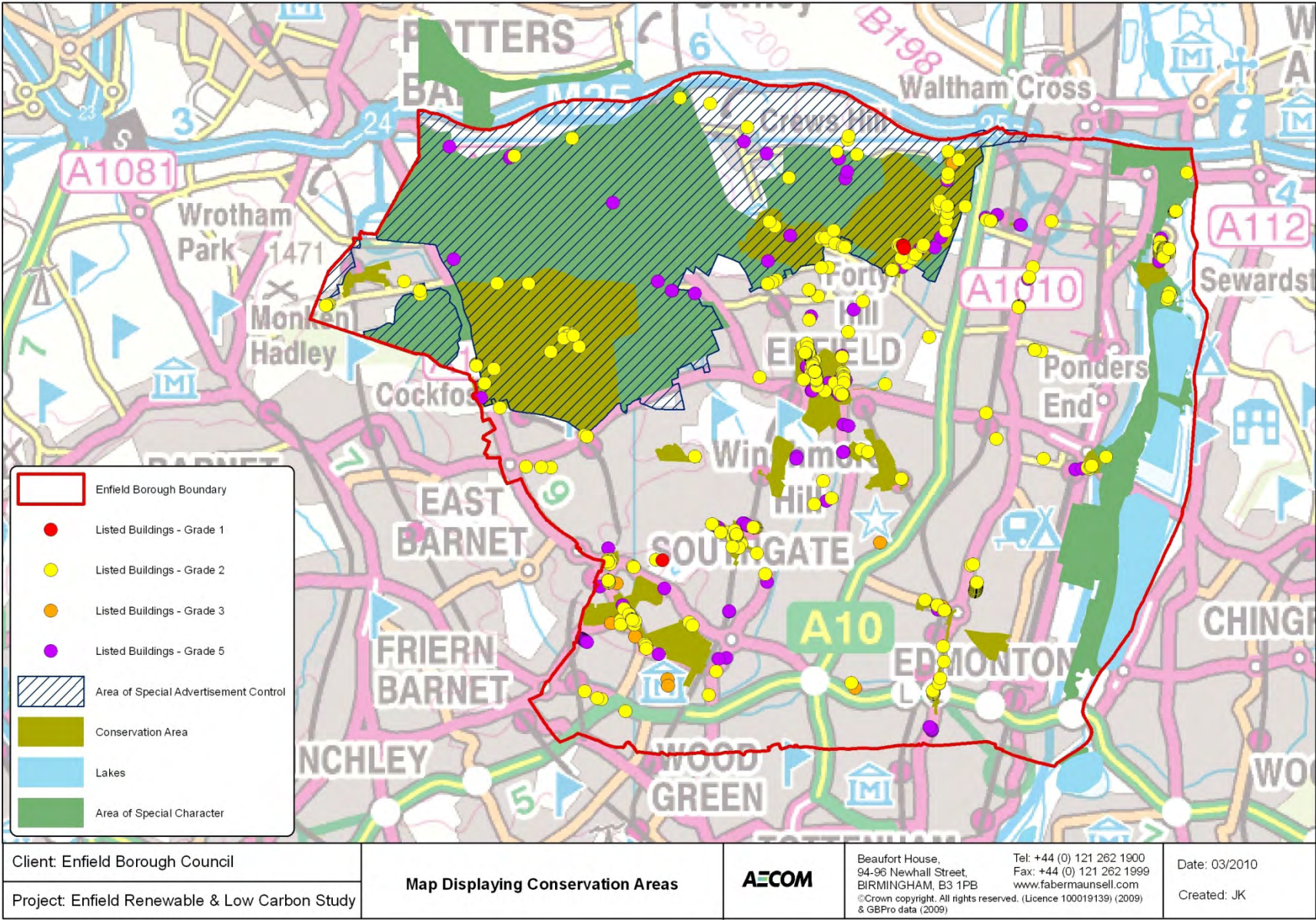
This creates a significant challenge for heat pumps installed in future homes, where hot water demands are likely to be comparable to the (reduced) space heating requirements. In such cases, heat pumps might be well complemented by other microgeneration systems that are sized in relation to domestic hot water requirements, for instance, solar hot water systems.

5.6.2 Constraints

5.6.2.1 Photovoltaics

The use of PV will be constrained by the availability of available roof spaces. For PV to work effectively panels should ideally face south and at an incline of 30° to the horizontal, although orientations within 45° of south are acceptable. It is essential that the system is unshaded, as even a small shadow may significantly reduce output. PV can be used at different orientations and angles, including vertical facades, but this will result in a reduction in the output. For new developments, issues of overshadowing can be avoided through consideration at the design stage.

The availability of suitable roof space may also be constrained by conservation designations, which may limit the use of solar technologies. The conservation area designations within Enfield are shown in the following map:



Map 12: Conservation designations in Enfield

5.6.2.2 Solar Water Heating

As with PV, the use of Solar Water Heating will be limited by the availability of suitable roof spaces. Collectors work best when mounted in a south-facing location, although south-east/south-west orientations are suitable with a small reduction in performance. The optimum angle for mounting flat plate collector panels is between 30° and 40°, although this is often dictated by the angle of the roof. Evacuated tubes can be mounted on vertical facades as well as roofs. Careful consideration needs to be given to placing the systems so that they are not overshadowed by adjacent buildings, structures, trees or roof furniture such as chimneys.

Where solar water heating systems are specified on blocks of flats direct supply systems are only likely to be feasible for serving the two floors immediately below the roof, for all other scenarios communal system are likely to be more appropriate. Beyond two floors, direct individual systems would require excessive pipework and riser space as the pipework passes from the lower flat through the upper floor flats to the panels on the roof.

As with PV there could be implications on the use of solar water heating in conservation areas, where the availability of suitable roof space could be limited.

5.6.2.3 Ground Source and Air Source Heating

The application of Ground Source Heat Pumps (GSHP) is mostly reliant on adequate space being available for the bores or coils. For existing and highly constrained sites this could potentially restrain the use of such systems but for new developments there is the possibility to design the system in, or to use 'energy piles' which combine the heat pump loop with the piles of the building.

For open loop systems, which extract water from aquifers, the ability to gain an abstraction licence from the Environment Agency may also constrain their use. Applications could potentially be refused on the grounds that they affect the flow of aquifers or affect ground and water temperatures.

Air Source Heat Pumps (ASHP) are relatively easy to install and are usually attached to the external facade of a building. For residential dwellings heat exhaust air heat pumps are available, these systems combine a MVHR system with a heat pump, thereby further improving the efficiency of the dwelling. Although not specifically covered in the model, air-source heat pumps could be expected to have a similar output and cost to ground-source heat pumps.

5.6.3 *Local Potential*

PV

The study area is predominantly comprised of conventional houses and purpose built flats. Most buildings will have pitched roofs and it is likely that a significant proportion will have some

part of the roof orientated between south-east to south-west. As the majority of the dwellings are low rise detached houses, over-shading is likely to be limited.

Conventional houses would suit the installation of stand-alone PV systems while apartment buildings would suit larger arrays of PV where it could be connected into the landlord supply. This would limit the number of individual connections to be managed and the number of inverters required. This offers some synergy with solar hot water systems which are better suited to installation on individual homes.

	Residential	Non-residential
Indicative sizing	~8m ² per house (~1kW) Size per flat depends on storey height	Depends on roof area
Indicative cost	£5,500/kW for new build homes £6,000/kW for existing homes	£4,500/kW for new build non-domestic £5,000/kW for existing non-domestic
Indicative generation	800 kWh/m ² /yr (SAP) Up to 900 kWh/m ² /yr for high performing systems	
Indicative CO₂ savings	Up to 25% of total emissions for existing homes depending on size Up to 40% of total emissions for new build homes depending on size	Depends on roof area and scale of system installed requirements

Table 13: Basic overview of the technical requirements, costs and CO₂ savings of PV systems (costs provided by suppliers, other information generated by AECOM unless specified)

Solar Water Heating

The study area is predominantly comprised of conventional houses and purpose built flats. Most buildings have pitched roofs and an orientation from south east to south west. Individual solar water heating systems are ideally suited to houses although they can also be employed in flats. Communal solar hot water systems can be used in larger blocks of flats and linked to a hot water distribution system.

Peak levels of solar irradiation occur in the summer months when 100% of a building's hot water demand can be supplied from the solar panel. Solar irradiation decreases substantially in winter but over a year a solar water heating system will typically meet around 50% of a building's total annual hot water demand.

	Residential	Non-residential
Indicative sizing	~4 m ² per house ~2-3 m ² per flat	Depends on scale of hot water requirements
Indicative cost	£2,500 for new build homes (2 kW system) £5,000 for existing homes (2.8 kW system)	£1,000/kW for new build non-domestic £1,600/kW for existing non-domestic

Indicative generation	396 kWh/m ² /yr for flat plates (OFGEM) 520 kWh/m ² /yr for evacuated tubes (OFGEM) Up to 850 kWh/m ² /yr for high performing systems	
	~10-15% of total emissions for existing homes ~10-20% of total emissions for new build homes	Depends on scale of hot water

Table 14: Basic overview of the technical requirements, costs and CO₂ savings of Solar Water Heating systems (costs provided by suppliers, other information generated by AECOM unless specified)

Ground sourced/Air sourced

The performance of ground source heat pumps is linked to the average ground temperature, while air source heat pump performance is influenced by the average air temperature. The following table shows the potential carbon savings from installing a heat pump to a new or existing building. The high cost of ground works for ground source heat pumps means that air source heat pumps are around half the installed cost, albeit with a lower efficiency. For air source heat pumps, retrofit costs are slightly higher than new build to allow for increases in plumbing and electrical work. For ground source heat pumps, the cost for retrofit is higher to allow for modifications to existing plumbing and removal of existing heating system, plus ground work costs.

There is a wide variation in costs for ground source heat pumps at the 20-100kW scale, principally due to differences in the cost of the ground works. The cost of the heat pumps themselves is also dependent on size as commercial systems are usually made up of multiple smaller units rather than a single heat pump. Due to these variations, heat pumps in the 20-100kW range are shown with an indicative cost of £1,000 per kW installed.

	Residential	Non-residential
Indicative sizing	5kW for ASHP 5-11kW for GSHP	Depends on scale of hot water requirements
Indicative cost	£5,000 for new build for ASHP £7,000 for existing for ASHP £8,000 for new build for GSHP £12,000 for new build for GSHP	£500/kW for ASHP £1,000/kW for GSHP
Indicative CO₂ savings	~0-5% for ASHP ~5-15% for GSHP	Depends on heat demands and scale of system installed

Table 15: Basic overview of the technical requirements, costs and CO₂ savings for heat pumps (costs provided by suppliers, other information generated by AECOM unless specified)

5.7 Stand alone Wind Turbines

5.7.1 Overview

Wind turbines capture energy from the wind to produce electricity. The capacity of turbines used on land range from a few Watts to 2-3 MW. Small scale turbines, usually considered to be less than 50kW, can be installed on buildings but tend to provide relatively small outputs, whereas larger, free standing turbines provide significant electrical outputs but need to be installed at a considerable distance from buildings and other obstacles.

Building mounted turbines or micro turbines are still relatively unproven in urban locations where wind regimes are very unpredictable and there is much debate about what can realistically be assumed in terms of their annual outputs.

Wind turbines do offer a number of significant advantages however. The cost of the electricity to the end user is likely to be comparable to current tariffs. In addition, if the turbine produces more than the electricity required by the development, the surplus can be sold, providing revenue that can either be distributed to the residents or discounted from the service charges. Wind turbines are usually a highly visible element in the landscape, which can be a powerful symbol of environmental credentials, provided the development is carried out with the relevant consultations to ensure that local residents and businesses are in favour of the project.

Appendix M of SAP provides an estimate of the likely outputs that can be expected from wind turbines located in urban, semi-urban and rural locations. Calculations of wind turbine outputs should use the SAP calculations to determine outputs of the systems selected.

Recent studies suggest that building mounted turbines located in urban areas suffer from lower and much more disrupted wind speeds than larger turbines mounted in open sites and this obviously has a significant impact on their energy generation potential. This is not necessarily a problem if the turbines can be designed to operate at low wind speeds and if their costs can be reduced to a level where their reduced performance is balanced by their low cost. There is, however, limited data on real energy generation from building mounted wind turbines in urban locations. Early examples notably generated significantly less than was predicted by manufacturers of the turbines.

5.7.2 Opportunities

There are benefits to choosing a turbine in the small to medium size range. This size of turbine is particularly well suited to direct connection to a development electrical network rather than to the National Grid. The electricity generated can then be used on site thus sparing costly distribution network development and avoiding distribution losses.

5.7.3 Constraints

Construction costs - Construction costs for smaller systems will be considerably less than those associated with large scale turbines, since it is not necessary to use cranes or build a road strong enough to carry large-scale turbine components.

Landscape and Visual Impact – The application of small or large systems may be constrained by aesthetical landscape considerations. Although smaller systems are less imposing the larger machines will usually have a much lower rotational speed, which means that one large machine may not attract as much attention as many small, fast moving rotors.

For a small free standing turbine, for example the 15kW Proven turbine the following constraints would need to be considered:

- Wind speed above 5m/s from NOABL database.
- 20m buffer around railway lines,
- 20m buffer around major carriageways,
- 150m buffer around residential areas.

The constraints map in the Local Potential section considers all of the general constraints for a large scale and small free standing turbines.

5.7.4

Local Potential

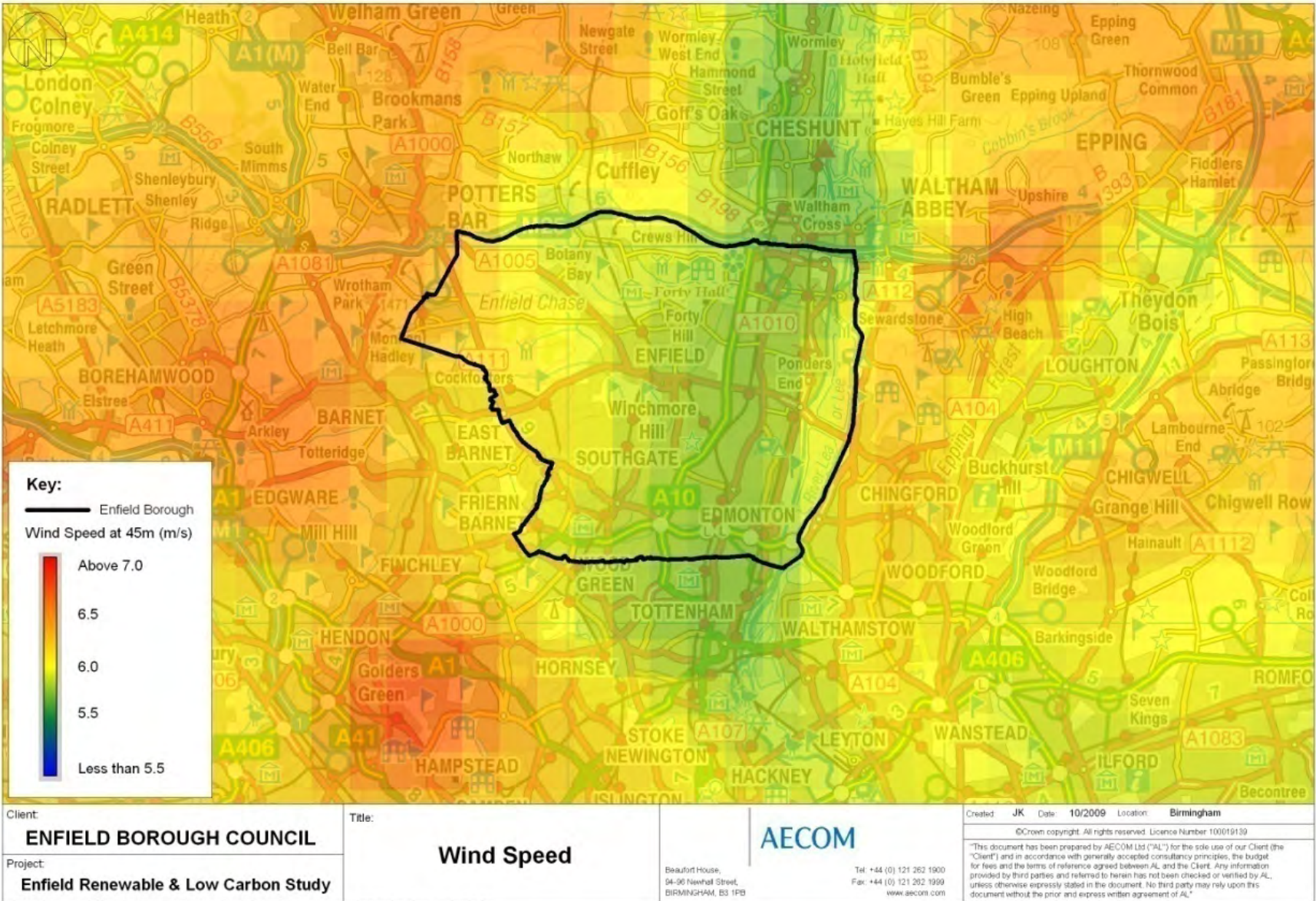
Map 12 shows the wind speeds at a height of 45m across the Borough

Potential for Large Scale Systems

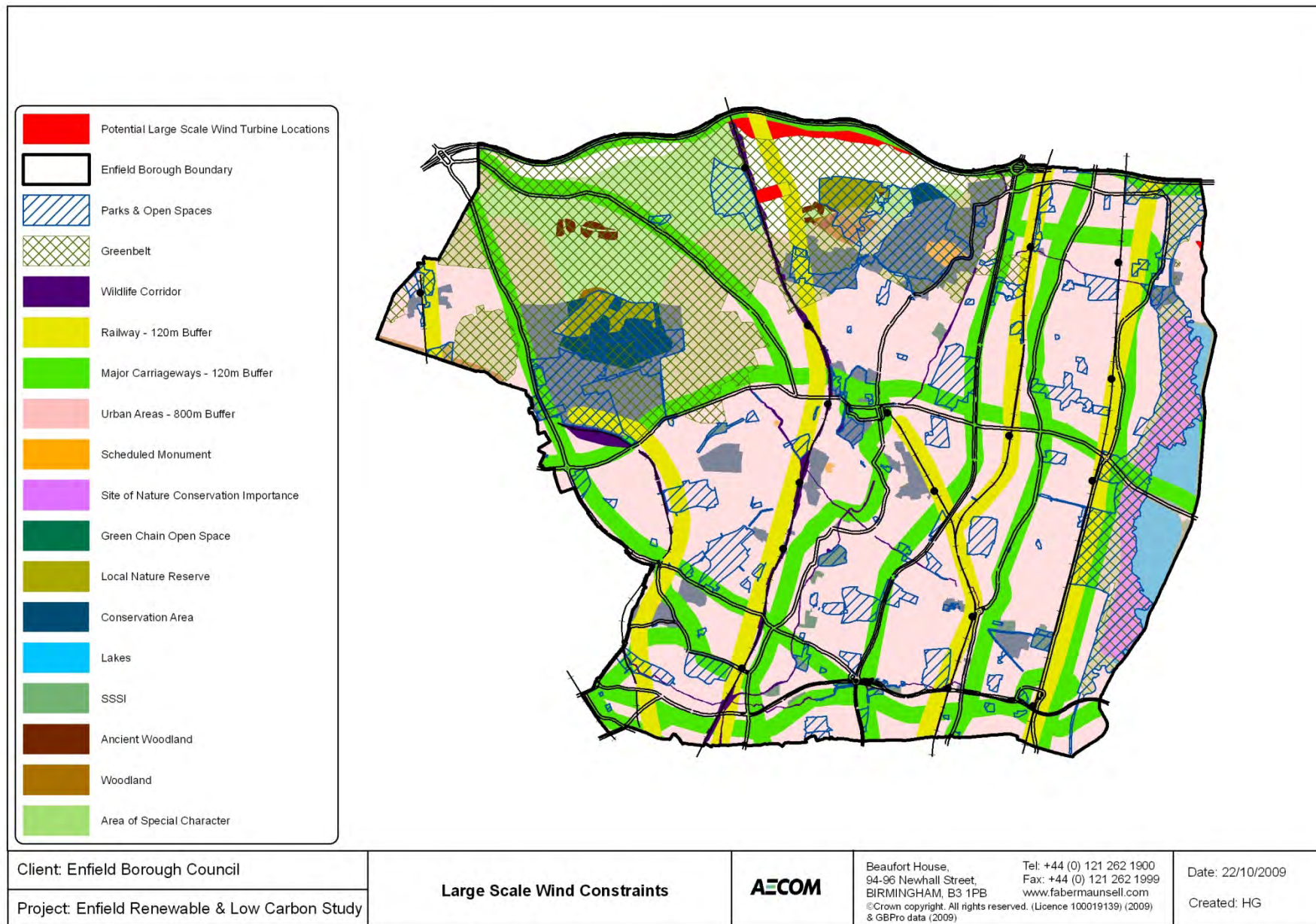
Accounting for the constraints imposed, the opportunities map for large scale wind power (Map 13) shows two small areas within the Borough that may be appropriate; the first in the north east near the areas identified for substantial growth and the other in the north, located between the green belt area and the M25.

Small Scale Systems

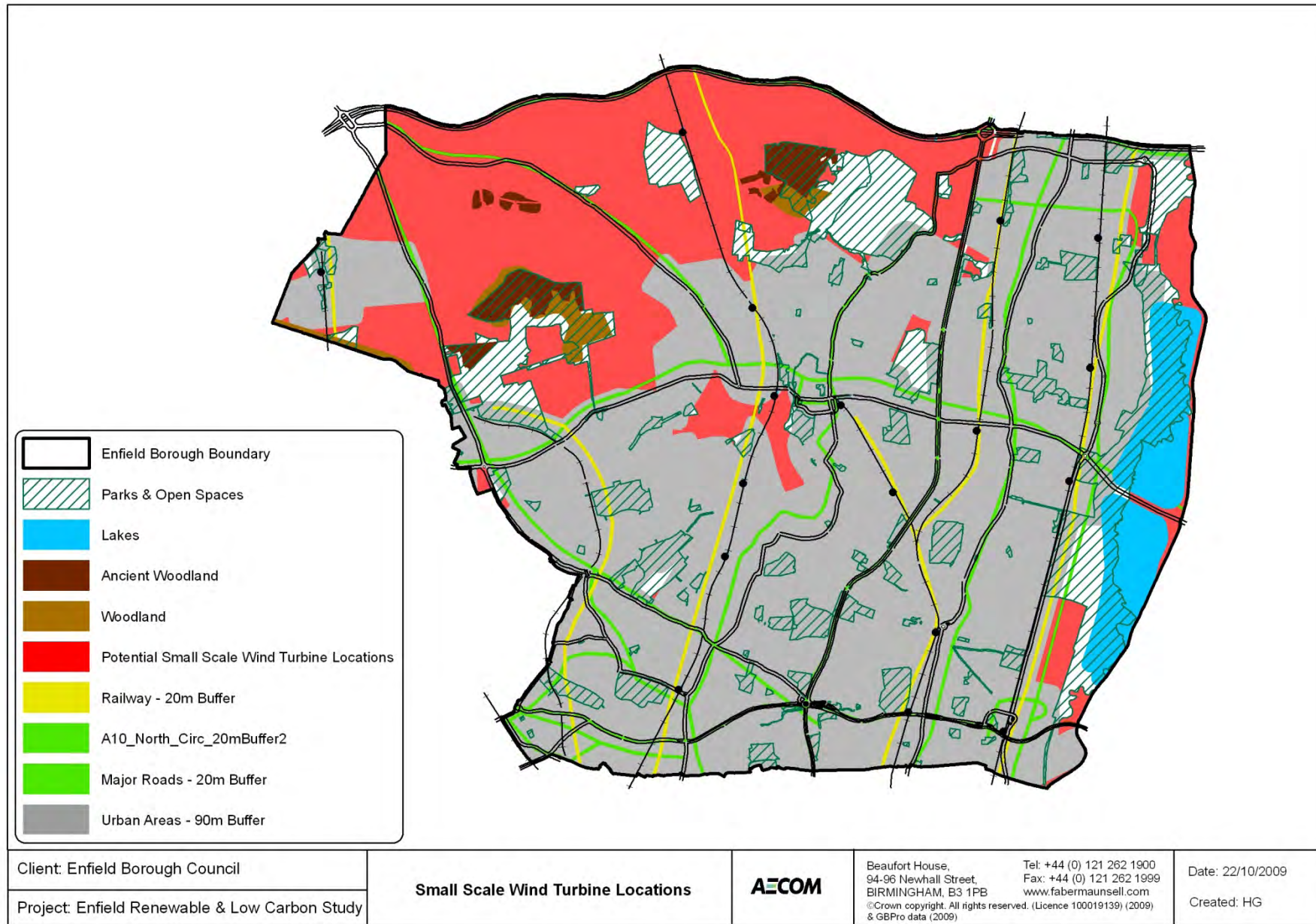
The constraints map for small scale wind (Map 14) shows a much larger area of opportunity for the use of turbines, some of which are located near strategic growth areas. However the reduced predictability of smaller scale wind means that these opportunities would need to be subject to more detailed studies to assess the impact of turbulence that will affect their performance.



Map 13: Average wind speeds in Enfield at 45m (Based on data from the UK wind speed database)



Map 14: Opportunities and constraints for the use of large scale wind turbines in Enfield



Map 15: Opportunities and constraints for the use of small scale wind turbines in Enfield

5.8 Other constraints

5.8.1 Flood Risk

Areas with significant flood risk may be more difficult to develop on and may have indirect impacts on the use of LZC technologies or certain policy requirements:

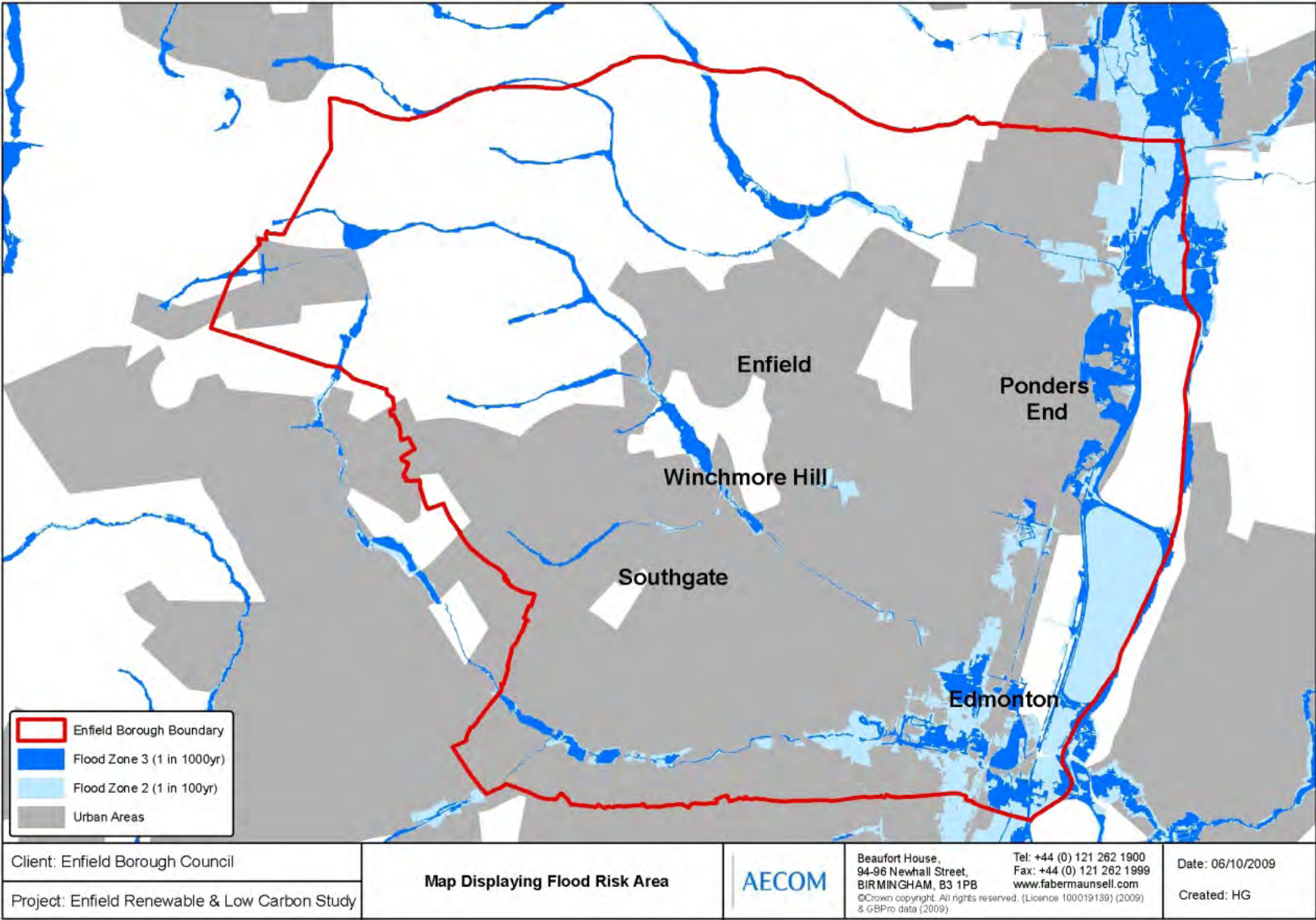
- Areas with high flood risk will have significant requirements for sustainable drainage which may reduce the land area available for decentralised and low and zero carbon technologies
- Developments in an area with a risk of flooding will be penalised in BREEAM and Code for Sustainable Homes assessments

Map 15 shows areas in Enfield that are located within Flood Zones 2 or 3. It shows that flood risks are present in the strategic growth areas of Central Leaside, North East Enfield and The area around the North Circular, which are likely to require measures to mitigate which could impact on the technical and financial ability to meet the energy requirements. In particular, Meridian Water has a high flood risk which could make it more difficult to achieve the higher CSH ratings.

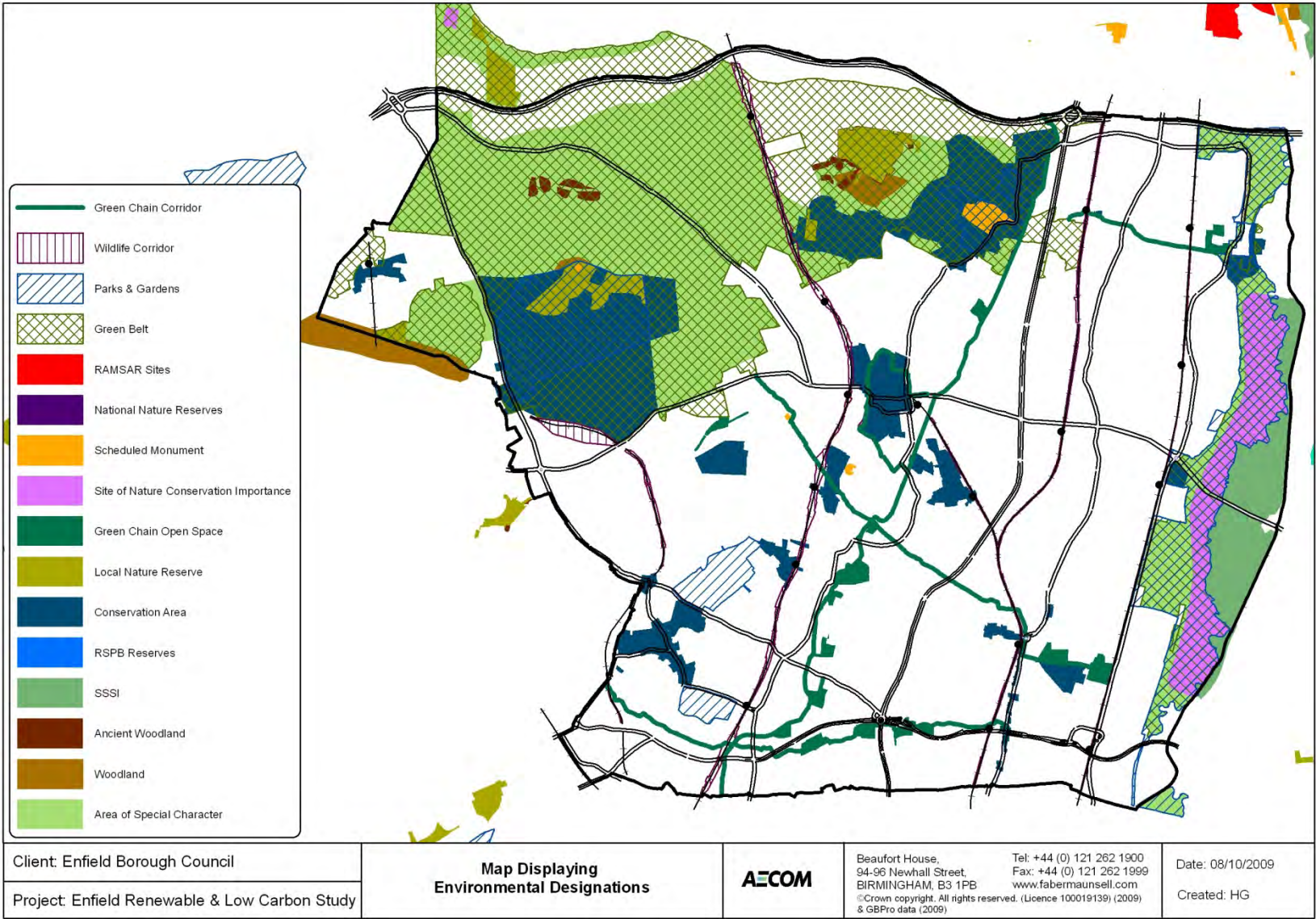
5.8.2 Environmental and Conservation Designations

The location of environmental and other designations may have an impact on the application of LZC technologies or certain policy requirements:

Map 15 shows areas in Enfield that have environmental designations. The areas with designations sit largely out of the main strategic growth areas.



Map 16: Areas at risk of flooding in Enfield



[The Green belt boundary on this map is based on the proposed map which accompanied the UDP (adopted March 1994). This layer does not take into account the amendments to Enfield's Green belt boundaries as a result of subsequent borough boundary changes (April 1994)]

Map 17: Environmental designations in Enfield

5.9 Energy Opportunities Plan

The analysis of renewable and low carbon energy opportunities discussed above, have been compiled to form an 'Energy Opportunities Plan' (EOP) for the Borough. This plan can be used as a resource in policy and planning to guide key opportunities for consideration. This spatial plan will enable the identification of delivery opportunities that exist now and those that are available as new development is taken forward.

The plan should also be used to inform planning policy as well as wider Council initiatives and investment decisions taken by the LPAs and Local Strategic Partnerships. The EOP should also be incorporated into supplementary planning guidance and corporate strategies so that it can be readily updated to reflect new opportunities and changes in feasibility and viability.

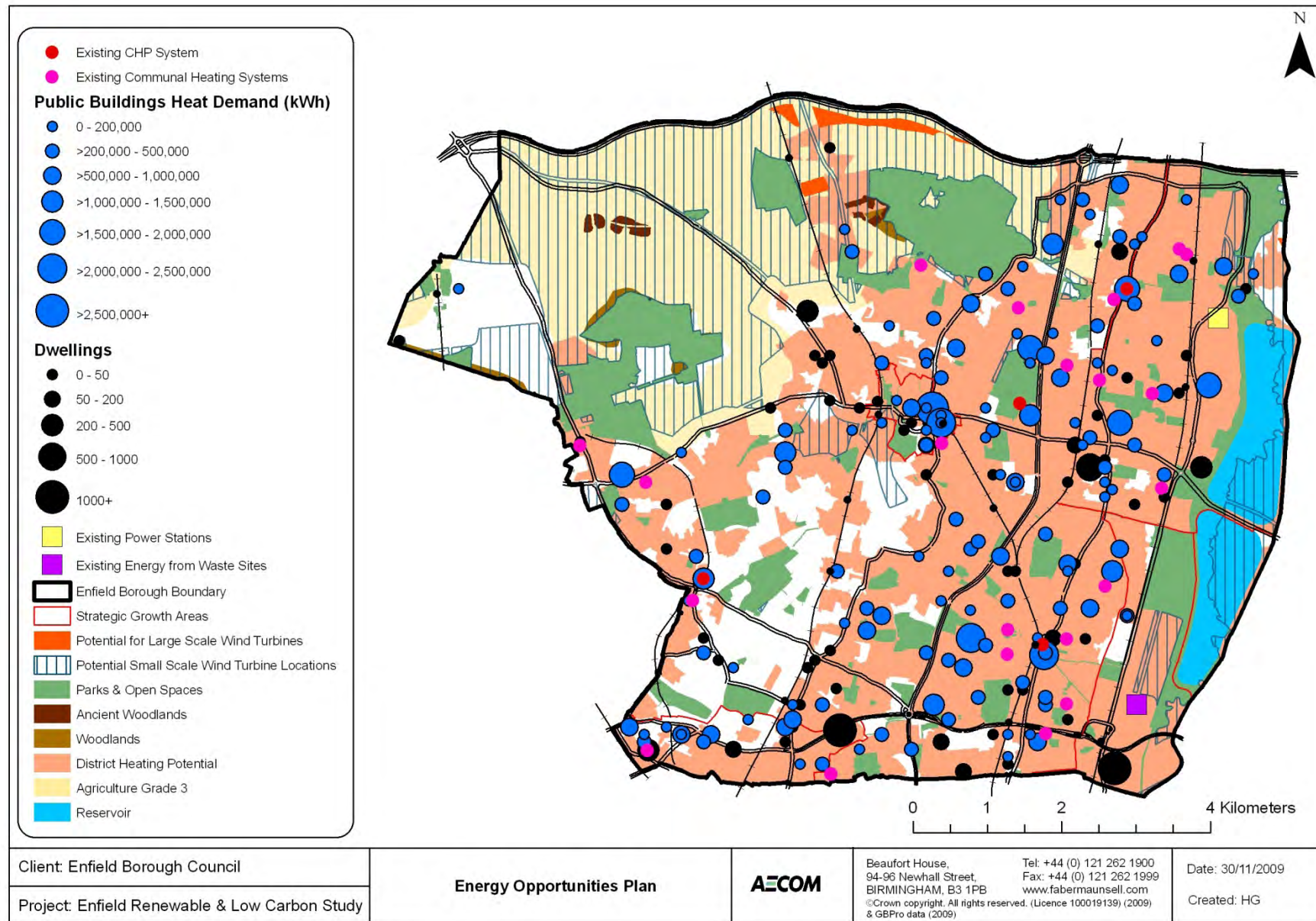
The EOP includes the following:

- Spatial distribution of opportunities and constraints relating to renewable resources including wind and biomass.
- Areas where the introduction of a district heating network likely to be viable due to the existing intensity of heat demand.
- Sites identified for residential development
- The location of public buildings which could act as 'anchor loads' for the creation or expansion of district energy networks.

5.9.1 Borough-wide

Based on the analysis of the potential opportunities and constraints discussed above for delivering low and zero carbon technologies across the Borough, the key opportunities were considered to be as follows:

- Creating district heating networks
- Large scale stand alone or development-linked wind turbines
- Capturing waste heat from existing industrial processes
- Biomass/biofuel production and supply



Map 18: Energy opportunities and constraints in Enfield

5.9.2

Strategic Growth Areas

The following pages focus on the specific opportunities and constraints within each of the Strategic Growth Areas:

- North East Enfield
- Central Leaside
- New Southgate and the area adjacent to the North Circular
- Enfield Town

The opportunities have been assessed with reference to the planned development within each of these areas.

Four place shaping priority areas have been identified, one within each of the strategic growth areas to drive forward the transformation of areas that are seen as priority for change. As part of the Council's place shaping programme, work is already underway on the creation of masterplans to guide development in the following four priority areas: Ponders End within North East Enfield, New Southgate and Ladderswood Estate within North Circular area, the area around Enfield Town Station within Enfield Town, and Meridian Water within Central Leaside. These masterplans are required to drive forward the transformation of areas that are seen as priority for change, taking into account both the levels and nature of local deprivation, and the opportunities for change offered by development sites and the plans and strategies of partners working in these communities. These take forward the work initiated through the Council's "pathfinder" project for Edmonton Green.

North East Enfield

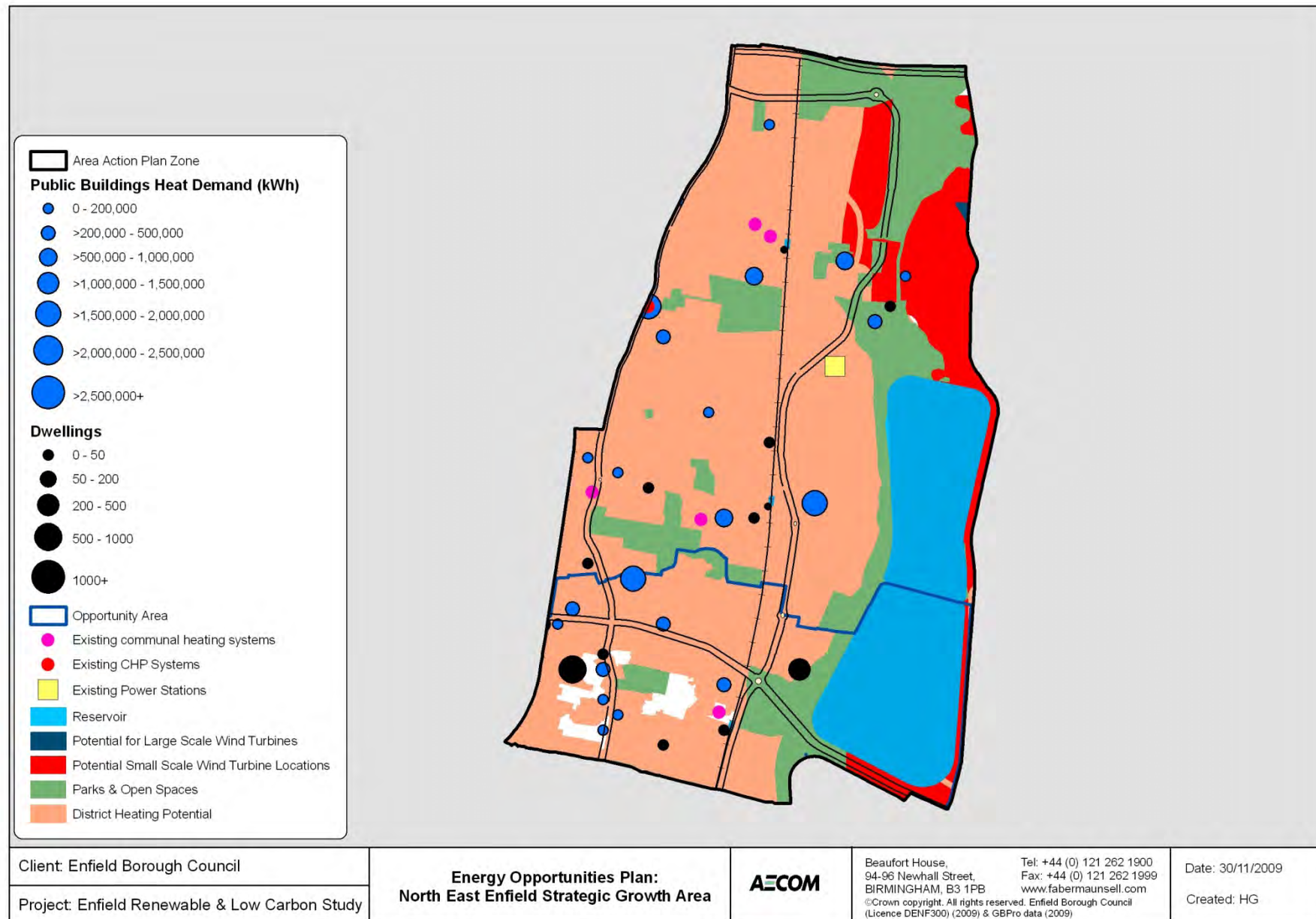
The opportunity map for the North East Enfield strategic growth area shows that the most significant opportunities lie in the use of district heating and wind turbines. The heat density throughout the whole area is suitable for the extension of district heating networks and the proximity of a number of public buildings, particularly in the place shaping priority area around Ponders End, suggest that there is a significant potential to deliver district heating, using the proposed new development and existing public buildings as the primary elements in a wider network.

Based on the constraints we have applied for the use of wind turbines, there is one small area which has been deemed to be potentially suitable to support a large scale turbine (45m hub height). There are larger areas that have been deemed to be suitable for supporting smaller scale turbines. The area to the east of the strategic growth area has a higher wind resource than the western area.

Additionally, although not shown on this map because work is still ongoing, there is the potential that a tree hub may be created in the north east corner of the strategic growth area¹¹. A local supply of biomass would encourage the use of biomass heating or heat and power systems, especially if using local arboricultural waste.

There is also a potential to utilise heat from the EOn power station, although based on initial contact with Eon this is only likely to be possible once a system has been created or if potential users have been identified.

¹¹ Awaiting outcomes from the feasibility study currently being prepared by consultants for the Forestry Commission.



Map 19: Energy opportunities and constraints in the North East Enfield strategic growth area

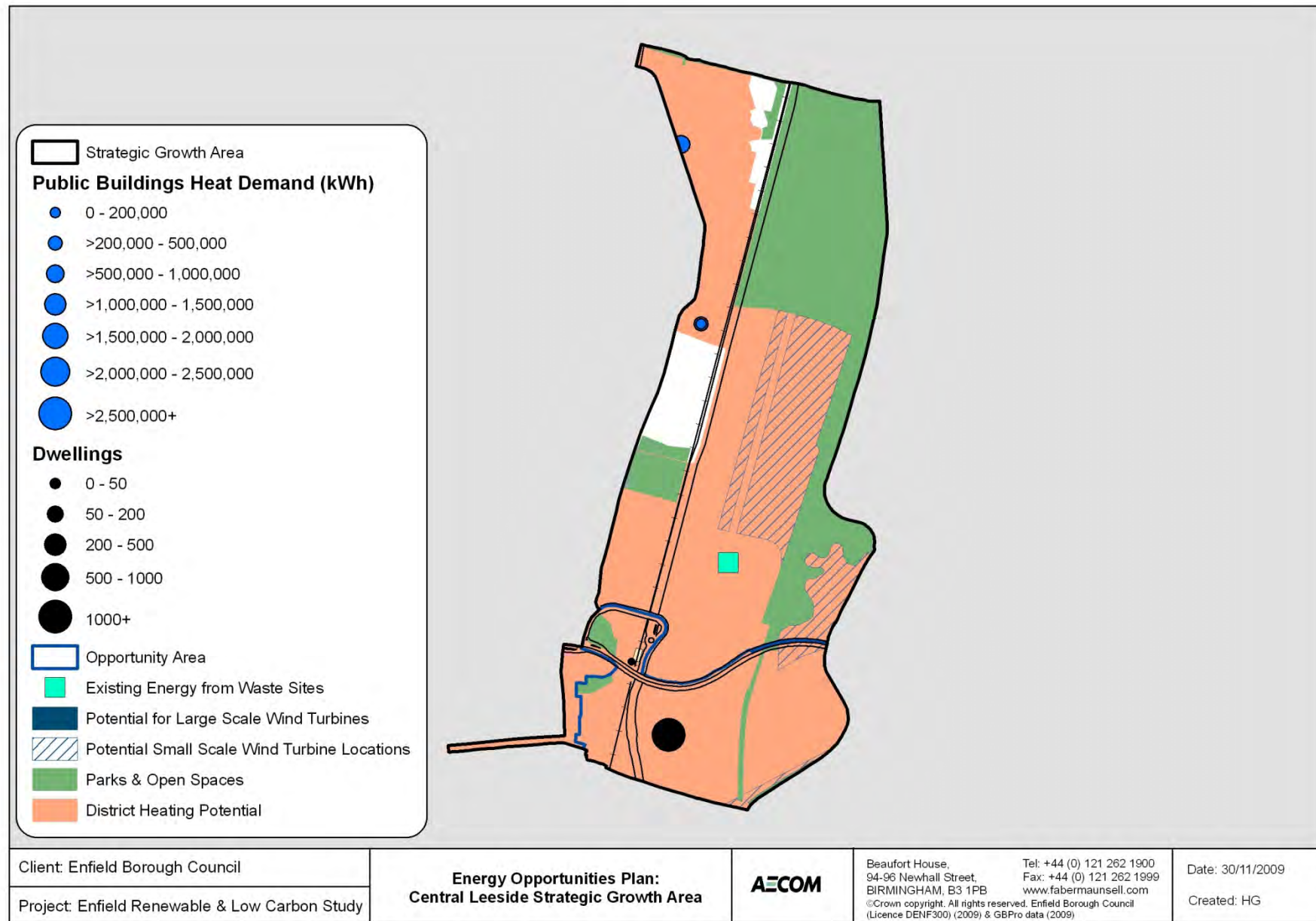
Central Leaside

The opportunity map for the Central Leaside strategic growth area shows that the most significant opportunity will be the implementation of district heating and wind turbines.

The heat density throughout most of the area is suitable for the extension of district heating networks although there are no significant heat demands from public buildings. The impetus for a district heating network will need to come from the proposed new development in the place shaping priority area of Meridian Water.

There are also large areas adjacent to the opportunity area and bordering the edge of the Borough that have been identified as suitable for supporting smaller scale turbines. As previously discussed, the constraints used in the mapping of the potential for small and large scale wind turbines uses relatively standardised assumptions and includes some factors that are not mandatory.

There is also a potential to utilise heat or power from the London Waste Site but this will be highly dependent on the future plans for the site. However, a district energy network would make connection a possibility.



Map 20: Energy opportunities and constraints in the Central Leaside strategic growth area

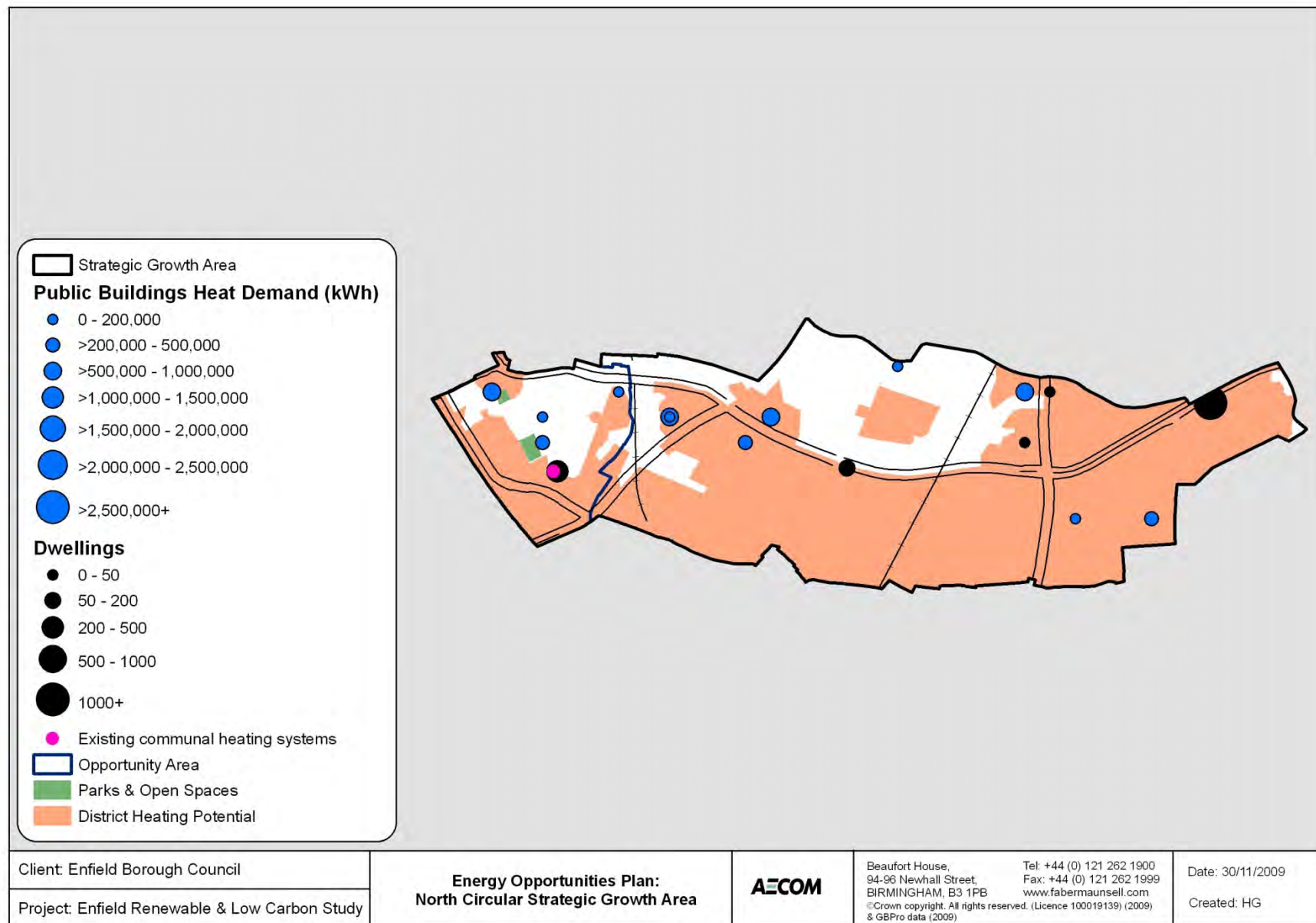
North Circular and New Southgate

The opportunities within the strategic growth area of the North Circular show relatively fewer energy opportunities when compared to the other three strategic growth areas. However, a significant proportion of the area has sufficient heat density to make the use of district heating viable. This could be increased significantly as a result of the proposed redevelopment in the area

Although the New Southgate place shaping priority area is currently only partially suitable for district heating, the proposed redevelopment of the Ladderswood Estate and the Western Gateway site, along with other potential redevelopment sites within the area have the potential to deliver a network that would then have the potential to be expanded, either linking to other development sites or public buildings.

In areas where wider energy infrastructure solutions are not possible, improved energy efficiency in combination with micro-generation is likely to be the preferred solutions for meeting the energy standard on new homes and reducing the energy consumption of the existing stock. Technologies such as solar water heating, photovoltaics, biomass heating and heat pumps would be potential options depending on the specific nature of the sites and proposed developments.



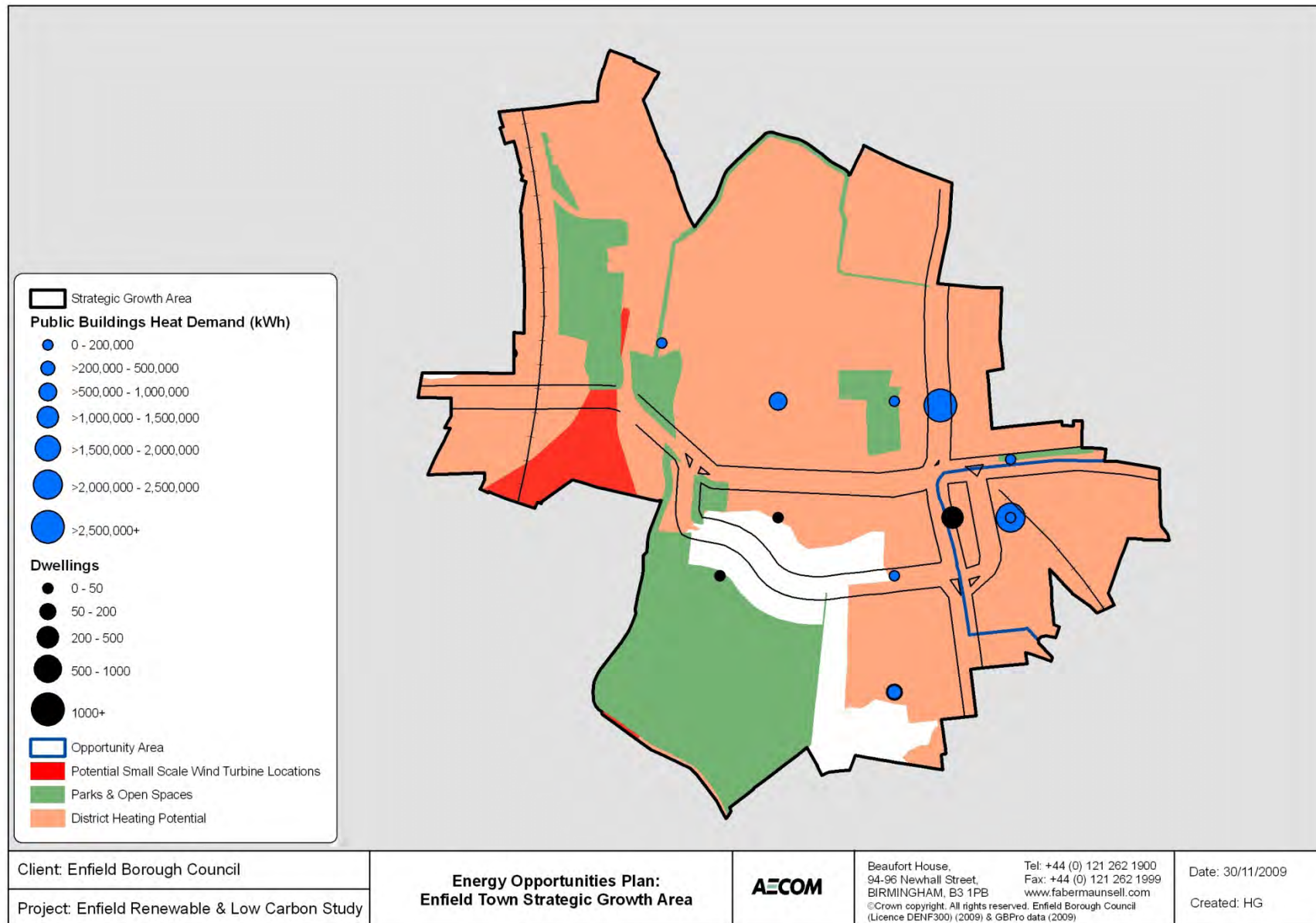


Map 21: Energy opportunities and constraints in the North Circular and New Southgate strategic growth area

Enfield Town

The opportunity map for the strategic growth area of Enfield Town shows that the most significant opportunities lie in the delivery of district energy networks. The heat density throughout the majority of the area is suitable for the extension of district heating networks and there are a few neighbouring public buildings with very high heat demands.

As shown in the energy consumption maps (Maps 2, 3 &4), this area has one of the highest consumption rates for fossil fuel and electricity in the Borough. This, together with the range of different building types and uses will further improve the viability of a heat network. Further analysis would be needed to investigate this option in more detail.



Map 22: Energy opportunities and constraints in the Enfield Town strategic growth area

5.10

Key Findings and Recommendations

- There are considerable opportunities for decentralised renewable and low carbon energy generation within the Borough
- An energy opportunity plan has been produced as a planning resource which will allow assessment and prioritisation of delivery of opportunities
- The scale of potential and types of technologies that are likely to be viable varies across the Borough
- The southern and eastern areas of the Borough, which have a higher density of heat demand, present a significant opportunity to deliver district heating networks, both for the new development planned in this area as well as existing communities
- A few sites have been identified in the north and eastern edges of the Borough which may be suitable for the use of large scale wind turbines.
- The northern and western areas have opportunities to develop biomass resources
- Opportunities to utilise waste heat or energy from waste could be developed by working closely with EOn and the North London Waste Authority and using planning policy to promote enable adjacent development to be connectable.
- The four strategic growth areas have significant potential to deliver district heating schemes associated with strategic development sites. The North East Enfield and Central Leaside strategic growth areas also have the potential to use wind resources. Further work will be required to explore these opportunities in more detail and develop potential projects or strategies to take them forward.
- All opportunities are delivery dependant, the resource potential in itself does not contribute to targets, therefore focus should be on enabling delivery.



Code for Sustainable Homes and BREEAM

6

Code for Sustainable Homes and BREEAM

6.1

Introduction

This chapter considers the opportunities and constraints to the implementation of targets related to the Code for Sustainable Homes (CSH or 'the Code') and BREEAM standards, which cover a wider range of criteria than just energy.

The PPS1 Supplement states that planning authorities should specify requirements for sustainable buildings "in terms of achievement of nationally described sustainable buildings standards, for example in the case of housing by expecting identified housing proposals to be delivered at a specific level of the Code for Sustainable Homes". Where such local requirements go beyond national requirements including the Building Regulations, the evidence base must justify this based on local circumstances.

Since the PPS1 Supplement was published in 2007, there has been further consultation on plans for a staged introduction of a zero carbon requirement for new homes and non-residential buildings in 2016 and 2019 respectively, through Part L of the Building Regulations. The energy and CO₂ emissions requirements of the higher levels of the Code have been superseded by future proposals for the Building Regulations. Future policy options, including targets for emissions reductions and contribution required from renewable or low carbon energy generation, have therefore been established with reference to the latest proposals for the Building Regulations.

Nevertheless, it could still be beneficial to use CSH and BREEAM as the basis for planning policies and targets for new development. Firstly, requiring developments to achieve a minimum Code level or BREEAM rating would improve the overall environmental performance of new development in the district. Secondly, and in terms of the requirements of the PPS1 Supplement, it would go some way towards addressing the potential future impacts of climate change, as it would set standards in terms of water consumption, flood risk management and ecology.

Thirdly, the Code and BREEAM provide an established framework for assessing and certifying the performance of a development. A Code or BREEAM certificate can be used to demonstrate compliance with policy, reducing the burden on development managers to monitor new development and provide assurance that planning requirements are being met in practice.

Specific areas covered of both assessments can be difficult to achieve on the basis of either cost or site-specific requirements. The requirements under the water, waste, land use &

ecology and pollution & flooding sections for both schemes are reviewed to determine cost implications and constraints.

6.2

Code for Sustainable Homes

The Code for Sustainable Homes was developed by BRE and is supported by the Department of Communities and Local Government (CLG). It sets out a national rating system to assess the sustainability of new residential development, replacing the previous system 'Ecohomes'. The Code consists of a number of mandatory elements which can be combined with a range of voluntary credits to achieve a credit level rating of between 1 and 6 covering nine sustainability criteria including CO₂ reduction, water, ecology, waste, materials, management and pollution. If the mandatory elements for a particular level are not reached, irrespective of the number of voluntary credits, then that code level cannot be achieved. This means that to achieve a full code rating, a range of sustainability issues will have to be incorporated into the building and site design.

Code Levels	Minimum Entry Requirements		Total score out of 100
	Energy Improvement over TER	Water litres/person/day	
Level 1 (★)	10%	120	36
Level 2 (★★)	18%	120	48
Level 3 (★★★)	25%	105	57
Level 4 (★★★★)	44%	105	68
Level 5 (★★★★★)	100%	80	84
Level 6 (★★★★★★)	Zero Carbon	80	90

Table 16: Mandatory requirements of each Level of the Code for Sustainable Homes (Code for Sustainable Homes Technical Guidance, May 2009)

Since May 2008 it has been compulsory for new homes to have a CSH rating. There is currently no national minimum requirement for the rating that they achieve, however proposed changes to the Building Regulations are expected to reflect the Code requirements for energy. However, residential developments supported by Homes and Communities Agency funding are currently required to achieve Code level 3, expected to rise to Code level 4 from 2010.

6.2.1

Cost Implications for the Code for Sustainable Homes

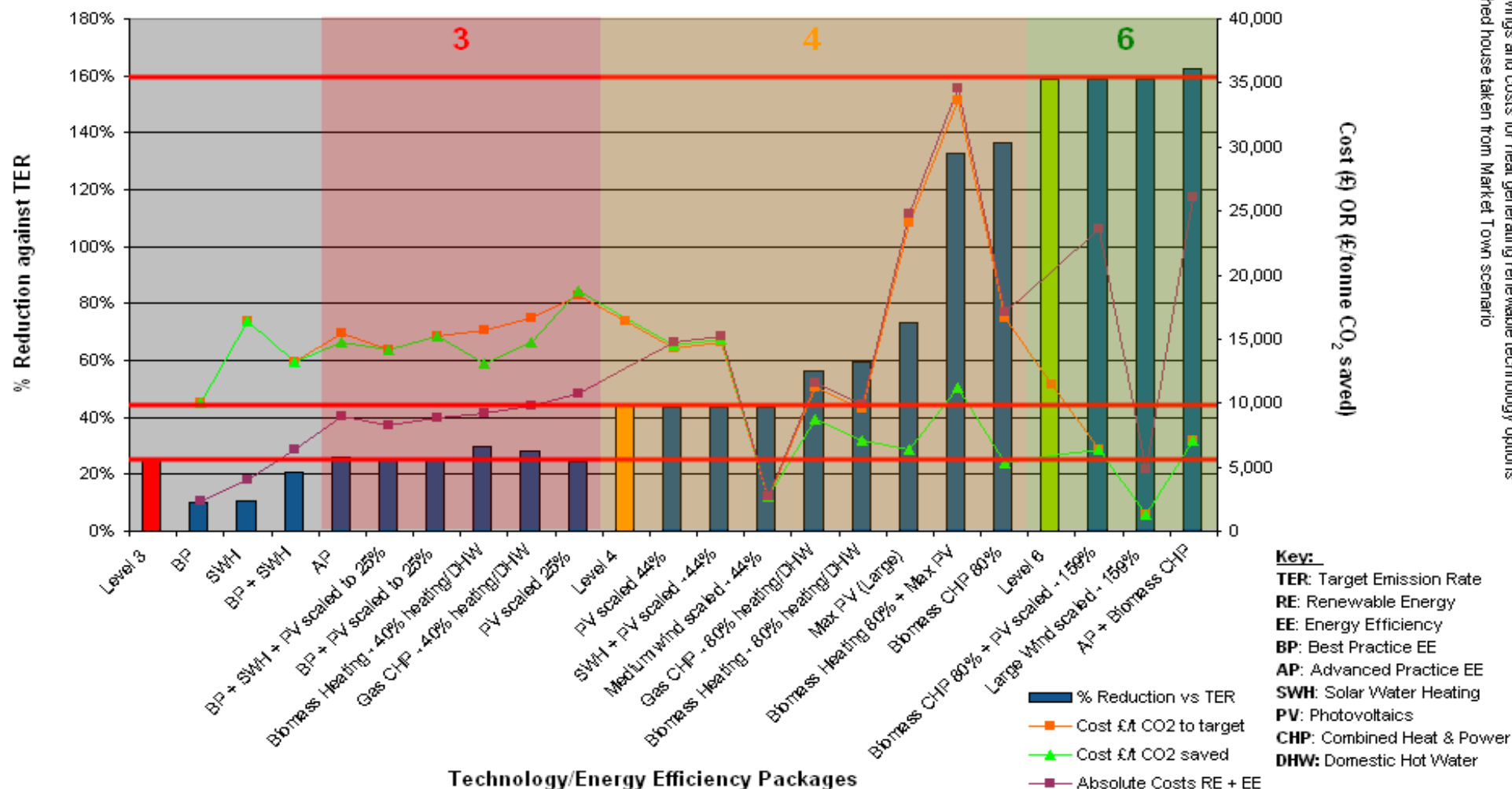
AECOM worked alongside Cyril Sweett who were commissioned by Communities and Local Government (CLG) to undertake analysis of the costs of achieving different levels of the CSH. The report, entitled: *Cost analysis of the Code for Sustainable Homes* presents the findings of

their study, but since only relatively few real CSH assessments have been completed, there is not yet sufficient final cost data to establish robust cost benchmarks

The following graph shows the predicted % increase over the base build cost to deliver CSH Levels 4, 5 and 6, broken down by the assessment category areas for a flat and a house. The graphs exclude the costs associated with credits ENE 1, 2 and 7 which are assumed to be covered in the costs discussed in the following Chapters to deliver the mandatory energy requirements.

Predicted costs show that costs associated with meeting advanced Code for Sustainable Homes levels are relatively modest for most elements. However a 'jump' in cost is evident upon an increase from Code Level 4 to Code Level 5/6 due to the requirements to meet higher levels of water efficiency through water recycling measures.

A selection of options to deliver energy targets for CSH levels 3,4 & 6 for a detached dwelling, showing absolute costs for developers and costs per tonne of CO₂ saved. (Costs 2008)



Note: Savings and costs for heat generating renewable technology options for detached house taken from Market Town scenario

Figure 24: CO₂ savings and costs for various strategies to meet different levels of the CSH (Cyrill Sweet and AECOM, 2008)

6.3

BREEAM

BREEAM (Building Research Establishment Environmental Assessment Method) is a voluntary assessment scheme which aims to help developers minimise the adverse effects of new non-residential buildings on the environment. Like the Code for Sustainable Homes, BREEAM allows the environmental implications of a new building to be assessed at the design stage by independent assessors to provide an easy to understand comparison with other similar buildings. It therefore provides a consistent and independent assessment tool which can be used in planning. An overall rating of the building's performance is given using the terms Pass, Good, Very Good, Excellent, or – new for BREEAM 2008 - Outstanding. The rating is determined from the total number of BREEAM criteria met, multiplied by their respective environmental weighting.

BREEAM was initially launched in 1990 as an environmental assessment methodology aimed specifically at office buildings (BREEAM Offices). Since then versions of the assessment have been developed for numerous other building types including schools, industrial, retail and healthcare. At the basic level the schemes for non residential buildings are all fairly similar in their approach and contain similar credit compliance criteria. Credits are typically grouped in to the following categories:

- Management
- Health and Well Being
- Energy
- Transport
- Water
- Materials and Waste
- Land Use and Ecology
- Pollution

Buildings which do not fall neatly under one of the established BREEAM schemes are able to be assessed using a bespoke methodology. In policy terms BREEAM is useful as it provides a single assessment method which covers a number of key topics relating to sustainable construction. A properly conducted BREEAM assessment can influence design both in terms of the masterplanning process and detailed architectural and mechanical and electrical specifications.

6.4 Requirements other than energy

6.4.1 *Water*

Targets are set for average water consumption per building occupant. As a mandatory standard, the higher levels of the Code (5 and 6) require water consumption of no more than 80 litres per person per day to be demonstrated. This would require some form of rainwater harvesting or greywater reuse on site. Costs of these are dependent on the scale of system, with individual house costs quoted at £2,650 but reducing to £800 for communal systems in flats. Communal systems can act as sustainable drainage systems (SUDS), for example, by holding and therefore slowing down the speed at which storm water enters the drainage system. The evidence base for a policy requiring levels 5 or 6 of the Code would need to demonstrate that water shortages in the Borough justify this additional expense.

6.4.2 *Waste and Recycling*

The Code has a mandatory requirement for all developments to implement a Site Waste Management Plan that monitors and reports on waste generated on site in defined waste groups, complies with legal requirements and includes the setting of targets to promote resource efficiency in accordance with guidance from WRAP, Envirowise, BRE and DEFRA. This is now a legal requirement for all construction projects over £300,000 in value so will be achieved by the majority of developments. Additional credits are available in both the Code and BREEAM for including procedures and commitments to reduce waste and divert waste from landfill, according to best practice. Ability to achieve these credits will depend to some extent on local municipal waste management services.

6.4.3 *Ecology and Land Use*

Credits are available in the Code and in BREEAM to encourage development on brownfield sites, avoid use of greenfield land where possible and enhance a site's ecological value. Developments in locations with high ecological value may be less able to achieve credits in this section of the Code and BREEAM.

6.4.4 *Pollution and Flood Risk*

There are credits available in the Code and BREEAM for using SUDS to reduce flood risk and risk of groundwater contamination. Approximate costs for SUDs on individual homes are £450 (based on one infiltration swale for every 2 units). The costs of incorporating flood resilience materials on the ground floor of a 2 bed mid terraced house are around £17,000. If standard infiltration techniques cannot be used due to ground conditions, additional costs may be incurred for attenuation measures such as permeable surfaces and/or rainwater harvesting. Other Code credits are available for building in a low flood risk area, or where flood resilience measures are incorporated into design in medium or high flood risk areas. Targeting these credits is not mandatory but is recommended when taking into account the long term

vulnerability of buildings to the effects of climate change in a flood risk area. Developments in the flood risk zones in the north, centre and east of the Borough may be limited in their potential to achieve these credits.

6.4.5 *Transport*

BREEAM includes credits which relate to the accessibility of sites by public transport, for staff commuting and business travel. Most locations in Enfield are likely to gain credits in this section but potentially development in the less urban areas of the Borough may be constrained. Credits for both the Code and BREEAM relating to cycle storage are more dependent on site layout and design, and are within the control of a developer to achieve.

6.4.6 *Other Areas*

Other sections of the Code and BREEAM, including management, health and wellbeing, and materials depend more on the design and construction of the proposed development, or the specific constraints of a given site. It has been assumed that these credits can be achieved at the discretion of the developer.

6.5 **Cost Implications**

6.5.1 *Code for Sustainable Homes*

A recent AECOM and Cyril Sweet study (July 2008)¹² has been used to show the financial implications of achieving different levels of the Code. The costs were predicted and are not yet fully supported by the development industry. There is not yet sufficient published data on the actual costs of achieving the higher Code levels to establish robust cost benchmarks.

The results demonstrate that the costs associated with meeting advanced Code levels are relatively modest for most elements. A significant proportion of the costs of delivering Code levels is in meeting the standards for CO₂ emissions, which after 2010 will become necessary for meeting Building Regulations. It is likely that these costs could be reduced further through effective supply chain management, economies of scale from the bulk purchase of materials and fittings, and innovation in design within the housing sector, as the Code becomes standard practice. There is potentially a role for the local authority here.

¹² *Cost Analysis of The Code for Sustainable Homes, Cyril Sweett and Faber Maunsell AECOM (2008)*

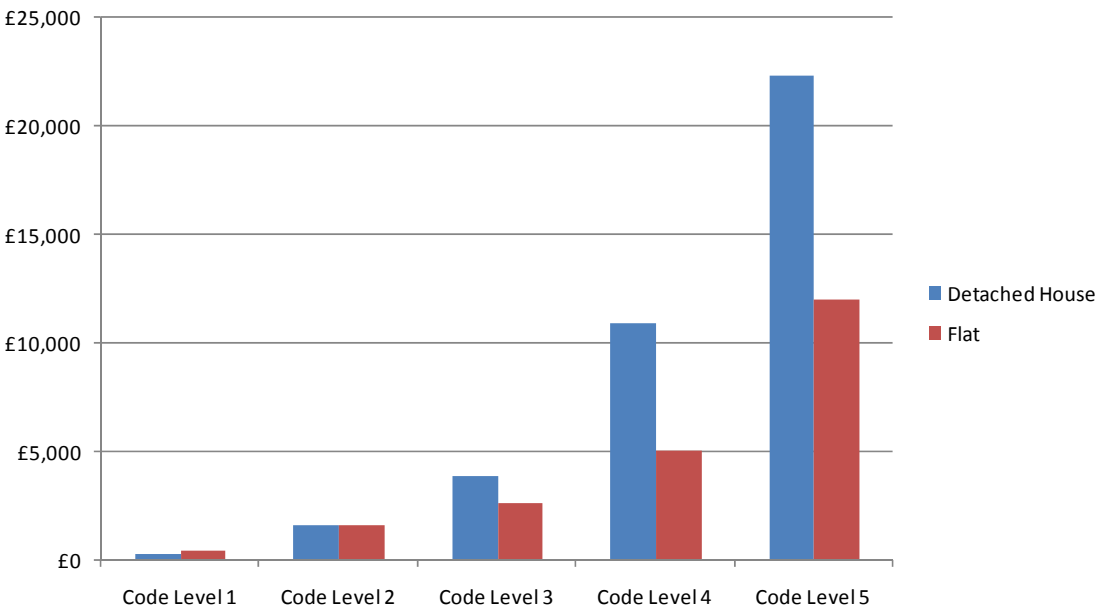


Figure 25: Cost of meeting the mandatory Energy criteria in the Code for a detached house and a flat. Code Level 6 has been excluded¹¹

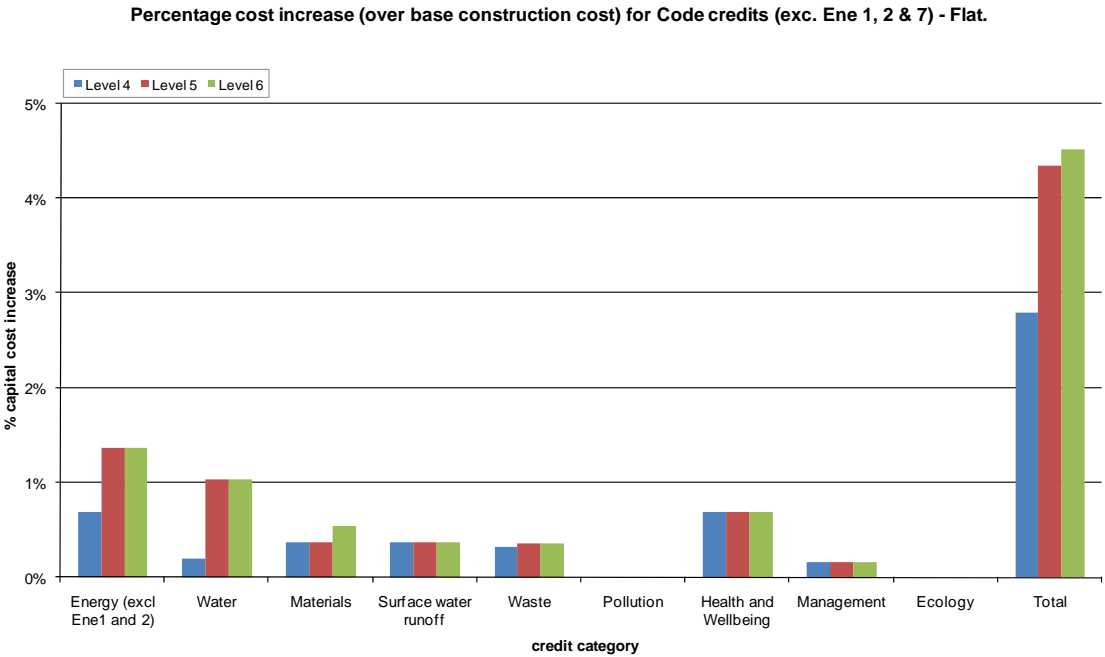


Figure 26: Costs (over base construction cost) for delivering Code credits as required to levels 4, 5 & 6 for a flat¹¹

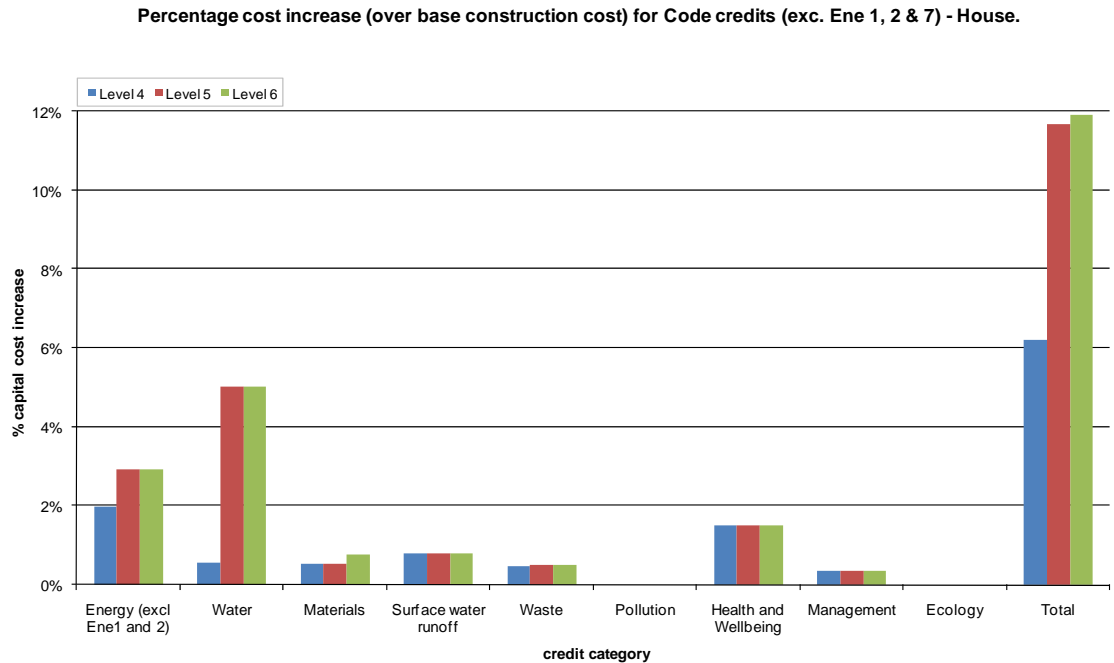


Figure 27: Costs (over base construction cost) for delivering Code credits as required to levels 4, 5 & 6 for a house¹¹

6.5.2

BREEAM

The figure below shows the percentage increase on the base build cost to deliver 'Good', 'Very Good' and 'Excellent' ratings under BREEAM Offices (2004) and BREEAM Schools^{13,14}. The cost analysis shows that the 'Very Good' level of BREEAM is achievable with a small increase to build costs, while the costs associated with BREEAM 'excellent' are much more significant.

We are not aware of any published cost data on meeting BREEAM office targets since 2004, certainly none is yet available showing the costs of delivering BREEAM Offices 2008, which contains a number of fairly significant changes, compared with earlier BREEAM versions.

¹³ Putting a price on sustainability (BRE Trust and Cyril Sweett, 2005)

¹⁴ Putting a price on sustainable schools (BRE Trust and Faithful & Gould, 2008)

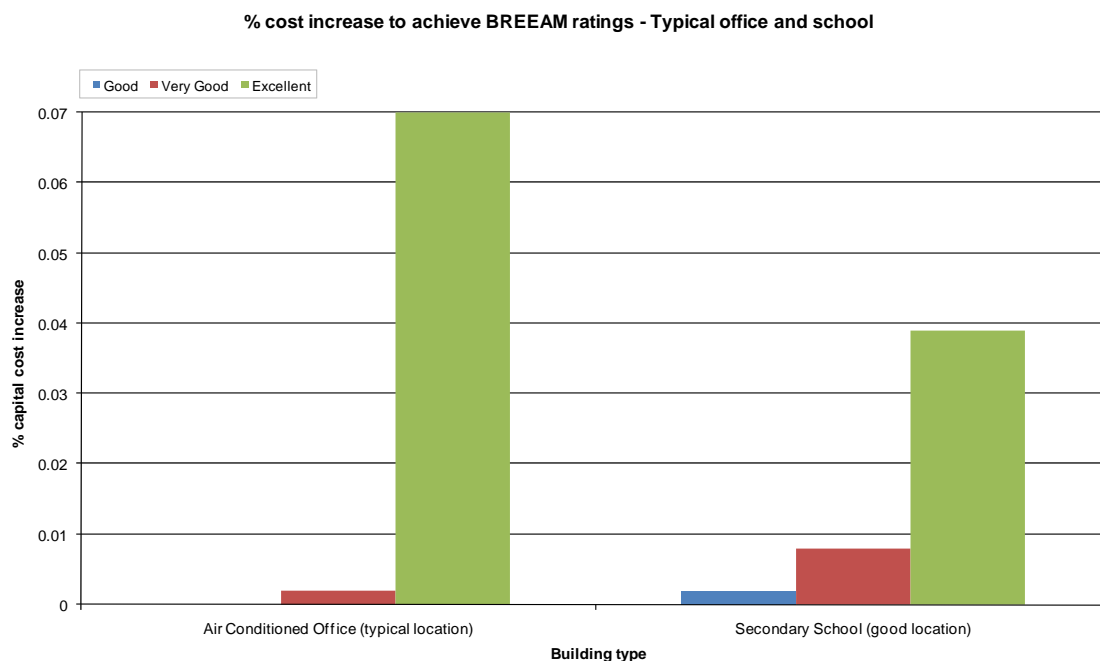


Figure 28: Costs (over base construction cost) for delivering BREEAM Offices (2004) and BREEAM schools ratings. (Source: Putting a price on sustainable schools (BRE Trust and Faithful & Gould, 2008))

6.6

Conclusions and Recommendations

- Setting requirements for delivering Code for Sustainable Homes or BREEAM standards in new development would:
 - Improve the overall environmental performance of new development
 - Deliver a level of mitigation against the potential future impacts of climate change by addressing water consumption, flood risk and surface run-off management
 - Be relatively simple to show compliance with policies and targets
- A significant proportion of the costs of delivering Code levels is in meeting the standards for CO₂ emissions, however this element will be met by other drivers:
 - The Building Regulations requirements for 2010 will require the mandatory energy standard for Code level 3 to be achieved
 - HCA have a requirement that all publically funded housing achieve Code Level 3 (moving to Code Level 4 in 2011)
 - The draft revised London Plan has proposed introducing a mandatory energy requirement equivalent to that required for Code Level 4
- The financial implications for achieving Code Level 3 and BREEAM Very Good are not significantly onerous. However, further work is recommended to establish the local circumstances which may affect a development's ability to achieve ratings, particularly if higher rating requirements were to be set for strategic sites.



Policy Testing

7 Policy Testing

7.1 Introduction

This chapter summarises the results of analysis undertaken to test the impacts and implications of a number of different policy options. The analysis was undertaken using the model described in Chapter 4. Further details on the methodology and assumptions used are contained in Appendix A.

The details of the new developments included in the model were taken from the Core Policies in the most recent revision of the draft Core Strategy. These were agreed following discussion with Enfield Council and, although they are only a projection of the possible numbers, timings and types of buildings to come forward, represent a reasonable set of data on which to assess the relative effects of different policy options.

7.2 Policies Tested

7.2.1 Existing Buildings

1. Consequential Improvements to residential properties

7.2.2 New Developments

2. CO₂ reductions expected through Building Regulations (proposed revisions)
3. 10% CO₂ improvement beyond Building Regulations
4. 20% CO₂ improvement beyond Building Regulations
5. Existing London Plan (2004, amended in 2008)
6. Draft London Plan (2009)

7.3 Findings for Improvements to Existing Buildings

7.3.1 Consequential Improvements to residential properties

The following information was received from Enfield Borough Council on 10th December 2009.

	Applications	Granted
Planning Applications	450	370
Lawful Development Certificates	190	160

Table 17: Housing extension applications received over previous 6 month period (Enfield Council, December 2009)

In order to assess the impact of this policy we have obtained information on the status of housing within the Borough from the Energy Saving Trust's (EST) HEED database (see section 3.6.1 for more details). This enables us to determine the proportion of properties that could be expected to require the improvement measures proposed. The CO₂ savings, capital costs and potential cost savings have been taken from the information on the EST website and provide indicative averages.

Improvement Measure	% of Houses which may be Suitable ¹⁵	Indicative CO ₂ Saving per House (kg) ¹⁶	Indicative cost per House ¹⁸	Indicative cost per tonne CO ₂ saved	Potential cost savings per year ¹⁸
Cavity wall insulation	11%	610	£500	~£820	£115
Solid Wall Insulation (internal)	60%	2000	£5,500-8,500	~£3,500	£380
Solid Wall Insulation (external)	60%	2100	£10,500-14,500	~£5,700	£400
Loft insulation (improvement from 0 to 270mm)	17%	800	£250-350	~£380	£150
Loft insulation (improvement from 50 to 270mm)	8%	230	£200-300	~£1,100	£45
Floor Insulation	?	270	£100	~£370	£50
New condensing boiler and heating controls	30%	1300	£2,200	~£1,700	£235
Insulation of hot water tank	18%	190	£12	~£60	35
Double Glazing (to EST recommended standard)	34%	720	varies	-	£135
Draught-proofing	?	130	£200	~£1,500	£25
Filling gaps between floor and skirting board	?	110	£20	~£180	£20

Table 18: Efficiency measures, associated costs and CO₂ savings (Source: Energy Savings Trust, HEED Database and AECOM analysis)

This information suggests that many of the possible improvement measures are relatively cheap and cost effective. However, solid wall insulation does represent a relatively expensive measure although it would address a significant issue in the Borough (with up to 60% of properties that could be in need of improvement) and deliver significant CO₂ savings.

Table 18 shows the CO₂ savings and costs associated with the application of the above measures to 740 dwellings over a year (based on only the number of granted planning

¹⁵ Source: Home Energy Efficiency Database, Energy Saving Trust (2009)

¹⁶ Source Energy Saving Trust (2009)

applications received over the last 6 months). Due to the high costs for solid wall insulation we have presented the outputs both including and excluding this measure.

Improvement Measure (assumed average cost)	Dwellings applicable based on proportions above (or estimation)	With solid wall measures		Without solid wall measures	
		CO ₂ savings per year (tonnes)	Cumulative cost per year	CO ₂ savings per year	Cumulative cost per year
Cavity wall insulation (£500)	81	49.7	£40,700	49.7	£40,700
Solid Wall Insulation (£10,000)	444	888.0	£4,440,000		
Loft insulation (£300)	185	388.5	£55,500	388.5	£55,500
Floor Insulation (£100)	74	17.0	£7,400	17.0	£7,400
New condensing boiler and heating controls (£2,200)	222	59.9	£488,400	59.9	£488,400
Insulation of hot water tank (£15)	133	173.2	£1,600	173.2	£1,600
Draught-proofing (£200)	370	266.4	£74,000	266.4	£74,000
Filling gaps between floor and skirting board (£20)	370	48.1	£7,400	48.1	£7,400
Total		1890.8	£5,115,000	1002.8	£675,000
Average per dwelling		2.56	£6,900	1.36	£900
Max per dwelling		4.80	£12,600	3.28	£3,100

Table 19: Potential CO₂ savings and costs for applying consequential improvements in Enfield
(Source: Energy Savings Trust, HEED Database and AECOM analysis)

7.4 Improvements to New Buildings

The impact of the policy options being considered for new development has been tested by considering the energy strategies that may be proposed for the typical developments listed above to demonstrate compliance. The model developed for this study compares a range of technology options and selects the cheapest option which will comply with the target in question. The modelling approach is described in detail in Appendix A.

7.4.1

Policies Tested

Following consultation with Enfield Council, the following five policies were selected for testing:

1. Building Regulations – current proposals for 2010 onwards

- 2010-2013: 25% improvement over 2006 (residential and non residential)

- 2013-2016: 44% improvement (residential and non residential)
- 2016-2019: 70% improvement (residential and non residential) + Allowable Solutions (residential only)
- 2019 on: 70% improvement + Allowable Solutions (residential and non residential)

2. Building Regulations +10%

- 2010-2013: 27.5% improvement over 2006 (residential and non residential)
- 2013-2016: 48.4% improvement (residential and non residential)
- 2016-2019: 70% improvement (residential and non residential) + Allowable Solutions (residential only)
- 2019 on: 70% improvement + Allowable Solutions (residential and non residential)

[Please note this policy has not been included in figures 27-32 because it showed only a minor variation to policy 1]

3. Building Regulations +20%

- 2010-2013: 40% improvement over 2006 (residential and non residential)
- 2013-2016: 55% improvement (residential and non residential)
- 2016-2019: 70% improvement (residential and non residential) + Allowable Solutions (residential only)
- 2019 on: 70% improvement + Allowable Solutions (residential and non residential)

4. Existing London Plan (ELP)

- Mandatory energy efficiency
- Mandatory decentralised heat if feasible
- 20% reduction in total CO₂ emissions from on-site renewable energy generation

5. Draft London Plan (DLP)

- 2010-2013: 44% improvement (residential + non-residential)
- 2013-2016: 55% improvement (residential + non-residential)
- 2016-2019: zero carbon (residential) Building Regulations (non-residential)
- 2019 on: zero carbon (residential and non-residential)

Please note: The colours in the text above are used to represent each of the policies in the following graphs.

7.4.2

Cumulative Impacts

The following graphs show the overall impacts of the policies based on the proposed development projected for the lifespan of the Core Strategy.

Figure 29 shows the impact of the policies on the CO₂ emissions likely to be associated with new development. Figure 30 puts this same graph into context with the existing emissions by showing the increases from the new development relative to the emissions from the existing buildings, this further demonstrates that the most significant CO₂ emissions reductions will come from addressing the existing buildings in the Borough.

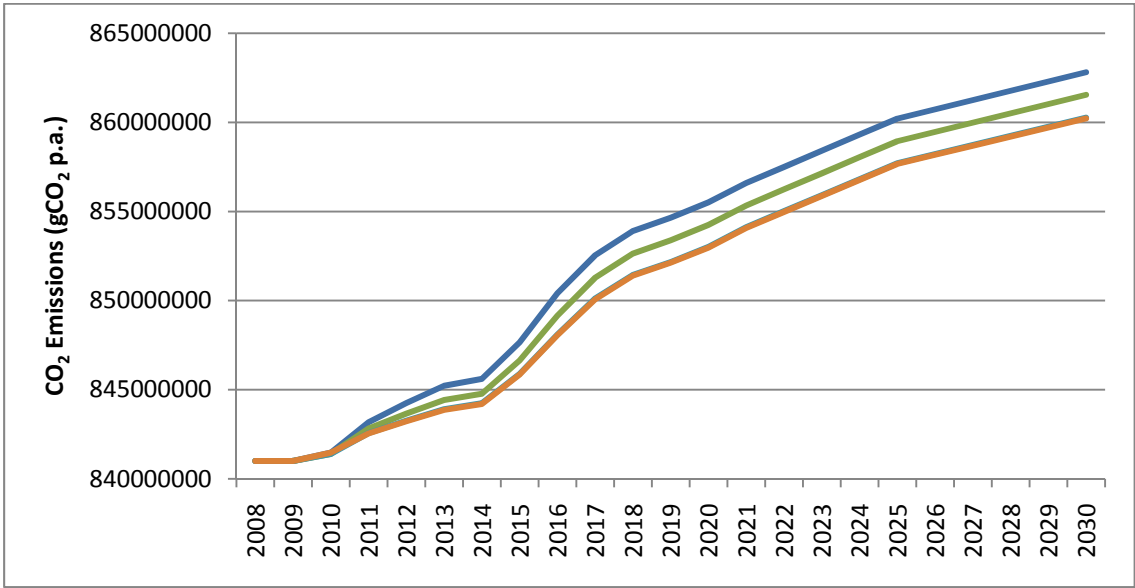


Figure 29: Modelled CO₂ emissions from new developments in Enfield based on the application of different policy options

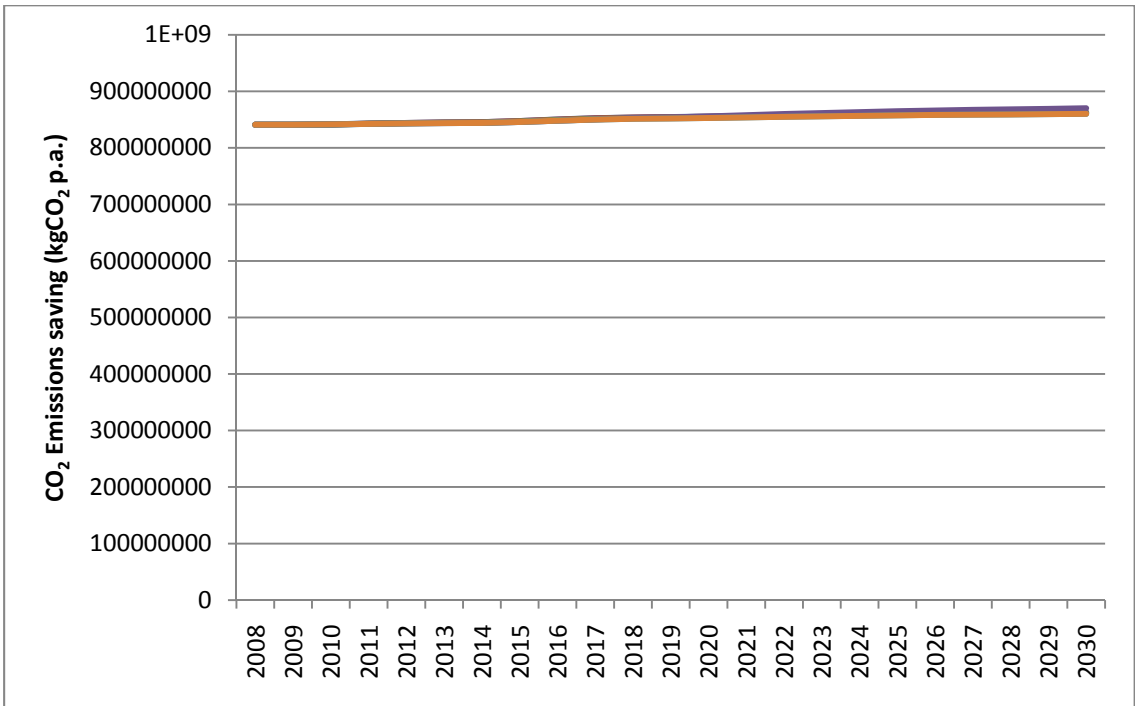


Figure 30: Modelled CO₂ emissions from all developments in Enfield based on the application of different policy options

Figure 31 shows the cumulative cost uplift of delivering the different policies, this shows that the existing and planned London Plan policies are more expensive to deliver than the building regulations and basic improvements on building regulations. This is a result of the higher targets and the requirement to deliver on-site CHP systems, which are expensive to install. However, new development will be key to kick-starting the delivery of district heating networks in Enfield, which is one of the key energy opportunities in the Borough and therefore this should not be seen as a constraint. Alternative delivery mechanisms, described in more detail in section 9, may be able to help deliver this policy and address the increased costs.

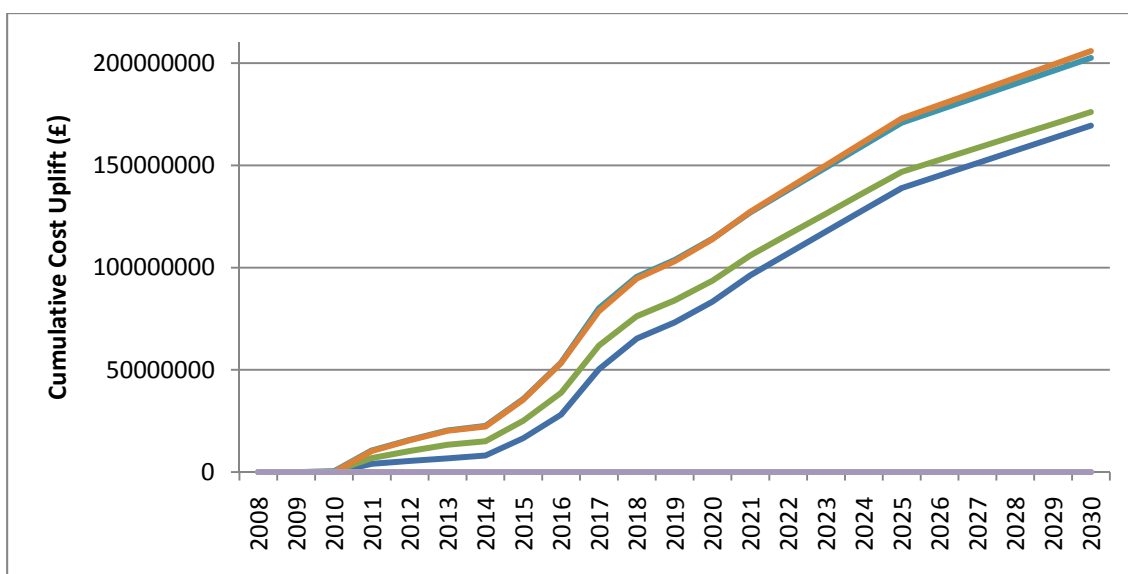


Figure 31: Modelled additional costs for delivering new development in Enfield following the application of different policy options

Figure 32 shows the projected demand for thermal fossil fuel following the application of the different policy options. The building regulations policy initially has a higher demand than existing and planned London policies but these increase over time as a result of the additional requirements of these policies to introduce gas-CHP. The policy requiring a 20% improvement over building regulations, which does not have a driver for gas-CHP, has a much lower fossil fuel requirement because of the incentive to use biomass as a cheap way to meet the policy requirements.

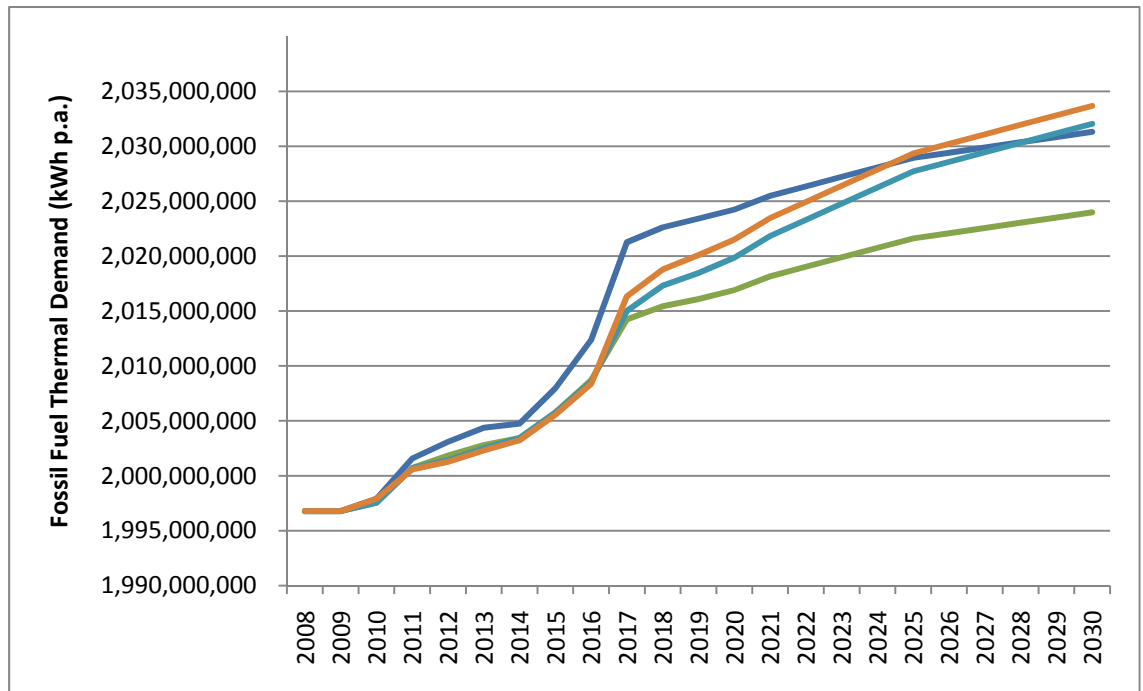


Figure 32: Modelled fossil fuel demands from developments in Enfield based on the application of different policy options

Figure 33 shows the projected demand for electricity following the application of the different policy options. The London Plan policies show a reduction from the building regulations policy, which is likely to result from the increased use of CHP and PV that would result from the higher targets and specific requirements for CHP.

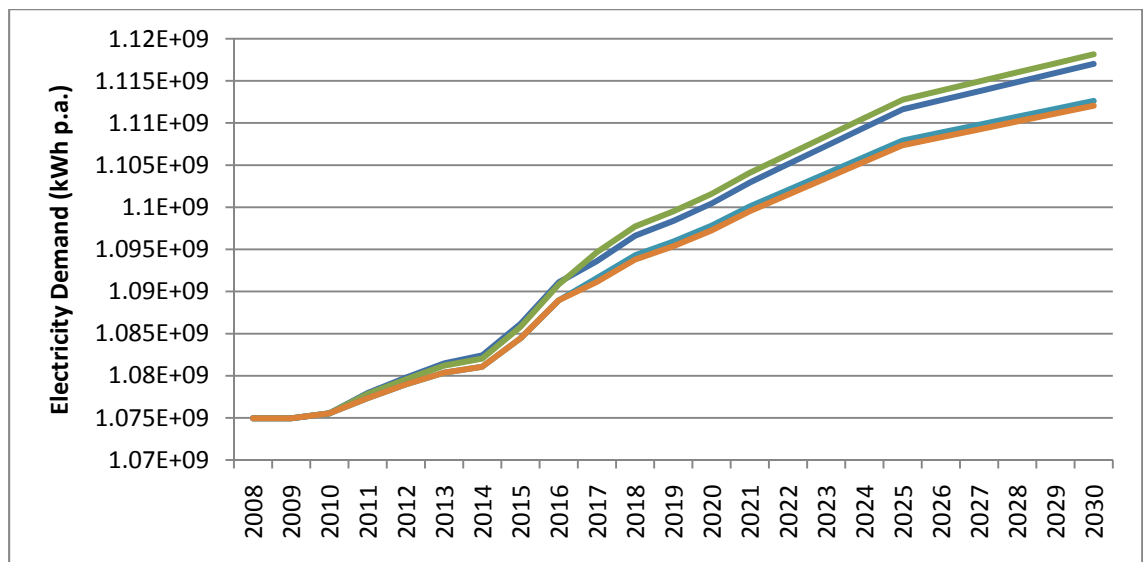


Figure 33: Modelled electricity demands from developments in Enfield based on the application of different policy options

Figure 34 shows the projected demand for biomass fuel following the application of the different policy options. This suggests that the more onerous policies will favour the use of biomass because it is a cheaper option for meeting the higher CO₂ reduction requirements, although the

difference between the policy options is relatively small. The implications of this will be the availability of biomass to supply these demands if they are realised. The opportunities mapping in section 5 suggests that Enfield has the potential to create supply chains as well as utilise existing arboricultural waste streams and potentially the proposed North London wood fuel hub.

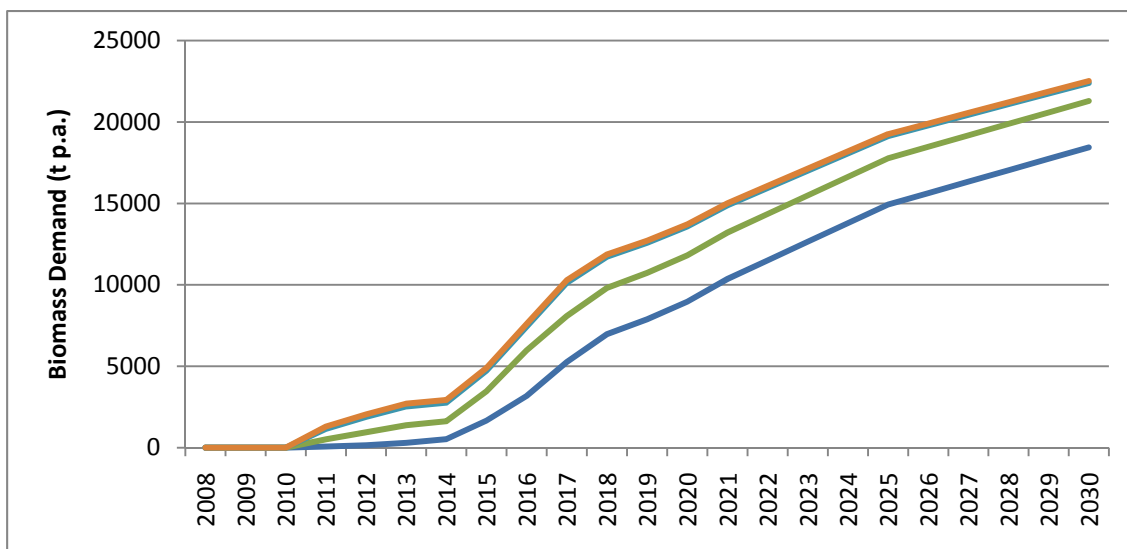


Figure 34: Modelled biomass demands from new developments in Enfield based on the application of different policy options

The Government's proposed methodology for delivering zero carbon buildings (see 3.5.1) would potentially allow the Borough to create a fund to deliver strategic energy infrastructure initiatives. Once buildings have implemented the mandatory energy efficiency and carbon compliance requirements, the remaining emissions must be met through 'allowable solutions'. We have assumed that the Borough may wish to use this measure to create a fund.

Figure 35 shows the projected allowable solutions fund following the application of the different policy options. There is relatively little difference between the policies, since the allowable solutions fund opens in 2016 for all policies. The size of the fund generated in the 'existing London plan' scenario appears to be lower than the other options, this may be because it has a specific requirement for renewable energy generation and may therefore require more to be achieved on site.

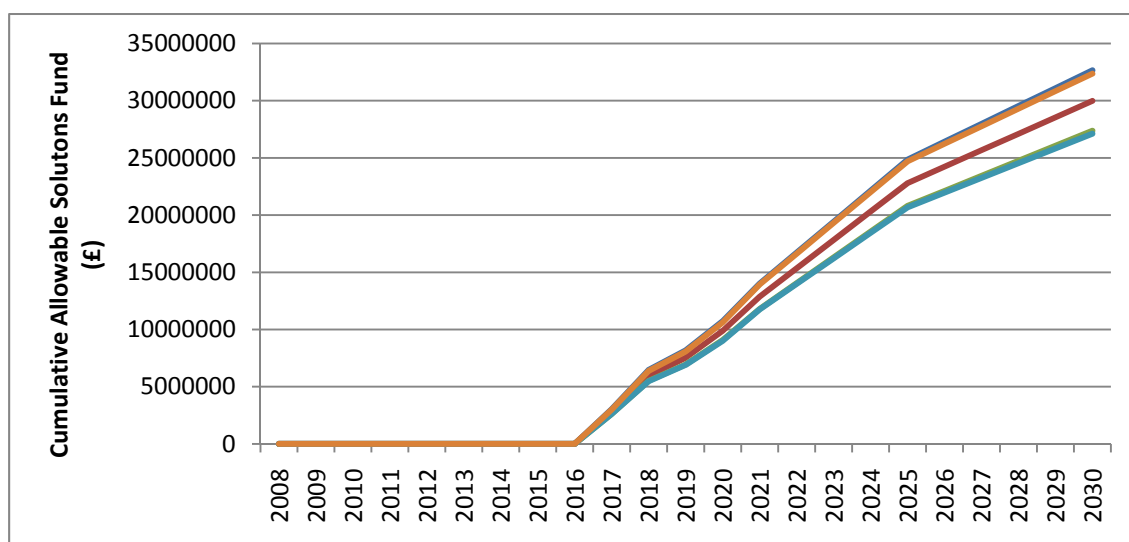


Figure 35: Modelled allowable solutions fund based on the application of different policy options

7.4.3

Policy Compliance Requirements

The following tables show the predicted design solutions, based on lowest capital cost, for meeting the proposed policy options for a range of different buildings.

Key to technologies referenced in the tables below (a more detailed key and description of these technologies is included in Appendix A): EE1 = Energy Efficiency ('best practice'); EE2 = Energy Efficiency ('advanced practice'); PV = Photovoltaics; SWH = Solar Water Heating; B = Biomass; gCHP = Gas-CHP; bCHP = Biomass-CHP; AS = Allowable solutions

DETACHED DWELLING*			
Policy	2010-2013	2013-2016	2016 onwards
1	EE2	PV+EE1	B+PV+EE1+AS
2	SWH	PV+EE1	B+PV+EE1+AS
3	PV	B+EE1	B+PV+EE1+AS
4	B+PV+EE1	B+PV+EE1	B+PV+EE1+AS
5	B+PV+EE1	B+PV+EE1	B+PV+EE1+AS

Table 20: Modelled technology choices (based on least cost) for a new detached dwelling complying with different policy options

2-BED FLAT*			
Policy	2010-2013	2013-2016	2016 onwards
1	SWH	PV+EE2	B+PV+EE1+AS

2	SWH	PV+EE2	B+PV+EE1+AS
3	SWH	B+PV+EE1	B+PV+EE1+AS
4	B+PV+EE1	bCHP+PV+EE1+AS	bCHP+PV+EE1+AS
5	B+PV+EE1	bCHP+PV+EE1+AS	bCHP+PV+EE1+AS

Table 21: Modelled technology choices (based on least cost) for a new 2-bed flat dwelling complying with different policy options

OFFICE*				
Policy	2010-2013	2013-2016	2016-2019	2019 onwards
1	B+EE1	B+EE1	B+PV+EE1	B+PV+EE1+AS
2	B+EE1	B+PV+EE1	B+PV+EE1	B+PV+EE1+AS
3	B+EE1	B+PV+EE1	B+PV+EE1+AS	B+PV+EE1+AS
4	B+PV+EE1	gCHP+B+EE1	bCHP+EE1	gCHP+B+PV+EE1+AS
5	B+PV+EE1	gCHP+B+EE1	bCHP+EE1	gCHP+B+PV+EE1+AS

Table 22: Modelled technology choices (based on least cost) for a new office building complying with different policy options

NON FOOD SHOP*				
Policy	2010-2013	2013-2016	2016-2019	2019 onwards
1	B+EE1	B+EE1	B+PV+EE1	B+PV+EE1+AS
2	B+EE1	B+EE1	B+PV+EE1	B+PV+EE1+AS
3	B+EE1	gCHP+B+EE1	B+PV+EE1	B+PV+EE1+AS
4	gCHP+B+EE1	gCHP+B+EE1	B+PV+EE1	B+PV+EE1+AS
5	gCHP+B+EE1	gCHP+B+EE1	B+PV+EE1	B+PV+EE1+AS

Table 23: Modelled technology choices (based on least cost) for a new retail building complying with different policy options

**Details of all the unit types modelled can be found in Appendix 1*

7.4.4

Individual Unit Testing

Figures 36-41 show the CO₂ emissions savings and capital cost uplift over the lifetime of the Core Strategy following the application of the different policy for four different building types.

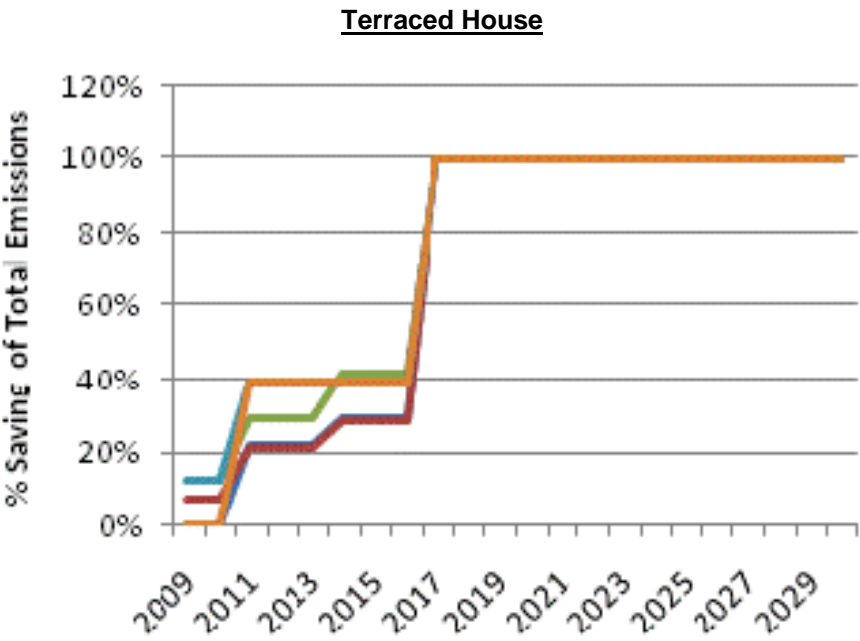


Figure 36: Modelled CO₂ emissions reductions in a terraced house for the different policy options over the course of the Core Strategy

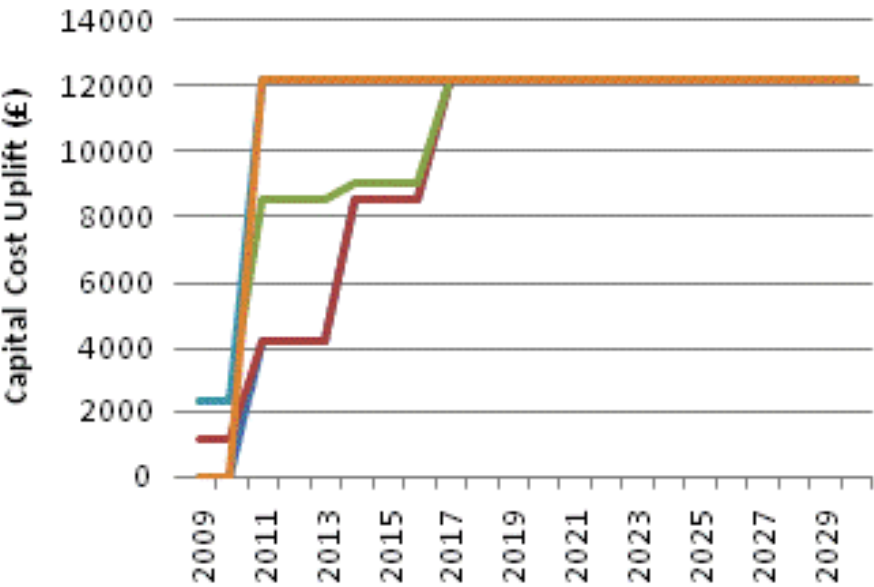


Figure 37: Modelled cost uplift for a terraced house for the different policy options over the course of the Core Strategy

General Office

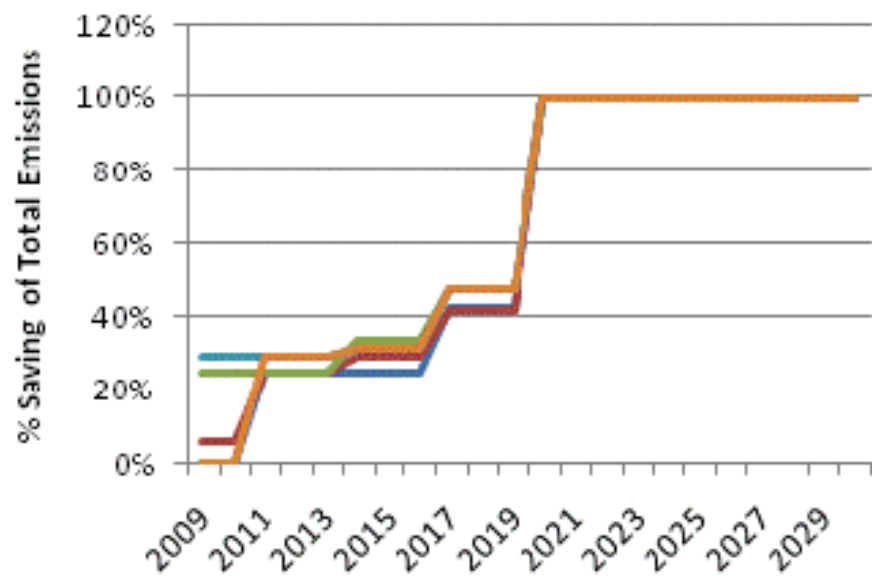


Figure 38: Modelled CO₂ emissions reductions for new general office buildings for the different policy options over the course of the Core Strategy

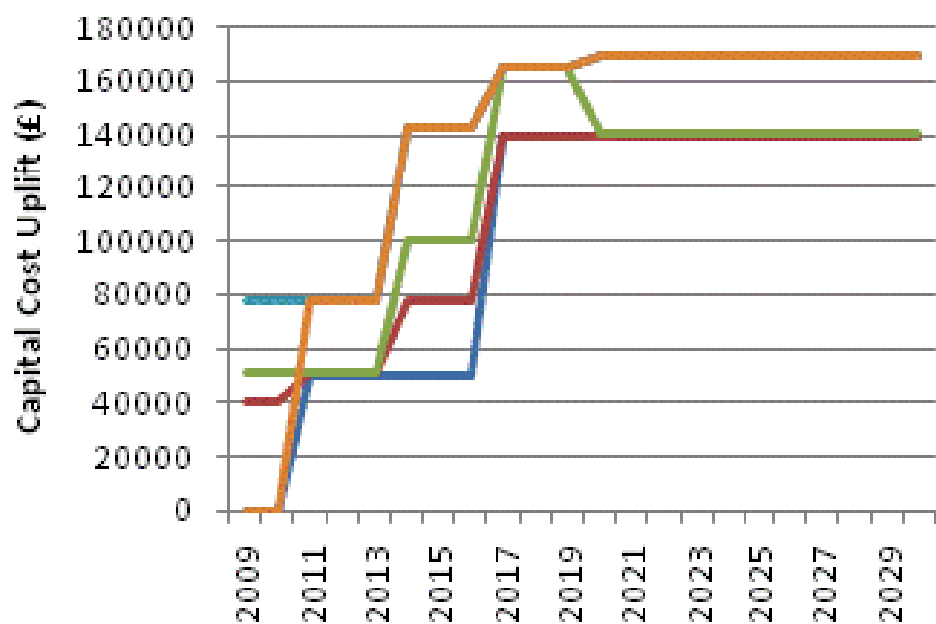


Figure 39: Modelled cost uplift for a new office building for the different policy options over the course of the Core Strategy

Industrial workshop

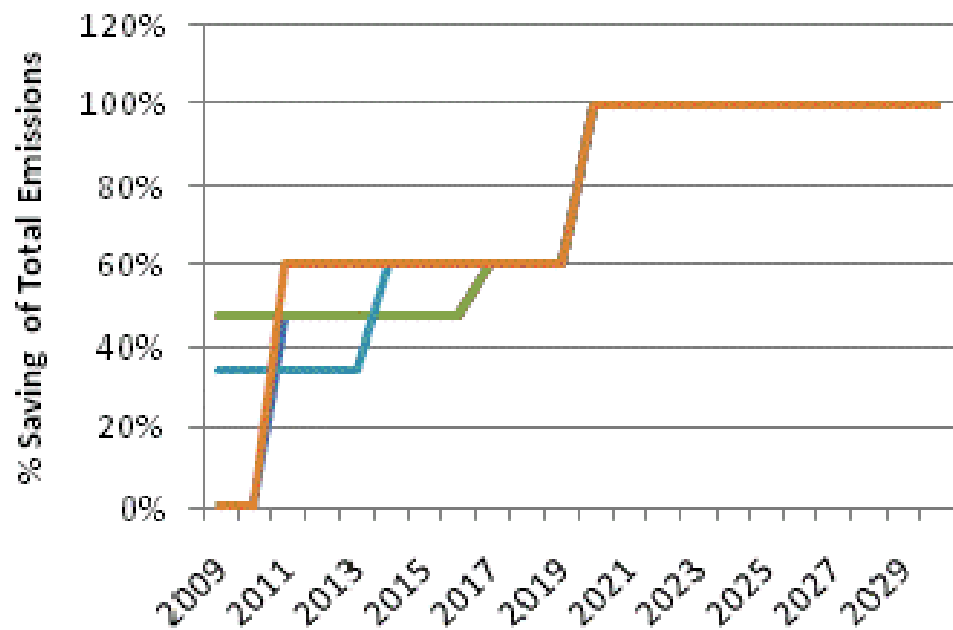


Figure 40: Modelled CO₂ emissions reductions in an industrial workshop for the different policy options over the course of the Core Strategy

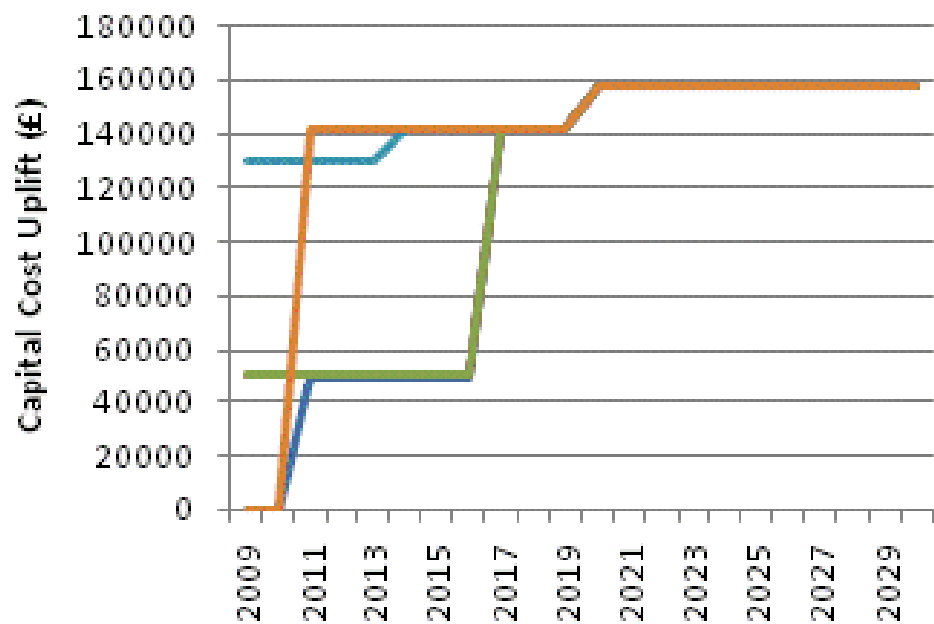


Figure 41: Modelled cost uplift for an industrial workshop for the different policy options over the course of the Core Strategy

These figures show that there is an increase in the cost of delivering the proposed London Plan compared to the Building Regulations base case but that there is also an increase in the CO₂ saving. The relative difference between the different policies varies for different building types but as a result of the sharp trajectory in the Building Regulations improvements, the implications of the policies converge when the Zero Carbon requirement is reached.

7.5 Key Findings and Recommendations

Existing Development

The impact of applying a consequential improvement policy for existing homes has been tested by reviewing the potential number of applications that would be covered by such a policy and then applied improvement measures based on information on a sample of existing homes in Enfield taken from ESTs HEED database. Existing commercial properties were not tested since the Building Regulations will require this.

The study shows that there is a significant potential to deliver CO₂ savings for relatively little cost, depending on the measures required. The average estimated CO₂ saving per dwelling is 1.36 tonnes at an average cost of £900 for the proposed improvement measures (excluding external wall improvements). Based on the assumptions we have taken this could result in a cumulative reduction in CO₂ emissions in the Borough of 1000 tonnes over the course of a year.

Given the importance of addressing the existing private housing stock to deliver reduced energy consumption and CO₂ emissions in Enfield (as detailed in section 3), this method represents a significant opportunity.

New Development

The impact of the policy options being considered for new development has been tested by considering how the energy strategies that may be proposed by typical developments are likely to demonstrate compliance. The model developed for this study compares a range of technology options and selects the cheapest option which will comply with the target in question. The modelling approach is described in detail in Appendix A.

The impact of each policy, in terms of technologies selected, CO₂ emissions saved and cost per unit of development, depends on which year a development comes forward for planning permission and which energy opportunities are available.

Residential Buildings

There is only a relatively small difference in the CO₂ savings associated with the base case policy of compliance with building regulations and the most stringent policies of compliance with the current London Plan, particularly when put into context against the total emissions from the entire building stock within the Borough

The proposed changes to Building Regulations, up to and including the introduction of the zero carbon requirement for homes in 2016 and for other buildings in 2019, is a significant driver and is likely to result in a significant increase in costs for developers.

The additional improvements proposed in the other policies tested only result in a relatively small decrease in CO₂ emissions and the additional costs are also relatively minor because of the limited time lapse before they are met by building regulations, which is on a par by 2016 /2019. However, the current and proposed replacement London Plan policies would promote the use of district heating infrastructure sooner than Building Regulations. This would assist in the long term to address the existing building stock as well as providing a network for new buildings to connect to, which will be particularly important when the zero carbon requirements are in place.

For residential developments, there are feasible options for complying with all policies. Against building regulations, residential dwellings were found to comply by using micro- generation systems (combining one or more of solar water heating, energy efficiency and PV) in the short term 2010-2016. Against the proposed London Plan policy decentralised energy systems using biomass or gas CHP were found to be the favoured options during the same period as cheaper options for delivering the higher targets. This suggests that the higher targets could promote the use of district energy systems.

The use of biomass is favoured due to the relatively low costs compared to the alternative options. However, the entire Borough of Enfield has been declared an Air Quality Management Area (AQMA) and therefore the acceptable use of biomass will depend on the location of the development and the ability of the developer to demonstrate that the system will not adversely affect the air quality of the local area.

The on-site carbon compliance element of the zero carbon requirement post-2016 is likely to be met by the use of highly energy efficient design and biomass or gas CHP systems in combination with one or more of biomass heating and PV.

Most of the major development sites will support the use of gas CHP, however the smaller sites (less than 100 dwellings) for which a CHP system is unlikely to be viable are likely to require biomass heating systems to comply with the higher CO₂ reduction targets and, where necessary, the requirements to enable future connection to a district heating system.

Our modelling indicates that where residential developments are able to connect to an existing district heating network, powered by waste heat from another source such as a large power station, this could reduce CO₂ emissions from residential development by around 45%. The district heating infrastructure would cost between £1,500 and £5,500 per dwelling, depending on type. This infrastructure may need to be provided by the Council, the supplier of heat or a third party, but the developer could be asked for a contribution towards the costs. Each dwelling would need a heat interface unit and meter, costing around £2,300 – similar to the installed cost of a new gas boiler. This represents a very cost effective solution but there are no networks currently in Enfield and the opportunity for connection to the EOn power station or the Edmonton Incinerator are not currently available. However, this conclusion should present an incentive for fully exploring these opportunities (Chapter 9 explores this in more detail).

Small wind turbines (15kW) have the potential to deliver higher CO₂ savings than all other technological options selected, for a lower cost, although this option will only be feasible in limited locations due to spatial constraints.

Large residential developments in suitable locations may find that investment in a large wind turbine is a cheaper option for achieving the zero carbon requirement post 2016. However, due to the requirement for an 800m distance between these turbines and the nearest residential property, few if any residential developments may be able to install one on-site and opportunities to install a turbine on adjacent land is also likely to be limited.

Viability will depend on a range of factors which are beyond the scope of this study to determine. These include land and market values of properties at the time of the planning application. The findings presented in this report should therefore be compared alongside the Affordable Economic Housing Viability Assessment and the Housing Market Assessment.

The method of financing the decentralised renewable and low carbon energy technologies will also influence viability. Financing mechanisms are discussed further in Chapter 9 and Appendix C.

Non-Residential Buildings

Our analysis indicates that some non-residential developments on a constrained site would struggle to achieve the zero carbon requirement under the Building Regulations from 2019 onwards, based on the current definition of zero carbon for dwellings. However, our model is based on flat rate CO₂ emissions, whereas the proposals for Building Regulations and the new London Plan, is to adopt an aggregate approach, where some building types have higher requirements than others in order to deliver the targeted saving across all building types.

The technologies that might be proposed on energy constrained sites are similar for all types of non-residential development considered in this analysis. Because the scale of development and the relative heat and electricity demand differs for an office compared to a workshop or storage facility, the percentage CO₂ savings that these technologies could deliver varies.

Biomass heating is likely to be the preferred option for complying with all policies, as the capital cost is relatively low and it is able to deliver a high contribution to CO₂ savings, although its use could be constrained by air quality issues. A combination of advanced energy efficiency and PV could achieve similar CO₂ emissions reductions, but is significantly more expensive.

Connection to an existing district heating network would offer the cheapest route to compliance but, as previously discussed, this option is not currently available.

For smaller non-residential developments, small wind turbines have the potential to deliver high CO₂ savings, although they will only be feasible in limited locations due to constraints and spatial requirements. Larger developments, particularly in North East Enfield or Central

Leeside, may be able to deliver large scale wind turbines, which would aid compliance especially for the more stringent policy requirements post 2019.

7.6 Site-Wide Impacts

To further assess the impact of the proposed policies on developments in Enfield we have looked at the impact upon a selection of proposed development sites.

7.6.1 Case Study 1- Ponders End

Development Proposals

The proposed development plans for the Ponders End Pace Shaping Priority Area is set out in the Ponders End Framework for Change consultation document. The consultation document highlights three key development areas:

- 1 – Ponders End Central
- 2 – Ponders End South Street Campus
- 3 – Ponders End Waterfront



Figure 42: Key Development Areas in Ponders End (Ponders End: A Framework for Change)

The proposed development for these three sites is set out in the draft framework for change consultation document. Using this information we have based our projections on the following potential development proposals:

Development Type	Location	Scale	Timing
Mixed use	01 – Middlesex University/High Street	600 residential units	2014-2018

Mixed Use	03	400 residential Units	2014-2018
Industrial	03	15,000sqm (across AAP)	2010-2025
Academy school	02	10,000sqm	2010-2011
Healthcare	?	500sqm	2015-2016
Other Community Facilities	01	5000sqm	2014-2018

Table 24: Development proposed for Ponders End

Local Energy Options

From the energy opportunities plan it is clear that the primary opportunity will be to deliver district heating but there is also the potential to deliver small to medium scale wind turbines and also, in the longer term, utilise waste heat from the EOn power station.



Figure 43: Excerpt of the Ponders End Place Shaping Priority Area (for key and wider context please refer to Map 18)

Solutions identified to comply with tested policies

Site 1 – Ponders End Central

The following tables show the likely lowest cost options identified for delivering the residential elements of the proposed Middlesex University/High Street development.

DWELLING CONSTRUCTED AFTER 2013				
Policy	CO ₂ reduction solution	Capital Cost (£)	Cost per dwelling	% CO ₂ Saving (regulated)
1 & 2	PV - medium installation + EE2	£5,505,503	£9,000	58%
3,4 & 5	Biomass heating + PV (minimum) + EE1	£7,821,610	£13,000	80%

Table 25: Options for meeting the different policy options for dwellings constructed after 2010

Dwellings built after 2016

DWELLING CONSTRUCTED AFTER 2016				
Policy	CO2 reduction solution	Capital Cost (£)	Cost per dwelling	% CO ₂ Saving (regulated)
All policies	Biomass heating + PV (minimum) + EE1 + Allowable Solutions Contribution	£10,040,459	£16,700	80%

Table 26: Options for meeting the different policy options for dwellings constructed after 2013

Biomass is likely to present a popular solution because it is the cheapest option for complying with the targets. However the whole of Enfield is within an AQMA and, because the draft Mayor's Air Quality Strategy suggests that Biomass Boilers may not be suitable in areas with a declared AQMA, an assessment would need to be carried out to demonstrate that there were no detrimental impacts on local air quality.

Site 2 – Ponders End South Street Campus

The following table shows the possible technology options for meeting the tested policies for the proposed Academy (assuming a build year of 2011):

CO ₂ reduction solution (including EE1)	Capital Cost (£)	% CO ₂ Saving (total)	% CO ₂ Saving (regulated)	Policy Compliance				
				1	2	3	4	5
Biomass Heating	£210,200	42.9	57.7					
Gas CHP + Gas Boilers	£1,300,000	30.8	41.4					
Gas CHP + Biomass Boiler	£1,420,000	54.4	73.2					
PV	£1,280,00	33.0	44.4					
SWH	£400,000	19.6	26.4					

Table 27: Options for meeting the different policy options for the proposed academy at ponders end

Again, biomass heating is likely to be the preferred solution for the proposed Academy because it has the lowest capital costs although it would be subject to the same assessment requirements to demonstrate the air quality impacts were not detrimental to local receptors.

7.6.2

Case Study 2 - New Southgate

The proposed development at New Southgate will comprise the redevelopment of the Ladderswood Estate as well as the development of the Western Gateway and the wider New Southgate area. This case study addresses the proposed new units being delivered as part of the Ladderswood Estate redevelopment.

As part of an exercise to identify known sites likely to be developed over the lifetime of the Local Development Framework it has been estimated that the site may support 241 new dwellings, to be constructed between 2011 and 2016, in addition to 116 houses being re-provided. These figures have been used to assess the likely solutions required for compliance with the policies tested.

Year	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	TOTAL
Dwellings to be delivered	48	48	48	48	49	241

This projected programme would mean that the dwellings are delivered under two different 'regulatory periods' 2010 Building regulations, which would be enforced between 2010 and 2013, and the 2013 Building regulations, which would be enforced between 2013 and 2016. The development would therefore need to be designed to ensure that dwellings built in the later phase have the ability to meet the higher targets required.

Local Energy Options

The energy opportunities and constraints analysis has shown that parts of the New Southgate Place Shaping Priority Area could have the density of heat demand required to make district heating systems viable. There is also an existing communal heating system in the Ladderswood Estate.

The proposed redevelopment of the area would present the opportunity to plan for the inclusion of energy infrastructure, including energy centres and district heating pipework routes.

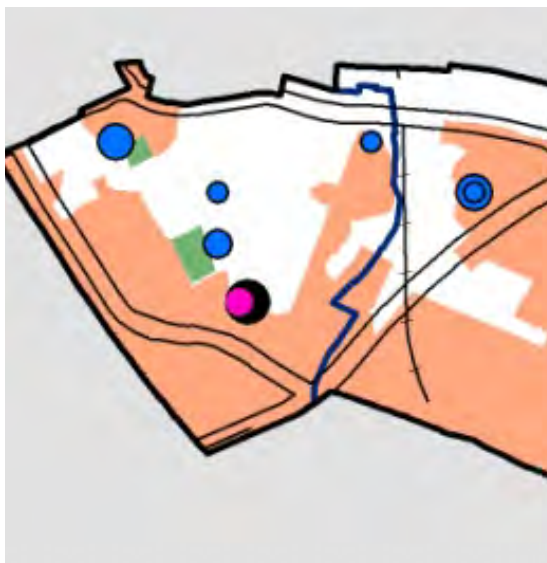


Figure 44: Excerpt of the New Southgate Place Shaping Priority Area (for key and wider context please refer to Map 20)

The scale and diversity of the wider development proposals for New Southgate are likely to make a district heating network both technically and financially viable.

Micro-generation technologies such as solar water heating and photovoltaics are also likely to be feasible for development within this area but their scope will depend on the location and design of the proposed development.

Solutions identified to comply with tested policies

Dwellings constructed between 2010 and 2013				
Policy	CO ₂ reduction solution	Capital Cost (£)	Cost per tCO ₂ (£/tCO ₂)	% CO ₂ Saving (regulated)
1&2	Solar Water Heating + EE1	£1,059,742	£6,751	38%
3	Biomass heating + EE1	£2,268,742	£8,645	64%
4 & 5	Biomass heating + PV (minimum) + EE1	£3,141,680	£9,563	80%

Table 28: Options for meeting the different policy options for dwellings constructed between 2010 and 2013

Dwellings constructed between 2013 and 2016				
Policy	CO ₂ reduction solution	Capital Cost (£)	Cost per tCO ₂ (£/tCO ₂)	% CO ₂ Saving (regulated)
1&2	PV - medium installation + EE2	£2,211,377	£9,324	58%
1	PV - medium installation + EE2	£2,211,377	£9,324	58%
2	Biomass heating + PV (minimum) + EE1	£3,141,680	£9,563	80%
3	Biomass heating + PV (minimum) + EE1	£3,141,680	£9,563	80%
4	Biomass heating + PV (minimum) + EE1	£3,141,680	£9,563	80%
5	Biomass heating + PV (minimum) + EE1	£3,141,680	£9,563	80%

Table 29: Options for meeting the different policy options for dwellings constructed between 2036 and 2016

The Ladderswood Estate together with the development in the Western Gateway site and the wider New Southgate area has the potential to create the building blocks of a wider decentralised energy network in this area of the Borough. It is therefore important that the design of the Ladderswood estate is compatible with this future vision. This is likely to require the development to incorporate communal heat distribution linked to either a single energy centre serving the site or separate communal systems in each block.

Looking at the Ladderswood Estate separately, current proposal are likely to be at the lower end of viability for the implementation of a district energy network served by CHP, because of the scale of the heat demands and the diversity, although this will depend upon the final density, masterplan and building designs proposed. The viability can potentially be improved if the design of the scheme is approached with the view to maximising the potential for delivering a decentralised energy, for example by designing a layout that makes the potential pipe network more efficient. However, a more robust viability assessment will only be possible when more details are known of the exact development plans.

7.6.3 Case Study 3 – Enfield Town Health Centre

Based on the policies within the Core Strategy, the following development is planned for the area around Enfield Town Station Place Shaping Priority Area:

Development Type	Scale	Timing
Residential Dwellings	500 units	2014-2018
Retail	35,000 sqm	2010-2025
Community provision	5000 sqm	2014-2018
Office	11,000 sqm	2010-2018
Health Centre	2000 sqm	2016-2017

Table 30: Development proposed for the Enfield Place Shaping Priority Area

This case study looks at the possible compliant options for delivering the proposed Health Centre Hub.

Energy Opportunities

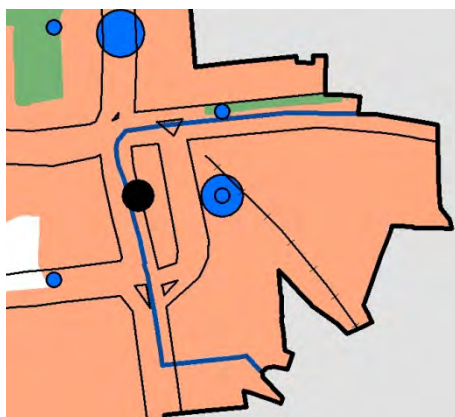


Figure 45: Excerpt of the Enfield Town Place Shaping Priority Area (for key and wider context please refer to Map 21)

Due to the density of the Enfield Town Place Shaping Priority Area the main energy opportunity will be for district heating. There are a number of public buildings in the area including the Civic Centre, which has the potential to be an attractive anchor load for an energy network because it has a significant heating demand in addition to being a public building and therefore more likely to be able to enter into a long-term utility contract.

The redevelopment of the area would present the opportunity to plan for the inclusion of energy infrastructure, including district heating pipework. The scale and diversity of the redevelopment proposed would support the technical and financial viability of such a project and this could be enhanced if large existing loads from public buildings were also connected.

Micro-generation technologies such as solar water heating and photovoltaics are also likely to be feasible for development within this area but their scope will depend on the location and design of the proposed development

Solutions identified to comply with tested policies

Based on the proposed size and planned delivery date of the Health Centre the possible options for delivering compliance with the tested policies is shown in the following table:

CO ₂ reduction solution (including EE1)	Capital Cost (£)	% CO ₂ Saving (total)	% CO ₂ Saving (regulated)	Policy Compliance				
				1	2	3	4	5
Biomass Heating	£50,200	38.5	55.2					
Gas CHP + Gas Boilers	£240,000	27.6	39.6					
Gas CHP + Biomass Boiler	£260,000	48.8	70.0					
PV (medium)	£433,000	40.2	57.6					

Table 31: Options for meeting the different policy options for the proposed Health Centre in Enfield Town

Although the costs are high, a significant proportion of the cost for gas CHP solutions relates to the plant and infrastructure required. If a district energy system was put in place the costs for simply connecting to the network would be much lower.

7.6.4

Case Study 4 – Truro House

[Please note that the number of dwellings quoted in this case study have been taken from a housing trajectory document in 2009 and may not reflect the number of dwellings proposed when the development is taken forward]

Truro House is located within the North Circular strategic growth area. As part of an exercise to identify known sites likely to be developed over the lifetime of the Local Development Framework it has been estimated that the site may support 26 new dwellings and be constructed in 2011-2012 (although these details are purely indicative for the purposes of this exercise)



Figure 46: Location of Truro House

The site (in red) currently houses a listed building that is not currently used. Opposite to the site at the north is a high school (green) and to the east is New Southgate Library (blue), which has also been highlighted as a site for redevelopment, with the possibility of supporting around 27 new dwellings.

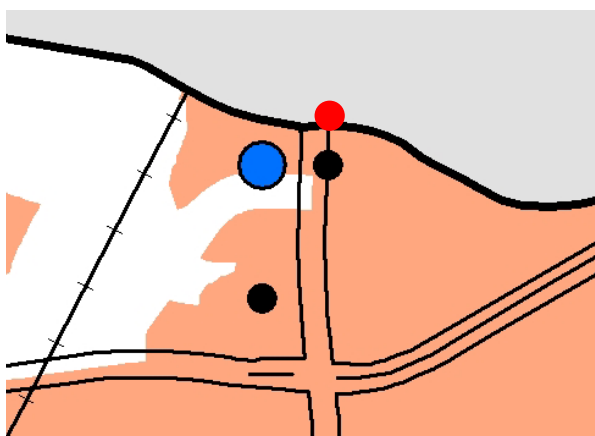


Figure 47: Excerpt from the Energy opportunities and constraints in the North Circular and New Southgate areas (for key and wider context please refer to Map 20)

The energy opportunities map shows that there is a heat density around the site that could support the use of decentralised energy systems. The adjacent library (shown as a blue circle)

and the school (not shown in this map but shown in the Borough-wide Energy Opportunities Plan) have high heat demands.

Solutions identified to comply with tested policies

The following table shows the solutions that our model predicts would be compliant for each of the policy scenarios, assuming construction starts in 2011/2012:

Policy	CO ₂ reduction solution	Capital Cost (£)	Cost per tCO ₂ (£/tCO ₂)	Cost per dwelling (£ est.)	% CO ₂ Saving (regulated emissions)
1 & 2	Solar Water Heating + EE1	£114,300	£6,750	£4,400	38%
3	Biomass heating + EE1	£244,800	£8,650	£9,400	64%
4 & 5	Biomass heating + PV (minimum) + EE1	£338,900	£9,600	£13,000	80%

Table 32: Options for meeting the different policy options for a development at Truro House

The scheme is not large enough to support a CHP system but a communal system using either biomass or combined with a communal solar water heating would provide the potential for future connection to a district energy system. The proximity of the neighbouring high school and the possible future development site at Southgate Library, together with the wider development planned for the North Circular, would present the opportunity for future connections to be made.

The use of biomass could be constrained by the air quality implications, particularly as a small boiler (in the region of 100kW) would be required and the draft Mayor's Air Quality Strategy suggests that these may not be suitable in areas with a declared AQMA. If a biomass system was to be pursued therefore, the system would need to be designed to reduced emissions and an assessment would need to be carried out to demonstrate that there were no detrimental impacts on local air quality.



Proposed Policies

8 Proposed Policies

8.1 Introduction

The following set of policies is recommended to assist in delivering the energy opportunities identified in this study. The policies have been developed based on the outcomes of the policy testing described in the previous chapter and with consideration of the technical feasibility and impact on development cost.

8.2 Proposed Policy 1: Support for decentralised low and zero carbon technologies in line with the Energy Opportunity Plan

8.2.1 Proposed Policy Wording

Enfield Borough Council are seeking to reduce CO₂ emissions and increase the supply of decentralised renewable and low carbon energy with the Borough. The Energy Opportunities Plan shows the potential application of different technology solutions. Planning applications for new development will need to demonstrate how they contribute to delivery of the current Energy Opportunities Plan. Applications for all types of decentralised renewable and low carbon energy will be considered favourably by the Council.

The Council recognises that different energy technologies and CO₂ reduction strategies will suit different parts of the district and different types of development. To reflect this three 'energy opportunity areas' have been defined. Where possible, the Council will work with developers to help deliver energy opportunities beyond the development boundary:

Potential for District Heating	<ul style="list-style-type: none"> ■ Designated District Heating Priority Areas (as shown on the EOP) ■ All sites to connect to district heating network where available, or be able to connect in future ■ Large residential and mixed use sites to install site wide heating network ■ Large residential and mixed use sites to use waste heat from nearby sources where available, or install on-site heat source ■ Land may be required to be set-aside for energy centre to house equipment (e.g. boiler plant, CHP engine, pumps) ■ Payment into a fund if the above policies are not feasible or viable
Potential for Wind Turbines	<ul style="list-style-type: none"> ■ Designated Wind Priority Areas (as shown on the EOP) ■ New developments to include wind turbines on site where feasible and viable

	<ul style="list-style-type: none"> ■ Support for commercial applications to develop wind turbines ■ Encouragement of applications from community groups or individuals to install wind turbines ■ Payment into a fund if the above policies are not feasible or viable
Energy Constrained	<ul style="list-style-type: none"> ■ Energy constrained areas are those falling outside of district heating or wind priority areas ■ Encouragement for developers to install energy efficiency measures and micro-generation technologies to achieve CO₂ reductions beyond Building Regulations current at the time of development ■ Developers will be required to explore innovative ways of funding these measures, including support from third parties, the community and the Council

Table 33: Proposed policy requirements for developments within different 'energy opportunity areas'

8.2.2

Policy Justification

The primary drivers are the national and legally binding policy to achieve an 80% reduction in CO₂ emissions over 1990 levels by 2050 and the equally binding requirement for the UK to generate 15% of its total energy from renewable sources by 2020. To achieve these ambitious targets all opportunities to reduce energy consumption and deliver low and zero carbon energy solutions will need to be taken.

It is proposed that the Energy Opportunities Plan will act as the key spatial plan for energy projects in Enfield, underpinning the policies related to the delivery of energy efficiency and renewable and low carbon energy generation as well as prioritising the infrastructure on which money should be spent. It should be used to inform corporate strategies and investment decisions taken by the local authority and local strategic partnership (see Chapter 9 and Appendix 3 for further detail on delivery mechanisms) and should be readily updated to reflect new opportunities and changes in feasibility and viability.

The policy recognises that different areas and development types will have different opportunities for achieving CO₂ reductions. For example, developments in energy constrained areas will have fewer opportunities for delivering CO₂ reductions cost effectively than those in areas with distinct energy opportunities such as CHP with district heating or wind. Similarly, small developments are likely to have fewer opportunities.

The energy opportunities in Enfield include commercial and community scale wind; district heating powered by gas, biomass or waste heat; biomass boilers and other microgeneration technologies. The Council is keen to maximise the installation of all of these technologies where they are appropriate but the policy does not seek to rule out any other technology if it will deliver reductions in CO₂ or will increase the supply of decentralised renewable and low carbon energy.

The energy opportunity area approach is designed to help applicants determine which technologies are likely to be most suited to a given area. It also seeks to encourage energy installations that will contribute to the Council's objective of delivering all opportunities identified in the current Energy Opportunities Plan in the most effective way. However, to reflect the fact that regulation may change and the applicability of new and existing technologies may vary over time, the Council will be prepared to discuss proposals that deviate from the Energy Opportunities Plan and energy opportunity area requirements with applicants at the pre-application stage.

8.3 Proposed Policy 2: Reduction in emissions from new development

8.3.1 Proposed Policy Wording

In order to minimise the impact of new development in the Borough, all new development will be expected to use energy efficiently and to incorporate decentralised renewable and low carbon technologies to deliver CO₂ reductions above the level required by Building Regulations current at the time of development. Developers should explore innovative ways of funding these measures, including support from third parties and the community and/or a financial payment into a Carbon Fund, which will be used by the Council to deliver projects identified in the Energy Opportunities Plan.

All developments will be expected to achieve improvements beyond Building Regulations in line with the proposed London Plan.

Residential Development	<ul style="list-style-type: none"> ■ 2010 -2013: 44% Improvement on Building Regulations Part L 2006 ■ 2013-2016: 55% Improvement on Building Regulations Part L 2006 ■ 2016 onwards: Zero Carbon <p>Targets to be 'flat rate' i.e. all dwellings to achieve the same targets</p>
Non-residential development	<ul style="list-style-type: none"> ■ 2010 -2013: 44% Improvement on Building Regulations Part L 2006 ■ 2013-2016: 55% Improvement on Building Regulations Part L 2006 ■ 2016-2019: As Building Regulations ■ 2019 onwards: Zero Carbon <p>Targets to be 'aggregate' i.e. some buildings to have more stringent targets than others but the overall effect to equal the percentages above – this is still to be defined in both the proposed Building Regulations and the proposed London Plan</p>

Table 34: Proposed targets for minimising CO₂ emissions in new buildings in the draft London Plan 2010 (policy 5.2)

Where this is not feasible developments will be required to contribute to a buyout fund for the CO₂ emissions that cannot be offset on site.

8.3.2 *Policy Justification*

Changes to the Building Regulations in 2010, 2013 and 2016 are expected to bring in tighter standards for CO₂ emissions. After 2016 it will be necessary for all new residential buildings to be delivered as zero carbon homes, with the equivalent standard for non-residential buildings due to be introduced in 2019. The role of planning in requiring new development to incorporate such technologies should therefore be limited to a supporting one.

It is common practice across the country for planning policy to require all new buildings, both residential and non-residential, to achieve an additional reduction on the residual CO₂ emissions after Building Regulations compliance. This can be achieved through a combination of energy efficiency measures, on-site renewable and low carbon energy technologies and directly connected heat or power (not necessarily on-site).

The policy testing, a summary of which is presented in section 7, has demonstrated that the proposed London Plan policy will deliver higher CO₂ savings and provides a greater incentive for developers to install on-site district heating infrastructure than a policy simply requiring building regulations or small improvements upon it and is more flexible than the previous London Plan policy which restricted developers to renewable forms of energy.

However, to reflect the fact that some developments may be more constrained and the targets may not be achievable on all sites, developers would have the opportunity to pay into a fund, with contributions dependent on a levy or tariff that could be linked to the CO₂ emitted per square metre of floor area over the building lifetime of 30 years, which is the current proposal for calculating allowable solutions contributions under the Building Regulations once the zero carbon requirement is introduced.

The fund would need to be simple to operate for both development managers and developers. One possibility would be to operate the fund as part of the CIL, if Enfield Council opts to implement this locally, whereby a simple charge per m² could be levied on new development. Diverting a proportion of CIL payments into a 'carbon fund' could enable investment in decentralised renewable and low carbon energy projects identified in the Energy Opportunities Plan. Such a fund would give the Council the resource to strategically coordinate the delivery of community scale energy generation technologies and infrastructure such as district heating networks. However, if the option to use CIL was not available it may be difficult to implement since the alternative approach, using Section 106, would be limited by the fact that money would have to be spent on projects directly related to the development and the demands on the Section 106 money for other priorities would be high.

8.4 Proposed Policy 3: District Heating Priority Areas

8.4.1 *Proposed Policy Wording*

Enfield Council supports the development of district heating networks within the Borough and recognises the important role that new development can play in delivering these systems and developing capacity.

The Council will expect all large residential and mixed use developments (over 100 units) to consider the potential to install CHP and a site wide energy network. This will be the preferred solution for the delivery of heat unless it can be shown that such a system would not be viable. To improve viability and feasibility, applicants should engage with the Council, third parties and communities. The design and layout of site-wide networks should consider the future potential for expansion into surrounding communities. They should provide capped off connections which can be used to connect to networks beyond the site boundary in future. Where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre to serve existing or new development.

The Energy Opportunity Plan for the Borough shows the areas in which district heating and CHP is deemed to be viable on the basis of heat density. Additional information such as the London Heat Map and the location and heat demands of potential anchor loads can provide additional information to support an assessment of an area's viability. Development within these areas will be deemed to have the potential for future heat network connection and as a result will be required to be compatible with a future heating network.

8.4.2 *Policy Justification*

The government and the GLA have recognised the importance of district energy networks and CHP systems in order to reduce CO₂ emissions, especially in dense urban areas. The PPS1 Supplement actively encourages opportunities to be sought to set higher standards on specific sites where it can be justified on feasibility and viability grounds. The long-term ambition is to deliver heating networks across the priority areas in the Borough.

The Energy Opportunities Plan has shown that there is a significant opportunity in the Borough to deliver district heating schemes. Developments within district heating priority areas will need to carry out an assessment of the potential to deliver a district heating network. Developers can meet the requirements by installing a site-wide network, connecting to an off-site network or, where these are not possible, enabling the development to be able to connect in the future.

The policy requires larger more strategic new developments to install their own network, which can later be connected up to a larger network. This has the benefit of reducing CO₂ emissions in new development and contributing to the longer term objective.

Where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre to serve proposed or multiple developments or existing buildings. Such a requirement will be important for ensuring availability of the necessary space in the right

location for an energy centre designed to serve more than one site. It is expected that requirements will be discussed at the pre-application stage and will be included as part of a planning condition. In order to provide additional certainty to the installation of district heating networks it is recommended that a Local Development Order be designated for the district heating priority areas.

Criteria used to define the district heating priority areas are set out below.

- New development:
 - Residential development of at least 55 dwellings per hectare and at least 100 dwellings
 - Large scale mixed use development
 - Proximity to areas of existing buildings with heat density of at least 3,000kW/m² – enables extension into existing development
 - Proximity to existing heat sources (EOn power station and the London Waste site)
- Existing development:
 - Heat demand density of at least 3,000kW/km² and residential density of at least 55 dwellings per hectare or presence of a public sector building to provide a good anchor load
 - Proximity to existing heat sources

The final wording of this policy and its justification will need to be based on decisions taken about the wider role of the local authority and its partners. Options and their implications for planning policy are discussed in more detail in Chapter 9, along with key strategic sites.

8.5 Proposed Policy 4: Consequential Improvements to Existing Residential Properties

8.5.1 *Proposed Policy Wording*

The Council recognises the importance of improving the energy performance of the existing building stock and strongly encourages the uptake of energy efficiency and renewable and low carbon technologies as part of building refurbishments.

Planning applications for changes to existing domestic dwellings will need to be accompanied by a completed 'energy checklist' to identify if there are any reasonable improvements that could be made to the energy performance of the existing dwelling. If measures are identified applicants will be encouraged to undertake these.

Improvements will include, but not be restricted to: loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers.

8.5.2 *Policy Justification*

The purpose of the policy is to reduce CO₂ emissions from existing buildings. Since consequential improvements for non-domestic buildings are covered by Building Regulations this policy focuses solely on housing.

The policy applies to all householder applications for planning permission to extend or materially alter a home. The approach aims to make the most of any straightforward opportunities for improvement to the property. This includes loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers.

The checklist approach is simple – if any of the measures on the list are applicable applicants will be encouraged to implement them. Measures discussed in Chapter 9 should be considered in terms of their effectiveness in helping to reduce the capital costs to residents. Applicant guidance could be prepared to support householders in understanding the available options, installations, available suppliers, costs and financial support. Recommendations in chapter 9 should be used to inform the design of appropriate delivery mechanisms.

A similar policy has been adopted and implemented by Uttlesford District Council for three years, and the policy has been applied to around 1,400 applications. Our initial assessment suggests that, based on the assumptions we have used for the rate of applications received and the scope for the efficiency measures proposed, around 1,000 tonnes CO₂ could potentially be saved each year. At the time of writing we are not aware of any incidences of similar policies being removed from draft development plan documents on the grounds of it being beyond the scope of planning although the views of inspectors suggests that a policy 'requiring' action would be unlikely to be acceptable.

8.6 **Proposed Policy 5: Wind Power**

8.6.1 *Proposed Policy Wording*

The Council recognises that wind power can play an important role in reducing CO₂ emissions and will positively consider applications for wind turbines which are, in the view of the Council, designed and located appropriately.

Three principal opportunities for the use of wind power have been identified:

- Large scale wind turbines delivered by commercial developers
- Small or large scale wind turbines delivered by community groups, co-operatives and individuals
- Small or large scale wind systems delivered alongside new developments

8.6.2 *Policy Justification*

The PPS1 Supplement on Planning and Climate Change and PPS22 (Renewable Energy) are both supportive of wind power and this policy has been worded accordingly.

The government's Renewable Energy Strategy expects a significant proportion of this to be delivered from onshore wind. If these targets are to be achieved then as many of the available opportunities as possible will need to be taken advantage of.

Wind is one of the most cost effective renewable energy technologies but this is highly dependent on the scale of the turbine. Despite there being good wind speeds across all parts of the Borough it is recognised that commercial opportunities for turbines are likely to be limited. The energy opportunities plan identifies what these constraints are. However, opportunities for individual large or smaller turbines exist across the Borough and, where these meet the following criteria, they should be encouraged:

- Good local wind resource with limited obstructions in the surrounding natural and built environment.
- Close to electricity infrastructure (e.g. 10-30kV power lines, substations) to connect to the national grid.
- Close to roads, railways for easier transport of components to site.
- Consideration of local residential areas and environmentally and archaeologically sensitive areas and areas of high landscape value.
- Consideration of local airports and defence structures (e.g. radars and flight paths).
- Close to the community involved if part of a community-led scheme (but not close enough to cause noise issues).

Developers within wind priority areas will need to show that they have fully considered the potential to deliver a reduction in the development's CO₂ emissions beyond Building Regulations using a wind turbine or turbines on-site. Where no opportunities exist on-site applicants should demonstrate that they have considered off-site opportunities. Close engagement with the Council and communities will be essential and different ownership models should be considered as a way of gaining support.

8.7 Proposed Policy 5: Environmental Design Standards

8.7.1 *Proposed Policy Wording*

All developments should be designed to reduce their impact on the environment and improve wellbeing of occupants. Where appropriate, all development will be required to demonstrate that these issues have been considered by undertaking a BREEAM or Code for Sustainable Homes assessment (using the most up to date assessment methodology available).

All developments will be expected to achieve Code for Sustainable Homes Level 3 or higher and BREEAM Very Good or higher (or equivalent rating if this scheme is updated).

Developments in areas with more opportunities or with a strategic importance for delivering buildings with improved environmental standards may be required to meet higher targets.

8.7.2 *Policy Justification*

The application of BREEAM and the Code for Sustainable Homes (CSH) can help to deliver development that reduces its impact on the environment. As described in section 6, the cost implications of achieving CSH Level 3 and BREEAM Very Good are relatively small.

The most significant cost implications of both schemes are normally in the achievement of credits in the energy section. The mandatory energy standard for CSH Level 3 will be met by all new dwellings when the revised version of Building Regulations is in force. In many cases, developments meeting Proposed Policy 2 (outlined above) would already be doing enough to meet the mandatory energy standard for CSH Level 4. BREEAM does not have any mandatory standards but, in complying with the policies outlined above, developments would achieve a significant number of credits to contribute towards the overall score.

There is a degree of flexibility in the other credits in both schemes and, although this study has not investigated all the possible constraints in detail, it is assumed that CSH Level 3 and BREEAM Very Good should be able to be achieved on all sites in the Borough.

Development in the strategic growth areas could be required to meet higher standards, such as CSH Level 4 and BREEAM Excellent. All residential development in these areas is likely to include district heating systems and be meeting the requirements of Policy 2, and therefore the additional technical design and cost implications of moving from Level 3 to 4 would be minimal. However, specifying CSH Levels 5 or 6 (as they are currently defined) would be significantly more expensive and technically challenging and would require a site-based assessment to be undertaken. The jump from BREEAM Very Good to Excellent can also be costly and would also need to be assessed before it is applied.



Implementation Plan

9 Implementation Plan

9.1

Introduction

Along with planning policy, targets provide a useful mechanism for articulating to stakeholders the extent of the challenge around low carbon and renewable energy. However, to be effective, policies and targets need to have a strategy for delivery and a collaborative approach between the Council, Enfield Strategic Partnership, utilities, private developers, other stakeholders and the community. This strategy should set out:

- What the objectives of the policy or targets are
- An appropriate mechanism for delivery
- Who is responsible for their delivery
- Recommended next steps

This chapter describes the mechanisms available to Enfield Council to lead the delivery of the principal opportunities for decentralised renewable and low carbon energy opportunities identified on the energy opportunities plan. It is not intended to be an exhaustive list, nor does it reach definitive conclusions about which mechanisms are most suited to Enfield. Rather it seeks to clarify the importance of considering delivery at the same time as planning policy and provide guidance on what opportunities exist and where further work is required. Making clear recommendations on what approach will be suitable for Enfield will require a more detailed study involving discussions across the Council and with partners.

A range of mechanisms and partners will be required to deliver change in Enfield. Both refer to three types of energy opportunity: existing development; new development; and strategic community-wide interventions. Each uses the energy opportunities plan as the starting point for informing the development of appropriate delivery mechanisms and planning policies.

Potentially the most immediate and helpful delivery opportunity is the Low Carbon Building Strategic Design Advice service offered by the Carbon Trust. Up to £50,000 of matched funding can be obtained for scoping works for CO₂ reductions. Although there is no defined product, money is available to large multi-site organisations, including but not limited to local authorities, which could enable Enfield to act on the recommendations set out in this section and to roll out area based programmes. AECOM is an accredited consultant and able to explore this process further with you.

9.2 Existing Development

9.2.1 *Delivering Energy Efficiency in Existing Buildings*

The CO₂ savings that can be achieved through improvements to existing buildings are substantial and this should be a priority across Enfield. However, a concentrated funding and improvement programme would have to be introduced to trigger the completion of higher cost elements of retrofit, such as solid wall insulation. The Council has a role in working with partner organisations to distribute and focus funding. Possible options are explored in this chapter.

This study shows certain areas as having higher heating demand per home than others, and hence in spatial terms these areas can be prioritised for intervention (see Chapter 3). Since heat loss can be more easily and cost effectively addressed than other efficiency measures, leading to immediate CO₂ savings, it has been prioritised for intervention in this study in homes and buildings across the Council area.

9.2.2 *Delivering On-Site Renewable and Low Carbon Energy Technologies*

Delivery of renewable and low carbon technologies within existing buildings and communities cannot easily be required by planning, but can be encouraged by the Council. The Council should seek to engage communities and highlight the cost-saving benefits of the inclusion of microgeneration, especially with the introduction of the feed-in-tariff¹⁷. There are also other funding sources available to homeowners and businesses to assist with the capital cost of installation (See Appendix C for more details).

9.2.3 *Available Delivery Mechanisms*

In addition to central government grants and subsidised energy efficiency offered by energy companies. Local authorities have access to low interest loans and have the powers to deliver energy opportunities in the existing stock using the Wellbeing Power and Community Sustainable Energy Programme (CSEP).

There are funding sources already available to homeowners and businesses to assist with the capital cost of installing CO₂ reduction solutions. These include Warm Front, Carbon Emissions Reduction Target (CERT), the Big Lottery Fund, the Low Carbon Buildings Programme, the Energy Saving Trust and Low Carbon Communities Challenge. Further details are contained in Appendix B.

The three part approach suggested below offers a potentially effective way to co-ordinate the various funding streams and to prioritise areas for installation of micro-generation technologies

¹⁷ Due to come into action in April 2010 for micro-generation installations not exceeding 5 megawatts. The tariff will pay generators a guaranteed price for electricity generated and exported to the grid over a period of 20 years (25 for solar PV).

and energy efficiency improvements. The initiative could be financed using a combination of SALIX and CESP and could be co-ordinated through the Council, possibly in partnership with the private sector and energy companies for finance and with installation companies for delivery:

- *Discount provision* – available finance could be used to bulk buy technologies, enabling them be sold on at a discount to households and businesses.
- *Householder or business hire purchase* – appropriate technologies could be leased to householders and businesses. Rental costs could be charged as a proportion of the generation income received by the beneficiary. After a period of time, ownership would transfer to the householder or business.
- *Householder or business rental* – a third model could be for the Council or partnership to retain ownership of the technologies and to rent roof or other suitable space. Again, rental costs would be set as a proportion of generation income. As with the hire purchase option, this approach would give benefits of low carbon and renewable energy to communities without the up-front expense. The advantage of this option would be the retention of control over phasing and technology choice, and greater flexibility to respond to changes in technology and demand.

Option	Potential Partners	Potential Delivery Mechanism
Increased energy efficiency Increased microgeneration	<ul style="list-style-type: none"> • Local authority • LDA • Energy companies and utilities • Community groups • Private installation companies 	<ul style="list-style-type: none"> • Provision of discounted CO₂ reduction solutions • Hire purchase of CO₂ reduction solutions • Rental of space for CO₂ reduction solutions • Awareness and education campaign for householders and businesses. • Salix Finance • Community Sustainable Energy Programme • Warm Front • Carbon Emissions Reduction Target • Big Lottery Fund • Energy Saving Trust • Low Carbon Communities Challenge • Low Carbon Buildings Programme

Table 35: Delivery options for existing development

9.3 New Development

9.3.1 Delivering CO₂ Reductions in New Development

Building Regulations are the primary drivers for higher energy performance standards and low carbon and renewable energy generation in new developments. The role of Enfield Council is therefore limited beyond specifying more stringent policy or targets to achieve this. The scale and extent of proposed development at Meridian Water, Ponders End, Enfield Town and New

Southgate offers good opportunities for using new development as the catalyst for delivery of wider strategic energy opportunities.

One option includes applying conditions to sales of the Council's own land requiring higher environmental standards or installation of energy technologies. Partnerships for Renewables provides a low risk option for installing renewables on local authority owned land.

Another opportunity is the Low Carbon Buildings Programme (LCBP) capital grant scheme. This could be used by the local housing authority, RSLs, schools and other charitable bodies to install micro-generation technologies on their own buildings. We recommend that the Council works with eligible partners to develop a delivery strategy based on the opportunities presented by the LCBP.

A third opportunity is both a planning and a delivery mechanism, that is to prioritise delivery of energy opportunities through spending of money raised through setting up a carbon fund which pools contributions from developers as a way of 'offsetting' any increase in energy demand and emissions from new developments and funding projects identified elsewhere in Enfield's energy opportunities plan.

There is currently some uncertainty over what kind of carbon fund may be established under existing provisions such as Section 106 and what the implications of future Government proposals will be, in particular the Community Infrastructure Levy (CIL). That said, Milton Keynes and Ashford Councils have adopted carbon fund policies and similar proposals are being developed by Dover Council. We are not aware of developers having mounted any legal challenges to these policies to date.

A carbon fund could fulfil more than one purpose and there are several options for how a policy might be defined:

- Payment into a carbon fund, where development can demonstrate that it is not feasible or viable to meet other planning policy on-site
- Payment into a carbon fund for all developments instead or in addition to other policy requirements directed at development
- Payment into a carbon fund, with discounts or exemptions for developments that can demonstrate an equivalent level of carbon saving on-site

Contributions could be in the form of:

- Equivalent on site CO₂ reductions delivered off site. This might cost more for developers but would deliver benefits direct to future owners/tenants
- Equivalent cost of delivering CO₂ reductions on site, which may offer lower CO₂ savings than infrastructure funded by a carbon fund contribution
- A simple tariff contribution, based on the m² of development basis as proposed by the CIL. Assuming that Enfield adopts a CIL then this would be the simplest option. It may also be the only permissible charging mechanism

It is our understanding that CIL money can be spent on infrastructure projects (the definition of infrastructure includes renewable and low carbon energy technologies) delivered by the public or private sectors or partnership between the two. Therefore, a local authority led delivery vehicle, partnership or joint venture could be established to manage and co-ordinate delivery of energy infrastructure to support new development and to help enable developers meet the requirements of planning and Building Regulations, including future allowable solutions. Although CIL is an optional charge for local authorities we would recommend adopting it in Enfield in order to deliver energy infrastructure. Should CIL not come into force it may be possible to set up a local tariff, similar to that in Milton Keynes.

9.3.2 *Delivering 'Allowable Solutions'*

Development post 2016 (domestic) and 2019 (non-domestic) offers a fourth opportunity to deliver low and zero energy in new development by virtue of the requirement through Building Regulations for zero carbon buildings. This is likely to mean that new development will be required to reach a 70% reduction in CO₂ on-site, leaving the remainder to be delivered through 'allowable solutions'. A final list of allowable solutions is still to be confirmed by the Government, but early indications are that developers will have two broad routes:

- Increased on-site energy efficiency or generation either within the site boundary or through connection of heat technologies directly to the site. Generally, district heating and wind energy will provide excellent and cost effective allowable solution opportunities, but often the integration of these technologies cannot be delivered solely within the boundary of the site since there may be restricted space or heat networks may be more viable when connecting into heat loads off site.
- Alternatively, developers can achieve the remaining CO₂ reductions through off-site reductions. For example, by contribution to the installation or expansion of district heating networks or wind energy elsewhere in the local area.

The latter would give the Council more control, through planning and the delivery mechanisms identified above, over the nature and location of off-site allowable solutions. The energy opportunities map can be used to identify possible locations. For example, New Southgate could potentially be an anchor development for a district heating solution linking new development and refurbishment in other parts of the North Circular AAP. Further feasibility work will need to be undertaken to understand the extent of the opportunities and to draw up a priority list. This will need to consider practical issues such as development phasing, cost, market potential and delivery strategies and funding. Funding options could include the JESSICA Holding Fund (see Appendix B for more details) and Strategic Design Advice.

The areas shown as having potential for small scale wind could also be further explored as allowable solutions. These exist in all AAPs except the North Circular. Developers could be required to pay for or contribute (through the proposed carbon fund) towards a large or small

wind turbine off-site in one of the wind opportunity areas. Although not shown as such, isolated large turbines might be possible in industrial areas. Lowestoft town centre is the site of the largest on-shore turbine in the UK, located in a commercial area (Figure 48). Further work will need to be undertaken to establish the extent of the opportunity, considering issues such as land ownership. Alternatively, if no tariff or buyout fund is in place a Merchant Wind Arrangement (see Appendix B for more details) could be entered into between the developer and energy company.



Figure 48 - 2.75MW wind turbine in Lowestoft town centre

Non-residential development may also demand allowable solutions, but the details of this are currently part of a government consultation. Potentially, allowable solutions or a local carbon buyout fund will be charged at £100/tonne¹⁸, resulting in significant availability of funding. A recent speech by Rt Hon John Denham¹⁹ suggests that an annual pot of £1bn will result from the zero carbon homes policy by 2020.

Enfield Council should develop a plan to deliver allowable solutions in the Council areas, to ensure funding available from new development is directed towards the best solutions in a coordinated manner.

9.3.3 *The Role of a Local Delivery Vehicle in Addressing Viability in New Development*

A carbon fund (operated through CIL or other tariff mechanism) may offer a useful way of providing continuity in delivery mechanisms between proposed planning policies requiring

¹⁸ Impact Assessment of the Zero Carbon Homes Consultation, CLG, December 2008

¹⁹ The Green Councils of the Future, 26th November 2009

energy performance standards ahead of Building Regulations prior to 2016 (Chapter 6) and the likely allowable solutions post 2016. Linked to this is the important issue of viability. Specifically in relation to new development, a local delivery vehicle (company, partnership or joint venture) set up to deliver projects funded through the fund could provide a useful opportunity for reducing the financial burden on developers, thereby improving viability, while increasing the level of low and zero carbon energy delivered.

While this option will require further work beyond the scope of this study, one of the objectives of a delivery vehicle could be to ensure synergy between delivery of its energy projects and phasing of new private sector development. Under such a scenario the vehicle could enter into an agreement with the developer whereby it commits to installing a district heating network. The responsibility and therefore financial burden for the developer would be limited to installing the secondary network, making space available for an energy centre and possibly payment of a connection fee, again operated through the carbon buyout fund. Where phasing synergy cannot be secured the secondary network could be powered by a containerised temporary energy centre. The proposed district heating policy in chapter 8 sets out the planning role in this.

The Council should carry out feasibility work to assess the potential for setting up a local delivery vehicle to deliver district heating networks across the town. This will need the involvement and buy-in from a wide range of stakeholders and potentially the Homes and Communities Agency.

Option	Potential Partners	Potential Delivery Mechanism
Higher energy and sustainability standards	<ul style="list-style-type: none"> Local authority LDA Energy companies Community groups 	<ul style="list-style-type: none"> Conditions attached to local authority owned land sales Low Carbon Buildings Programme CIL or local carbon fund 'Allowable solutions' or off-site opportunities
Wind energy	<ul style="list-style-type: none"> Private installation companies 	<ul style="list-style-type: none"> Local delivery vehicle (company, partnership or joint venture) Salix Finance
District heating networks	<ul style="list-style-type: none"> Homes and Communities Agency 	<ul style="list-style-type: none"> Low Carbon Communities Challenge Merchant wind JESSICA Holding Fund Strategic Design Advice

Table 36: Delivery options for new development

9.4

Strategic Community-Wide Interventions

The principle strategic and community-wide renewable and low carbon infrastructure opportunities in Enfield come from large and small scale wind turbines, district heating networks to provide community heat from biomass, gas (preferably with CHP to provide electricity as well) and waste heat from the power station and energy from waste plant. These types of technologies are likely to come forward in one of two ways: through private commercial interest or through local authority and/or community investment. Schemes are likely to be larger and may significantly contribute towards delivery of authority wide, regional or national energy

generation targets rather than primarily off-setting increases in CO₂ emissions or energy demands resulting from new development.

Local authority-led delivery is likely to be crucial to increasing installed capacity and maximising delivery of energy opportunities, especially for district heating since the private sector is traditionally poor at delivering this kind of infrastructure, particularly when it is not linked solely to a specific site. Opportunities are set out below and will need to be supported by planning policies.

Planning policy and decision-making should support the market development of renewable and low carbon energy where it doesn't conflict with other planning criteria. Broadly speaking, there are three areas where planning can influence strategic community-wide decentralised renewable and low carbon energy:

- Providing an overarching supporting policy, along with a set of criteria policies to guide development
- Identification of suitable sites and opportunity areas
- Providing policies designed to support delivery mechanisms, such as a requirement for new development to connect to a district heating network

9.4.1 *Delivering Decentralised Renewable and Low Carbon Energy through Private Investment*

Market opportunities will be delivered with little or no requirement for intervention by the public sector beyond supportive planning policies. However, the Council and its partners can maximise the likelihood of delivery by the market in a number of ways:

- Planning policies to support development of stand-alone wind power is a possibility a two principal areas to the north and north west of the Borough.
- Planning policies to improve the likelihood of developers installing a site-wide district heating network (along with other energy opportunities) as part of the Ponders End, Meridian Water, Enfield Town and New Southgate developments. We understand that the New Southgate masterplan includes proposals for an energy centre, which could form the basis of a wider network within the North Circular AAP.
- As with new development, the proposed allowable solutions will place emphasis on the Council to identify and support delivery of strategic and community scale solutions. Therefore, there is potentially an opportunity to use delivery of energy opportunities across Enfield as a driver for housing delivery. In other words, where key large-scale opportunities driven by new development have been identified then the value of these energy opportunities to a developer, in terms of potential income from energy sales combined with Renewables Obligation Certificates (ROCs), feed-in-tariff or future renewable heat incentive, could actually drive the delivery of more homes rather than acting as a break on development.

Option	Potential Partners	Potential Delivery Mechanism
Wind energy Biomass supply chain	<ul style="list-style-type: none"> Local authority LDA SITA Regional and sub-regional bodies Energy companies Homes and Communities Agency 	<ul style="list-style-type: none"> CIL or local carbon fund 'Allowable solutions' or off-site opportunities Local delivery vehicle (company, partnership or joint venture) Merchant wind Region-wide development and coordination of biomass supply chains Renewable Obligation Certificates and feed-in-tariff New housing or non-domestic development

Table 37: Delivery options for strategic community-wide market interventions

9.4.2 *Delivering Low Carbon and Renewable Energy through Local Partners*

There are three principal reasons why reliance on delivery of energy opportunities through market mechanisms alone may be insufficient to achieve maximum delivery:

1. Where opportunities extend beyond the boundaries of an individual site or development. This is particularly an issue for CHP or district heating schemes where viability is determined by a combination of scale, mix of use and density. Individual sites, even many of Enfield's larger strategic ones, may not be able to support a network without extending it into existing developments or connecting to an anchor load, such as a hospital or civic building. The additional cost and practical challenges of delivering a scheme that crosses new and existing development, areas of multiple land ownership and other infrastructure such as roads, rivers or railways is unlikely to attract commercial developers. It is therefore unlikely that an individual planning application will be forthcoming.
2. District heating is a well established type of infrastructure in many parts of Europe. In the UK, however, there are a relatively small number of examples suggesting that the viability of schemes can be marginal.
3. Where schemes are of insufficient size to attract a commercial developer. Wind developers are generally less interested in smaller schemes (those below 5MW may be considered as a very crude rule of thumb) meaning that more constrained, but still windy, sites may go undeveloped. The link to allowable solutions for new development described earlier may offer one solution but this will still leave some opportunities unrealised.

Where market delivery isn't forthcoming Enfield Council can lead delivery of energy infrastructure, potentially with support from the LDA, private sector, investors or communities. Communities may want to join together to deliver energy infrastructure, investing in capital cost and receiving income from selling energy, though further work will need to be undertaken to understand the potential interest and uptake.

Small and large scale wind

Beyond the large scale wind opportunity areas identified in the energy opportunities plan most of the opportunities will be for isolated turbines, perhaps in the commercial areas to the south of Enfield power station or near to Edmonton incinerator, or smaller scale turbines. Many of these are unlikely to be attractive to commercial wind developers. One option is of developers or site owners or operators to enter into a Merchant Wind or partnerships for Renewables (if the land is publically owned) arrangement.

Alternatively, a public sector-led delivery vehicle, such as an ESCo, partnership or joint venture, could be established. Types of ESCo are discussed in more detail below. Initial feasibility work could be funded by Strategic Design Advice or ELENA, with later project finance options including the issuing of bonds to residents and businesses or the new London Green Fund. Returns on investments would be based on energy sales, ROCs and the feed-in-tariff. Further community incentives could include discounts on council tax.

Cooperatives are a common delivery mechanism in parts of Continental Europe and a few examples exist across the UK, including Baywind, the first UK wind cooperative. The cooperatives are overseen by Energy for All. Shares are issued to fund development of turbines with investors receiving a stake in the project and annual financial returns. Importantly, community ownership can help to boost support for a wind proposal. The local authority can play a useful role as a partner and in raising awareness of the potential for community ownership. Community ownership or investment could bring particular benefits for delivering more controversial schemes; large scale wind schemes being one example.

For all potential wind sites the Council and its partners should identify delivery opportunities, considering available financial mechanisms, publically owned land, community involvement and ownership.

District heating with CHP and waste heat

There are major opportunities across Enfield for the introduction of heat networks, particularly in the AAP areas. A strategic approach will be necessary to successfully manage and co-ordinate delivery. The local authority would be ideally placed to plan, deliver and operate part or all of a district heating network through establishment of a delivery vehicle. The following will need to be considered:

- Financing – feasibility work could be funded through ELENA and Strategic Design Advice. In terms of delivery, the different elements of a network can be treated differently. The operating costs of the insulated pipes that move heat between the energy centre and customers are relatively low. The main cost is installing the pipeline at the start. The pipe work, therefore, could be competitively tendered by a local authority-led vehicle and, since the Council may have access to low interest loans and repayments over a long time period using prudential borrowing, repayments can be kept to a minimum. Repayments could be serviced by energy sales and income from the renewable heat incentive, ROCs and/or the feed-in-tariff.

It needs to be recognised however the ability of the public sector to raise finances is likely to be severely hampered for the foreseeable future by the current economic crisis. Alternative sources of funding may need to be considered, including: bond financing; local asset-backed vehicles; and accelerated development zones or tax increment financing. In the December 2009 Pre Budget Report the Government committed to examining tax increment financing and the scope for local authorities to borrow against future CIL revenues and the renewable heat incentive and feed-in-tariff revenue streams. This could provide crucial finances to support investment.

Energy centres tend to have lower upfront costs. The expense comes with ongoing operation and maintenance, a shorter life span (around 15 years) and exposure to fluctuations in energy prices. While ownership of the sites and buildings may be retained by the local authority, the plant itself could be operated by a private sector EScO. To simplify things further for the Council, the billing and customer service elements could be contracted out to a third party.

- Delivery of networks as part of new development could also be undertaken by a local authority-led delivery vehicle or partnership, leaving the secondary network to be installed by the developer. The developer could then be charged a connection fee to the primary network. This option would necessitate redrafting the proposed planning policy.
- Planning - the PPS1 Supplement presents opportunities at the local level in the form of an LDO, which can be applied by local authorities to extend permitted development rights across whole local authority areas or to grant permission for certain types of development. Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of establishing an LDO in order to add certainty to the development process and potentially speed up delivery.
- Liaison with key stakeholders – the LDA with others have recently published their decentralised energy prospectus²⁰. This recognises the crucial role of boroughs as facilitators; providing supportive local policies and assembling public heat demand. It outlines commercial models, the regulatory and policy environment, and the public sector support on offer to unlock the market. It also includes a pipeline of potential projects, including the Upper Lea valley OAPF. The LDA is currently assessing the feasibility of an energy masterplan for the area and so it will be important for Enfield and its partners to involve the appropriate people from the LDA in further work, especially on the North East Enfield and Central Leaside AAPs.
- Phasing – installing a district heating network is a major capital investment. The cost depends on the number of buildings to be connected, how close together they are and how much heat they require. In order to minimise risk, a general strategy for developing a scheme would be to secure the connection of a large anchor load within close

²⁰ LDA, Local Councils, London First, Mayor of London (October 2009) 'Powering Ahead: Delivering low carbon energy for London', GLA, London.

proximity to the generating plant. Existing anchor loads are identified on the energy opportunities plan. Further work will need to prioritise sites based on the following suggested considerations (further discussion is included Chapter 7):

- Opportunities for incremental delivery, such as by requiring energy infrastructure to be installed as part of area improvements. The North Circular housing improvements and new development may be one example.
 - We are not aware of any major road redevelopment proposals, but the Ponders End Central development area is next to the Middlesex University and High Street developments. Proposed improvements to the public realm should be seen as a key opportunity for installing a district heating network.
 - Accessibility is an issue in Central Leaside and North East Enfield. Addressing this has been identified as an important precursor to attracting new commercial activity and homes. Priority should be given to assessing the feasibility of installing a district heating network.
 - Similarly, the Enfield Town opportunity area offers the chance to plan a network that links new development with the Civic Centre, and potentially retail along the high street.
 - Phasing of and opportunities from strategic sites. Sites that include new anchor loads or energy centres as part of the development will make ideal candidates, such as the healthcare hub and energy centre in the New Southgate development.
 - Opportunities for utilising waste heat from the power station should be maximised by undertaking a feasibility study. This should consider: opportunities to connect public sector anchor loads, new development and the very high private heat loads that exist nearby.
 - Opportunities for utilising waste heat from the Edmonton incinerator are limited at present, but in the future could supply new development at Meridian Water. Similarly, solid recoverable fuel could feed into a local fuel supply chain.
 - Areas of hard to treat homes and buildings, such as those with solid walls (a significant proportion) or conservation areas.
- *Type of development* – the following criteria can be applied to detailed assessments:
 - Large scale mixed use development (at least 500 homes and 10,000m² non-domestic) to enable a good anchor load
 - Proximity to high heat density areas with gas grid to enable extension into existing development (as shown in the Energy Opportunities Plan)
 - Proximity to existing fuel sources (e.g. waste heat, managed woodland, waste treatment site) to enable easy access to renewable fuel sources

- Proximity to good transport links to enable solid fuel delivery
- Proximity to sources of waste heat (e.g. industrial processes) to enable zero carbon energy sources.

9.4.3 *Creating a biomass supply chain*

There are opportunities to establish biomass supply chains, coordinating both forestry and agricultural waste and growth of bio-crops locally. The limited supply of biomass within Enfield means that the Council would need to explore sub-region or region-wide opportunities with partners in neighbouring rural authorities

Option	Potential Partners	Potential Delivery Mechanism
Wind energy District heating and CHP and waste heat Biomass supply chain	<ul style="list-style-type: none"> • Local authority • LDA • Regional and sub-regional bodies • Energy companies, including E.ON • SITA • Homes and Communities Agency • Partnerships for Renewables • NHS • Developers • Community groups 	<ul style="list-style-type: none"> • CIL or local carbon fund • 'Allowable solutions' or off-site opportunities • Local authority led delivery company, partnerships and joint ventures • Merchant wind • Region-wide development and coordination of biomass supply chains • ROCs and feed-in-tariff (April 2010) and possibly renewable heat incentive in 2011 • District heating priority areas • Wind priority areas • Cooperatives and community involvement • EDF Renewable Energy Fund • Carbon Emissions Reduction Target • Building Schools for the Future • JESSICA Holding Fund • Strategic Design Advice • ELENA technical assistance facility • The London Green Fund

Table 38: Delivery options for strategic community-wide local authority and community interventions

9.5 **Delivery Partners**

It is clear that a planned approach is necessary, with targets complemented by spatial and infrastructure planning. The implications of this for the Council are significant. We are no longer simply talking about a set of planning policies; rather success depends on coordination between planners, other local authority departments (including the corporate level) and local strategic partners.

The two central documents for coordinating delivery of low carbon and renewable energy projects at the local level are, " Enfield's Future: A Sustainable Community Strategy for Enfield 2007 - 2017", and the Local Development Framework (LDF).

Options for setting up a local authority delivery vehicle could be explored. Although the skills required for this are likely to need to be developed this does not need to be an insurmountable barrier and there are a growing number of local authorities engaging in similar activities both in energy and other areas. The key to success is likely to be leadership: from senior local

authority management or, at least initially, from committed individuals in planning or other departments.

Delivery vehicle models range from fully public, through partnerships between public, private and community sectors to fully private. Broadly speaking, the greater the involvement of third parties the lower the risk to the authority but, importantly also, the less control the authority will have. Whichever route is chosen, the delivery vehicle should be put in place as early on in the development process as possible, so that its technical and financial requirements can be fed through into negotiations with potential customers.

	Private Sector Led ESCo/delivery vehicle	Public Sector Led ESCo/delivery vehicle
Advantages	<ul style="list-style-type: none"> • Private sector capital • Transfer of risk • Commercial and technical expertise 	<ul style="list-style-type: none"> • Lower interest rates on available capital can be secured through Prudential Borrowing • Transfer of risk on a District heating network through construction contracts • More control over strategic direction • No profit needed • Incremental expansion more likely • Low set-up costs (internal accounting only)
Disadvantages	<ul style="list-style-type: none"> • Loss of control • Most profit retained by private sector • Incremental expansion more difficult • High set-up costs 	<ul style="list-style-type: none"> • Greater risk • Less access to private capital and expertise, though expertise can be obtained through outsourcing and specific recruitment

Table 39: Advantages and disadvantages of ESCo/delivery vehicle models

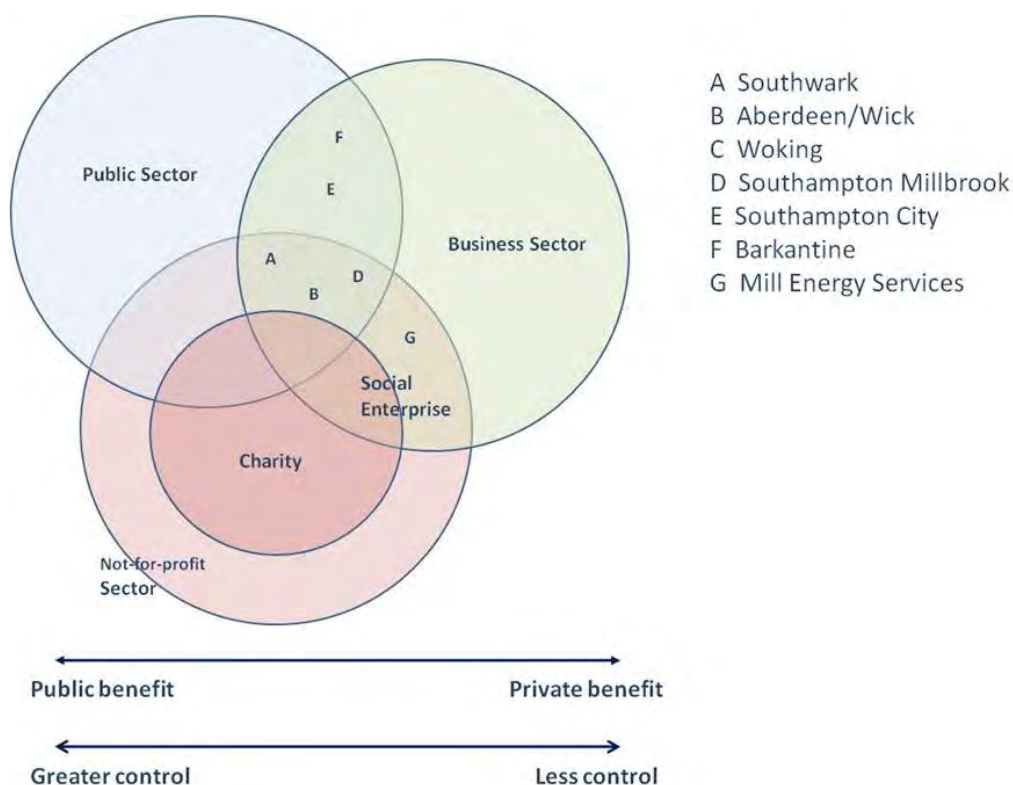


Figure 49: Spectrum of ESCo/delivery vehicle (Source: Making ESCos Work)

9.6 Monitoring and Review

Key to delivering an effective area-based low carbon and renewable energy strategy is successfully drawing on all of the available opportunities. This includes the Comprehensive Area Assessment (CAA) process, which recognises the fact that no single organisation can be responsible for meeting local needs. Alongside the opportunities for a local delivery vehicle are shorter-term Local Area Agreements (LAA) and National Indicators. The Renewable Energy Strategy (2009) proposes introducing a renewable energy indicator, but until this time several can be used to deliver energy projects:

- NI 185 – Percentage CO₂ reduction from local authority operations.
- NI 186 – Per capita CO₂ emissions in the local authority area.
- NI 187 – Tackling fuel poverty – percentage of people receiving income based benefits living in homes with a low and high energy efficiency rating.

9.7 Recommendations and Next Steps

There are a wide range of delivery mechanisms that can be employed to support planning for energy. Not all will be suitable for Enfield and a mix will be needed to encompass all of the energy opportunities. This report provides the context for making decisions. Further work, discussions and advice will be needed to make them happen. As a first step we recommend

that Enfield Council explores further the potential for using Carbon Trust Low Carbon Building Strategic Design Advice money to undertake some of the following next steps:

Provide the necessary leadership and skills

- The Council must take a strategic leadership role together with Enfield Strategic Partnership to ensure the necessary political and stakeholder buy-in. This will involve using this study inform preparation of relevant strategies, including the climate change strategy and North London Waste Plan.
- It must develop skills across the Council and its partners.

Priority actions and projects (See Priority Projects below)

- The Council needs to set out a clear framework which gives relative certainty. Action should be prioritised at strategic locations, council and public sector property and assets, such as Meridian Water, New Southgate, Ponders End and Enfield Town.
- Initiatives to support the proposed residential energy efficiency retrofit policy should be designed to reduce the financial burden on households.
- The Council should work with eligible partners to develop a micro-generation retrofit strategy based on the opportunities presented by the LCBP.
- A set of priority district heating and waste heat schemes should be drawn up by the Council and its partners and further feasibility work carried out. This should be based on factors such as financing options, planning, liaison with stakeholders including the LDA, phasing and type of development. Initial feasibility work could be funded by Strategic Design Advice or ELENA, with later project finance options including the issuing of bonds to residents and businesses or the new London Green Fund. Options for designation as a district heating priority area include:
 - Opportunities for incremental delivery, such as by requiring energy infrastructure to be installed as part of area improvements, such as the North Circular housing improvements and new development.
 - Proposed improvements to the public realm as part of the Ponders End Central development area and Middlesex University and High Street developments should be seen as a key opportunity for installing a district heating network.
 - Priority should be given to assessing the feasibility of installing a district heating network as part of improving accessibility in Central Leaside and North East Enfield
 - The Enfield Town opportunity area offers the chance to plan a network that links new development with the Civic Centre and retail along the high street.
 - Sites that include new anchor loads or energy centres as part of the development will make ideal district heating candidates, such as the Ladderswood Estate and Western Gateway site.

- Opportunities for utilising waste heat from the power station should be maximised by undertaking a feasibility study. This should consider: opportunities to connect public sector anchor loads, new development and the very high private heat loads that exist nearby.
 - Opportunities for utilising waste heat from the Edmonton incinerator are limited at present, but in the future could supply new development at Meridian Water.
 - Areas of hard to treat homes and buildings, such as those with solid walls or conservation areas.
- Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of establishing an LDO in order to add certainty to the development process and potentially speed up delivery.
- The LDA is currently assessing the feasibility of an energy masterplan for the Upper Lea Valley OAPF. Enfield and its partners should involve the appropriate people from the LDA in further work, especially on the North East Enfield and Central Leaside AAPs.
- Beyond the large scale wind opportunity areas identified in the energy opportunities plan opportunities should be explored for isolated turbines in the commercial areas to the south of Enfield power station or near to Edmonton incinerator. The Council and its partners should identify delivery opportunities, considering available financial mechanisms, publically owned land and community involvement and ownership.
- Opportunities for biomass, biofuels and biogas should be explored with partners in neighbouring authorities and the wider regions.
- The Council and its partners should undertake further work to explore the role for the local authority to link housing development to energy supply delivery.

Delivery vehicles and funding

- The Council and its partners need to establish an appropriate form of delivery vehicle or vehicles to pursue the key energy efficiency and supply opportunities. Further work will be needed to understand what is suitable for Enfield but will need to consider ESCo, partnerships and joint ventures.
- Funding mechanisms should be identified and applied first to priority schemes, co-ordinated through the appropriate delivery vehicle. These could include:
 - Delivery of whole house and street-by-street energy efficiency improvements and retrofit of micro-generation technologies.
 - Setting up a carbon fund, possibly using the CIL. This should be used to pay for projects identified in the energy opportunities plan, including large or small wind turbines off-site in the wind opportunity areas. Further work will need to be undertaken to establish the extent of the opportunities.

- Developing a plan to deliver allowable solutions to ensure funding from new development is directed towards the best solutions in a coordinated way.
- Communities are likely to play a crucial role in the delivery of energy infrastructure. However, to be successful further work will be needed to explore how communities function within Enfield.

Potential Projects

Based on our understanding of the details and timescales of the developments planned over the Local development Framework plan period we have proposed a number of short, medium and long term projects that could help to realise the low carbon energy infrastructure opportunities identified in this report.

Short Term (next 1 – 3 years)

- *Ponders End District Energy Feasibility Study*

The redevelopment of the Ponders End Priority Area has recognised the potential to establish a district energy network. To take this concept forward a detailed feasibility study should be undertaken to establish the potential extent of the network and costs and to prepare a business plan. As well as providing a basis on which to tender for the full design, construction and operation of a network, this exercise will also provide additional evidence to support proposals in planning policy 3 (District Heating Priority Areas) that local developments should be designed such that they will be able to connect to the network. It could also provide the basis for creating an offset funding scheme, either as part of the allowable solutions component of the proposed 'Zero Carbon' methodology in 2016 or for a scheme operated through CIL or Section 106.

- *Meridian Water Energy Infrastructure Strategy*

The development of the Meridian Water Place Shaping Priority Area presents a specific opportunity to prepare a strategy for delivering low carbon energy to the new dwellings and commercial developments proposed. By considering energy infrastructure as part of the masterplanning process it will be possible not only to make the delivery of district energy systems more efficient but also to take advantage of the specific opportunities in this location, particularly the North London Waste Authority site, proposed Remade gasification plant and local industry with high energy consumption. A detailed strategic plan for the energy infrastructure of the masterplan, created with stakeholder buy-in, will enable a more holistic solution to be achieved.

- *Scoping Delivery Vehicles*

As specific schemes begin to take shape the Council should review the possible delivery vehicles, powers and funding mechanisms that it would be prepared to use to take the schemes forward. As discussed earlier in this section the available options are likely to have different financial, legal and political implications and risks.

Medium Term (next 3 - 10 years)

- *Energy Infrastructure Strategies for other Place Shaping Priority Areas*

The plans for the other area action plan zones and place shaping priority areas will also need to establish strategies for delivering low carbon decentralised energy infrastructure to ensure that the opportunities for delivery are maximised. Progressing these strategies to detailed energy network feasibility studies will provide more certainty for developers as well as establishing the financial and technical requirements for their implementation.

- *Implementation of energy infrastructure at Ponders End*

Subject to the identification of a viable scheme at Ponders End, the results of the feasibility study stage should enable a full tender to be prepared and a decision on the delivery approach to be reached.

- *Engage with EOn and NLWA and other stakeholders*

Following on from the detailed strategy and feasibility studies for Ponders End and Meridian Water, it will be possible to provide a more robust basis on which to take forward discussions with NLWA, EOn and other stakeholders on the potential to take advantage of the waste heat from their processes. To date, as explained in this report, the lack of detailed proposals has meant that while stakeholders have responded positively, the current future plans for these facilities do not currently incorporate connection to these development schemes. Providing more detailed technical information and assurance that they will be taken forward will be the first steps towards developing more integrated energy networks.

- *Agreed Approach to Scheme Delivery and Funding*

Following the scoping study and further consultation across the Council the agreed delivery strategy/strategies should be formalised and used to implement the projects as they come forward.

Long Term (10+ years)

- *Establishment of Borough-wide Energy Infrastructure and Connections to the Wider Upper Lee Valley*

The long term strategy will be to establish wider networks across the Borough and into neighbouring boroughs, particularly the Upper Lee Valley Opportunity Area. This expansion is likely to result from organic growth of the networks established at each of the place shaping priority areas, supported by infrastructure delivered through new developments.



Monitoring & Enforcement

10 Monitoring & Enforcement

10.1 Introduction

The following chapter provides details of how the policies described in Chapter 9 can be enforced and their impacts monitored over time.

10.2 Demonstrating and Checking Compliance

10.2.1 *Proposed Policy 1: Support for decentralised low and zero carbon technologies in line with the Energy Opportunity Plan*

- Planning applications to be reviewed in line with the EOP to ensure that the proposed design solutions deliver the energy opportunities appropriate to the area.
- Council strategies which are related to buildings or infrastructure to be reviewed in line with the EOP to highlight opportunities to assist in the delivery of the energy opportunities.

10.2.2 *Proposed Policy 2: Reduction in emissions from new development*

- Planning applications should be accompanied by an energy strategy incorporating the design stage Part L calculations which can be used to check the improvement over building regulations
- The energy strategy should also demonstrate that the proposed solutions are the most practical and best option for the site and provide details on the measures that have been taken to address any consequences of the proposed energy solution (e.g. air quality)
- Planning: Check compliance of design stage Part L calculations
- Building control: Check As-Built Part L calculations

10.2.3 *Proposed Policy 3: District Heating*

- The energy strategy accompanying planning applications should demonstrate the should also demonstrate that the proposed solutions are the most practical and best option for the site and provide details on the measures that have been taken to address any consequences of the proposed energy solution (e.g. air quality)
- Ensure that plant replacement in all public buildings considers the future potential for district heating in line with the EOP

- Planning: Check that planning applications have fully considered and if feasible implemented on-site CHP and district energy networks.
- Development Control: Check that all development has implemented on-site CHP and district energy networks where required and that it is operational.

10.2.4 *Proposed Policy 4: Consequential Improvements*

- Development Control: Check that all applications are accompanied by a completed checklist and that the actions identified in the checklist are completed as part of the works on site.

10.2.5 *Proposed Policy 5: Wind Power*

- Planning applications: Developments in or near wind priority areas should assess the potential to deliver wind turbines and report findings in the energy strategy that accompanies the planning application

10.2.6 *Proposed Policy 6: Environmental Design Standards*

- The energy strategy accompanying planning applications should include a pre-assessment for the CSH or BREEAM as appropriate.
- Planning applications: Check pre-assessments to confirm that correct rating has been targeted
- Development Control: Require copy of the final CSH or BREEAM certificate following the post-construction assessment to confirm correct final rating.

10.3 **Monitoring**

Some potential options of ongoing monitoring of energy infrastructure in the Borough are outlined below:

- The creation of a database to capture the details of low and zero carbon technologies implemented in the Borough. The database should include:
 - Location and details of district heating schemes
 - Location and system specification of micro-generation systems
 - Location and specification of community scale systems such as large-scale wind turbines

This database could then be used to report against regional and national targets for renewable energy generation.

- Update the Energy Opportunity Map and the other sets of opportunity and constraints maps should be updated to take account of new development and other changes that might affect the potential to deliver the low and zero carbon energy generation technologies discussed in this study. The updated maps would also be able to represent the details included in the database described above.

The GIS layers prepared for this study will be made available for the Council to use and modify as they wish.

- Using the model created for this study the Council could potentially seek to undertake an ongoing monitoring programme of CO₂ emissions from buildings within the Borough.
 - Update the survey data for existing residential and commercial development
 - Updating the projected new development
 - Including improvement measures to existing dwellings
 - Including new development and associated LZC solutions as they are implemented

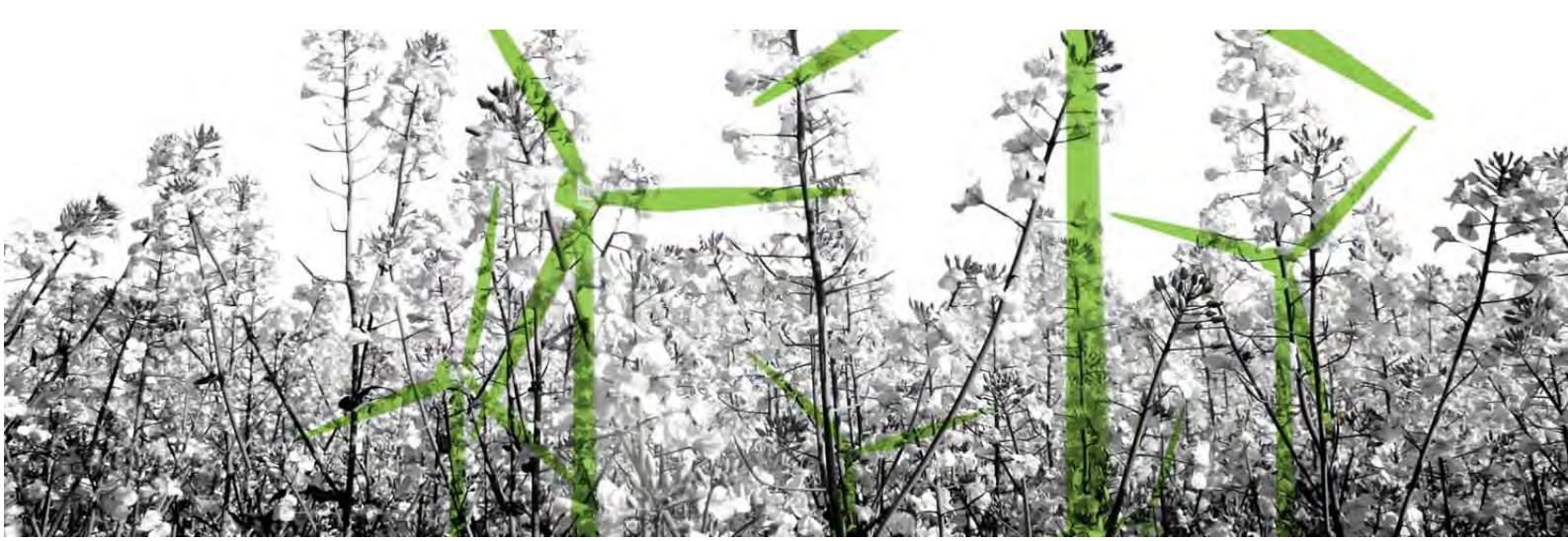


Glossary

AAP	Area Action Plan
ASHP	Air Source Heat Pump
Allowable Solutions	These are mainly off-site measures for dealing with the residual CO ₂ emissions (including from appliances).beyond carbon compliance
Baseload	The pre-existing load for a given area or to be met by any system under consideration.
BERR	Government Department of Business, Enterprise and Regulatory Reform.
BREEAM	The Building Regulations Establishment Environmental Assessment Method. It measures the environmental performance of a building.
Carbon Compliance	The achievement of zero carbon emissions entirely within the site boundary and/or with connection to off-site heat networks.
CERT	Carbon Emissions Reduction Target aim to promote the uptake of measures by requiring utility companies to promote and facilitate energy efficiency improvements.
CHP	Combined Heat and Power. This system works by generating electricity near or on-site, capturing the heat for space and water heating.
CIBSE	Chartered Institution of Building Services Engineers.
CSH / Code / Code for Sustainable Homes (CSH)	This is an environmental assessment method which attempts to rate the sustainability of residential dwellings by assessing them against nine key criteria including water, energy and CO ₂ emissions.
CRC	The Carbon Reduction Commitment is a mandatory carbon trading scheme, coming into force in 2010, designed to encourage organisations with large property portfolios to manage energy consumption and emissions.
DHN	District Heating Network. This term is generally given to a system where a centralised heat raising plant (using any one of a range of technologies) provides heat to surrounding buildings in the area by means of a network of pipes.
EOP	Energy Opportunities Plan, see section 5.9

ESCo	Energy Supply Company – A commercial entity which typically operates and maintains the plant associated with a DHN. They would also normally bill any user of the DHN.
Existing Non-Residential	Any building which is not a dwelling that exists within area at the time of this study.
Existing Residential	Any dwelling, whether privately owned, rented or social housing which exists within the area at the time of this study.
GIS	Geographic Information System. Visual representations in map form so that relationships of physical location can be observed.
GSHP	Ground Source Heat Pumps. These are renewable and low carbon technologies which extract heat from the ground for space and water heating.
Heat Density Mapping	A visual representation of the heat demand in a given area, shown as thermal energy demand per Km.
HECA	Home Energy Conservation Act. The 1995 Act mandates all Local Authorities to carry out voluntary cost effective and practical measures that will reduce home energy consumption by 30% over 10 to 15 years.
HESS	Heat and Energy Saving Strategy. Government strategy to increase the scope and ambition of energy saving measures, as well as decarbonising the generation and supply of heat.
LZCs	Low and Zero Carbon energy generation technologies, such as; biomass, wind, solar etc.
Micro-generation	Refers to the use of on-site technologies to generate heat and/or electricity from low or zero carbon sources.
MVHR	Mechanical Ventilation with Heat Recovery
NI186	National Indicator 186 is the per capita CO ₂ emissions for a given Local Authority area.
On-Site	In this context, on-site means any measures taken by a developer within the boundary of the building required to comply with Part L of the Building Regulations.
Planned Development	Planned development in the area from data provide by Southwark's Regeneration and Neighbourhood team at the time of writing.
PV	Photovoltaic. These are renewable energy systems which convert energy from the sun into electricity through semi conductor cells.
Regulated CO₂ Emissions	That element of a building's CO ₂ emissions which are controlled by Part L of the Building Regulations (space and water heating, ventilation, lighting, pumps, fans & controls).
SAP Modelling	Standard Assessment Procedure. This is the methodology which must be used to demonstrate compliance of any new dwellings with Part L of the Building Regulations.
SDHAs	Strategic District Heating Areas. These areas are those where we have been able to demonstrate that a district heating network is viable.

SELCHP	South East London Combined Heat & Power.
TER	Target Emissions Rate. TER is the calculated target CO ₂ emission rate, expressed in kilograms of CO ₂ per square metre of total useful floor area (TUFA) per annum.
TM46	Technical Memorandum 46 published by CIBSE provides a range of energy consumption benchmarks for non-domestic buildings.
Zero Carbon	Refers to the definition provided by the 'Definition of Zero Carbon' (CLG, 2009), including both regulated and unregulated emissions.



Appendix A

Appendix A

To test and monitor the effects of national, regional and local targets on the district, we have developed Microsoft Excel® based model of the energy use and CO₂ emissions of buildings in the district covering the period of influence of the Core Strategy.

Integral to our model is an updateable input sheet which includes energy demands and CO₂ emissions for 76 different building types - both in the 'base case' (i.e. Part L 2006 compliant) and assuming a range of CO₂ reduction improvements (i.e. energy efficiency measures and low and zero carbon technologies). The outputs from the input sheet, although derived from only these 76 assumed building forms, are expressed in a form which can then be applied to the actual building stock.

It is recognised that there are a number of alternative approaches to sizing renewable and low carbon technologies and for calculating the likely energy and CO₂ savings. Technology costs also vary greatly between product and suppliers and are expected to fall in future at differing rates, as a result of technology 'learning'. For these reasons we felt it important to set out clearly what has been assumed at this stage, so that it will be possible to update the model input sheet as more robust data becomes available.

We have tended to use 'rules of thumb' to estimate installed technology capacities, annual energy generation, CO₂ savings and costs. Some, but not all, of these 'rules of thumbs' can be referenced to external and authoritative sources. Unreferenced assumptions are based on our experience of undertaking renewable and low carbon feasibility studies for a range of developer clients over the last 10 years.

It is recommended that the model input sheet is updated in line with the future publications of:

- Part L of the Building Regulations – expected March 2010, and;
- Standard Assessment Procedure (SAP) – expected end 2009.

Drafts of these documents (for consultation) contain a number of changes which will need to be updated in the model input sheet.

CO₂ Emissions

Conversion factors used to calculate CO₂ emissions are shown below. These are based on the emissions factors included in the 2006 Building Regulations Part L, Conservation of fuel and power ADL2. It should be noted that revised emissions factors are expected to be published in the 2010 update to Building Regulations Part L. The revised factors could significantly affect the calculated emissions figures, however as they are not yet known it has not been possible to take this into account in this study.

Fuel	CO ₂ emissions kgCO ₂ /kWh delivered
Gas	0.194
Grid Supplied Electricity	0.422
Grid Displaced Electricity	0.568
Biomass	0.025
Waste Heat	0.018

Table 40 Conversion factors for different fuels

Calculating Energy Demand of Development

As far as possible the model aims to use locally specific data for the district (e.g. Census data, Valuations Office Agency (VOA) data) on the number, types and size of buildings. Although building numbers and floor areas in the model are informed directly by local data, in order to develop the modelling, and specifically to make assumptions relating to the types and likely cost of appropriate renewable and low carbon technologies, the buildings have been split into a manageable number of categories.

Residential

Data on the number of existing residential buildings in the district was taken from the 2001 Census in England and Wales and information from the Council regarding post-2001 developments. Both the age and dwelling type was taken into account to characterise differences in building fabric, occupant density, and the likelihood of building fabric improvements having been made.

Projected figures for the location, scale and phasing of new residential were taken from the Core Strategy. Residential development was modelled using benchmarks which take into account proposed changes to Building Regulations Part L requirements expected in 2010, 2013 and 2016.

Non-residential

Data was collected from the Valuation Office Agency (VOA) for existing, non-residential buildings. This provided floor areas of non-residential building types. Each building type was assigned to one of the benchmark categories set out in CIBSE TM46²¹, which defines energy benchmarks to allow assumptions to be made of CO₂ emissions from a range of building types.

CIBSE TM46 benchmarks were used to model energy demand of future non-domestic buildings. The benchmarks are based on data from the existing non-domestic building stock. A 25% reduction was applied to account for higher energy efficiency standards in new buildings.

Projected figures for location, scale and phasing of new non-domestic development were taken from the Core Strategy policies.

Building Type Assumptions

The 76 building categories that were modelled comprise;

- 12 existing dwelling types, comprising;
 - 4 types – semi detached (dense), semi detached (less dense), small terrace and flat/apartment
 - Modelled in three different age bands - pre 1919, 1919-1975 and post 1975
- 6 new dwellings types (i.e. post 2006), comprising;
 - Detached, semi detached, end terrace, 1 bed flat, 2 bed flat and 3 bed flat.
- 29 commercial building types (existing)
- 29 commercial building types (new, post 2006)

The house types selected were considered representative for the district (existing and proposed housing development) based on the draft SHLAA, Census information and the review of proposed development in the area. Residential floor areas were taken from existing building energy models and were cross checked with housing floor area assumptions used in earlier similarly strategic studies. The housing types and floor areas used for modelling are shown in Table 41 below.

House Type	Age	Floor Area	Storeys	Sources
Semi Detached (Dense)	pre 1919	104.65	2	Census Data + English House Condition Survey
Semi Detached (Dense)	1919-1975	83.89	2	Census Data + English House Condition Survey
Semi Detached (Dense)	post 1975	72.13	2	Census Data + English House Condition Survey
Semi Detached (Less Dense)	pre 1919	104.65	2	Census Data + English House Condition Survey
Semi Detached (Less Dense)	1919-1975	83.89	2	Census Data + English House Condition Survey
Semi Detached (Less Dense)	post 1975	72.13	2	Census Data + English House Condition Survey
Small Terrace	pre 1919	58.27	2	Census Data + English House Condition Survey
Small Terrace	1919-1975	60.40	2	Census Data + English House Condition Survey
Small Terrace	post 1975	54.32	2	Census Data + English House Condition Survey
Flat; maisonette or apartment	pre 1919	96.44	4	Census Data + English House Condition Survey
Flat; maisonette or apartment	1919-1975	84.76	4	Census Data + English House Condition Survey

²¹ CIBSE TM46:2008 Energy Benchmarks (CIBSE, 2009)

Flat; maisonette or apartment	post 1975	89.21	4	Census Data + English House Condition Survey
Detached	post 2006	101.61	2	CLG Zero C. RIA (Hurstwood)
Semi	post 2006	76.32	2	CLG Zero C. RIA (Wessex)
End- Terrace	post 2006	76.32	2	CLG Zero C. RIA (Wessex)
1 bed flat	post 2006	43.4	5	EST NBO Sirocco
2 bed flat	post 2006	76.6	5	EST NBO Sirocco
3 bed flat	post 2006	100.9	5	EST NBO Sirocco

Table 41 Modelled house type basic assumptions (CLG Zero C and EST NBO Sirocco refers to models created by AECOM for other schemes)

Information on public buildings and buildings not eligible for business rates was obtained from the Council and from the local authority website. Commercial building categories were selected to match the energy benchmarks published in CIBSE TM46. Floor areas were assumed as below and are representative of floor areas for real buildings of these types within the district (verified using VOA data).

Commercial Building Type	Floor Area	Storeys
General office	1000	4
High street agency	200	1
General retail	400	1
Large non-food shop	500	1
Small food store	500	1
Large food store	7000	1
Restaurant	250	1
Bar, pub or licensed club	500	1
Hotel	5000	6
Cultural activities	500	3
Entertainment halls	300	1
Swimming pool centre	1000	1
Fitness and health centre	500	2
Dry sports and leisure facility	150	1
Covered car park	500	5
Public buildings with light use	200	3
Schools and seasonal public buildings	6000	2
University campus	500	2
Clinic	200	2
Hospital; clinical and research	500	2
Long term residential	500	2
General accommodation	500	2
Emergency services	500	1
Laboratory or operating theatre	500	1
Public waiting or circulation, e.g. local station or mall	500	1
Transport terminal, e.g. airport	500	1
Workshop	1000	1
Storage facility	10000	1
Cold storage	500	1

Table 42 Commercial building types basic assumptions.

Roof areas

Assumptions relating to available roof areas are important with respect to potential energy generation from solar technologies.

For all building types, the available roof area for the installation of solar technologies has been assumed to be total floor area divided by the number of storeys, multiplied by 45%. Floor areas and assumed storey heights for each of the building types are shown in tables 1 and 2 above.

On pitched roofs, only half of the roof will face south, whereas on flat roofs, panels are mounted on frames which need to be spaced apart to limit over shading. Some area is also required for circulation, maintenance etc. Therefore, the maximum roof area that can be used for mounting solar panels, whether on flat or pitch roofs, has been considered to be 90% of half the available roof area i.e. 45% of the total roof area.

Energy Demand Assumptions

Dwelling energy demands were modelled in SAP, input assumptions were altered to take account of the likely fabric and plant performance in homes of varying age. The new dwellings have been modelled to comply with Buildings Regulations Part L 2006 or later. Unregulated energy demand (i.e. from non fixed building services - small power) has been calculated using a formula published within the Code for Sustainable Homes. This approach (for the unregulated emissions) has been used for existing and post 2006 dwellings.

For commercial buildings energy demands have been estimated by multiplying the floor areas above with energy benchmarks from CIBSE TM46. Energy use benchmarks have not been altered to differentiate between existing and new (post 2006) commercial uses, as there are no robust sources of information on which to base this.

We have had to assume how the energy benchmarks breakdown according to the energy demands which are regulated under Part L (i.e. for fixed building services such as heating, hot water and lighting) and which are unregulated (i.e. for small power). This is clearly essential where proposed policies being tested are framed in these terms. There is no recognised method for splitting energy benchmarks according to the emissions which are regulated or unregulated, but we have used assumptions that were made in the development of an the energy strategy for a major and high profile development in London.

	Benchmarks			Assumptions for splitting benchmarks			
	All Fossil	All Electric	ALL CO ₂	a.) Assumed % 'All Electric' (Regulated)	b.) Assumed % 'All Electric' used for space heat (where no Gas)	c.) Assumed % 'All Fossil' used for DHW	d.) Assumed % 'All Electric' used for DHW (where no Gas)
	kWh/m ²	kWh/m ²	kgCO ₂ /m ²	%	%	%	%
General office	120	95	75.1	30%	-	20%	-
High street agency	0	140	77	60%	20%	15%	10%
General retail	0	165	90.8	60%	20%	20%	10%
Large non-food shop	170	70	70.8	30%	-	15%	-
Small food store	0	310	170.5	60%	20%	20%	10%
Large food store	105	400	240	30%	-	20%	-
Restaurant	370	90	119.8	30%	-	25%	-
Bar, pub or licensed club	350	130	138	30%	-	25%	-
Hotel	330	105	120.5	30%	-	20%	-
Cultural activities	200	70	76.5	30%	-	20%	-
Entertainment halls	420	150	162.3	30%	-	15%	-
Swimming pool centre	1130	245	349.5	30%	-	20%	-

Fitness and health centre	440	160	171.6	30%	-	20%	-
Dry sports and leisure facility	330	95	115	30%	-	20%	-
Covered car park	0	20	11	60%	20%	0%	10%
Public buildings with light use	105	20	31	30%	-	15%	-
Schools and seasonal public buildings	150	40	50.5	30%	-	20%	-
University campus	240	80	89.6	30%	-	20%	-
Clinic	200	70	76.5	30%	-	20%	-
Hospital; clinical and research	420	90	129.3	30%	-	20%	-
Long term residential	420	65	115.6	30%	-	20%	-
General accommodation	300	60	90	30%	-	20%	-
Emergency services	390	70	112.6	30%	-	20%	-
Laboratory or operating theatre	160	160	118.4	30%	-	20%	-
Public waiting or circulation, e.g. local station or mall	120	30	39.3	30%	-	15%	-
Transport terminal, e.g. airport	200	75	79.3	30%	-	15%	-
Workshop	180	35	53.5	30%	-	10%	-
Storage facility	160	35	49.7	30%	-	10%	-
Cold storage	80	145	95	30%	-	20%	-

Table 43 Commercial building energy demand splits – regulated and unregulated.

Heat Mapping

Heat mapping has been conducted using gas supply data and assuming an average boiler efficiency of 80%. Heat density is defined as the annual heat demand in kWh, divided by the number of hours per year to give an annual average demand. This was then divided by the area under consideration. Potential issues with this method are:

The use of gas data ignores the use of other heating fuels such as electricity and oil, which is expected to make up a small proportion of heat demand.

The resolution of the heat map is limited by the Middle Layer Super Output Area boundaries, which is the format in which address data is provided. The results only provide an average of each Middle Layer Super Output Area and do not highlight point sources which may have a high heat demand.

Assumptions for Renewable and Low Carbon Energy Packages

The model has been constructed to test different policy options and select the least cost technology option to meet the different policy requirements.

▪ Energy Efficiency Level 1 (EE1)			References
Buildings applied	All residential buildings plus all commercial buildings		
Modelled or assumed savings	<i>Energy savings</i> <i>Modelled</i> Existing residential units: <ul style="list-style-type: none">▪ Pre 1919 – 20% saving on heat demand (regulated)▪ 1919-1975 – 15% saving on heat demand (regulated)▪ Post 1975 – 10% saving on heat demand (regulated)	<ul style="list-style-type: none">▪ SAP 2005▪ AECOM	

	<p>New residential units:</p> <ul style="list-style-type: none"> Package of measures designed to deliver a 15% - 20% reduction in the DER relative to TER (Part L 2006). Savings are split across regulated heat and regulated power – as modelled. <p><i>Assumed</i></p> <p>Commercial:</p> <ul style="list-style-type: none"> Between 5 – 15% (depending on building type) reduction in fossil fuel demand where fossil fuel used for heating and hot water. Between 5 – 10% (depending on building type) reduction in electricity use where electricity is used for heating and hot water. 	
Costing assumptions	<p>£15/m² residential</p> <p>£20/m² commercial</p>	<ul style="list-style-type: none"> From unpublished work undertaken by AECOM for Energy Savings Trust

▪ Energy Efficiency Level 2 (EE2)

		References
Buildings applied	All residential buildings plus all commercial buildings	
Modelled or assumed savings	<p><i>Energy savings</i></p> <p><i>Modelled</i></p> <p>Existing residential units:</p> <ul style="list-style-type: none"> Pre 1919 – 30% saving on heat demand (regulated) 1919-1975 – 25% saving on heat demand (regulated) Post 1975 – 20% saving on heat demand (regulated) <p>New residential units:</p> <ul style="list-style-type: none"> Package of measures designed to deliver around a 25% reduction in TER relative to TER (Part L 2006). Savings are split across regulated heat and regulated power – as modelled. <p><i>Assumed</i></p> <p>Commercial:</p> <ul style="list-style-type: none"> Between 7 – 21% (depending on building type) reduction in fossil fuel demand where fossil fuel used for heating and hot water. Between 7 – 14% (depending on building type) reduction in electricity use where electric used for heating and hot water. 	<ul style="list-style-type: none"> SAP 2005 AECOM
Costing assumptions	<p>£30/m² residential</p> <p>£40/m² commercial</p>	<ul style="list-style-type: none"> From unpublished work undertaken by AECOM for Energy Savings Trust

Solar Water Heating		
		References
Buildings applied	Residential buildings only.	
Technology sizing assumptions	Assumed to deliver 50% Domestic Hot Water. Domestic Hot Water consumption in homes taken from SAP (1). SAP models were run using data from the English House Condition survey for existing homes. For commercial buildings hot water use has been assumed at 20% of the fossil fuel benchmark (2). Evacuated tube Solar Water Heating panels assumed to deliver 520kW per m ² panel (3)	1. SAP 2005 2. CIBSE TM46 3. Ofgem
Costing assumptions	Evacuated tube system assumed to be £1000 per m ² . Note: Full system cost including hot water storage tanks etc	▪ Supplier quotes to AECOM

PV – minimum installation		
		References
Buildings applied	All residential buildings plus all commercial buildings	
Technology sizing assumptions	Assumed kWp taken to be ¼ of maximum possible panel based on the assumed roof areas Panel area assumed to be 7m ² /kWp Assumed output to be 800kWh/kWp	▪ SAP 2005 ▪ Supplier data
Costing assumptions	Assumed to be £6000 per kWp Note: Full system cost including invertors etc	▪ Supplier quotes to AECOM (2004 – 2008).

PV – medium installation		
		References
Buildings applied	All residential buildings plus all commercial buildings	
Technology sizing assumptions	Assumed kWp taken to be ½ of maximum possible panel area based on the assumed roof areas Panel area assumed to be 7m ² /kWp Assumed output to be 800kWh/kWp	▪ SAP ▪ Supplier data
Costing assumptions	Assumed to be £5500 per kWp. Note: Full system cost including invertors etc Note: Costs fall as system size gets larger.	▪ Supplier quotes to AECOM (2004 – 2008).

PV – maximum installation		
		References

Buildings applied	All residential buildings plus all commercial buildings	
Technology sizing assumptions	<p>Assumed kWp taken to be maximum possible panel area based on the assumed roof areas</p> <p>Panel area assumed to be 7m²/kWp</p> <p>Assumed output to be 800kWh/kWp</p>	<ul style="list-style-type: none"> ▪ SAP ▪ Supplier data
Costing assumptions	<p>Assumed to be £5000 per kWp.</p> <p>Note: Full system cost including invertors etc</p> <p>Note: Costs fall as system size gets larger.</p>	<ul style="list-style-type: none"> ▪ Supplier quotes to AECOM (2004 – 2008).
▪ Biomass		
		<i>References</i>
Buildings applied	New (post 2006) residential and post 2006 commercial buildings only. Different assumptions for new detached and semi detached homes.	
Technology sizing assumptions	<p>Biomass assumed to meet 80% of total heat demand, remainder met by gas.</p> <p>Biomass boiler efficiency assumed to be 76%</p> <p>Biomass demand based on energy generation of 3.85kWh/kg based on woodchips at 22% Moisture Content</p> <p>System size per unit assumed to be 50% of peak demand based on 60W/m²</p> <p>Detached and semi detached homes are assumed to be fitted with a 10kW individual boiler. Terraced houses and flats assumed to be part of a communal system</p>	<ul style="list-style-type: none"> ▪ AECOM ▪ BSRIA 'rules of thumb' ▪ Supplier data
Costing assumptions	<ul style="list-style-type: none"> ▪ £1020 per kW accounting for boiler, civils and communal heating infrastructure ▪ For the detached and semi detached homes – cost assumed £10,000 per dwelling for an individual boiler. <p>Note: Costs exclude civils work in connection with the biomass installation – i.e. plant room, fuel storage room etc</p>	<ul style="list-style-type: none"> ▪ Supplier quotes to AECOM (2004 – 2008). ▪ Department for Children, Schools, Families
▪ Ground Source Heat Pumps		
		<i>References</i>
Buildings applied	New (post 2006) residential and post 2006 commercial buildings only. Different assumptions for new detached and semi detached homes.	
Technology sizing assumptions	<p>Replacing 90% efficient gas boiler (except for in the case of commercial buildings which have no gas demand in the basecase and are assumed all electric)</p> <p>COP of 3.2 assumed for space heating</p> <p>COP of 2.24 assumed for water heating</p> <p>System sized to meet peak heat demand - based on 60W/m²</p> <p>Detached and semi detached homes are assumed to be fitted with an individual heat pump of 10kW. Terraced houses and flats assumed to be part of a communal system</p>	<ul style="list-style-type: none"> ▪ SAP 2005 ▪ BSRIA 'rules of thumb'

Costing assumptions	<ul style="list-style-type: none"> GSHP costs of £2000 per kW installed. <p>Notes: Costs exclude costs for ground testing and for laying ground loops either horizontally or vertically.</p> <p>Heat pumps provide heating and hot water and therefore often negate the need for a gas connection to the building. Given the strategic nature of this study this is assumed to be covered within the cost benchmark above.</p>	<ul style="list-style-type: none"> Supplier quotes to AECOM (2004 – 2008).
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■ Air Source Heat Pumps

		References
Buildings applied	All residential buildings and all commercial buildings	
Technology sizing assumptions	<p>Replacing 90% efficient gas boiler (except for in the case of commercial buildings which have no gas demand in the base case and are assumed all electric)</p> <p>COP of 2.5 assumed for space heating</p> <p>COP of 1.75 assumed for water heating</p> <p>Assumed all individual systems for residential</p>	<ul style="list-style-type: none"> SAP 2005 BSRIA 'rules of thumb'
Costing assumptions	<p>Residential – £6000 per system</p> <p>Commercial – £800 per kW</p>	<ul style="list-style-type: none"> Supplier quotes to AECOM (2006 – 2008).

■ Gas fired CHP

		References
Buildings applied	New residential and new commercial buildings only.	
Technology sizing assumptions	<p>60% heat from CHP, 40% from gas fired boilers</p> <p>Distribution loss factor: 5%</p> <p>CHP Electrical Generation Efficiency assumed to be 33%</p> <p>CHP Heat Generation Efficiency assumed to be 45%</p> <p>System sized to meet 50% peak thermal demand, assumed to be 60W/m².</p>	<ul style="list-style-type: none"> AECOM SAP 2005 Supplier system efficiencies BSRIA 'rule of thumb'
Costing assumptions	<p><i>Residential</i></p> <p>£5000 per dwelling for fixed cost of district heating infrastructure plus £2000 per kW_e.</p> <p><i>Commercial</i></p> <p>Fixed cost of £20/m² (floor area) for district heating infrastructure plus £2000 per kW_e.</p>	<ul style="list-style-type: none"> Supplier quotes to AECOM (2006 – 2008). The potential and costs of district heating networks (Faber Maunsell & Poyry, April 2009)

■ Gas fired CHP plus Biomass top-up

		References
Buildings applied	New residential and new commercial buildings only.	
Technology sizing assumptions	<p>60% of total heat requirements delivered by CHP</p> <p>Remaining heat from biomass (80%) and gas fired boilers (20%)</p> <p>Distribution loss factor: 5%</p> <p>CHP Electrical Generation Efficiency assumed to be 33%</p> <p>CHP Heat Generation Efficiency assumed to be 45%</p> <p>System sized to meet 50% peak thermal demand, assumed to be 60W/m².</p>	<ul style="list-style-type: none"> ▪ AECOM ▪ SAP 2005 ▪ Supplier system efficiencies ▪ BSRIA 'rule of thumb'
Costing assumptions	<p><i>Residential</i></p> <p>£5000 per dwelling for fixed cost of district heating infrastructure plus £2000 per kWe.</p> <p>Biomass boiler cost assumed to be £200 per kW</p> <p><i>Commercial</i></p> <p>Fixed cost of £20/m² (floor area) for district heating infrastructure plus £2000 per kWe.</p>	<ul style="list-style-type: none"> ▪ Supplier quotes to AECOM (2006 – 2008). ▪ The potential and costs of district heating networks (Faber Maunsell & Poyry, April 2009)

▪ Biomass CHP		
		References
Buildings applied	New residential and new commercial buildings only.	
Technology sizing assumptions	<p>60% heat from CHP, 40% from gas fired boilers</p> <p>Distribution loss factor: 5%</p> <p>CHP Electrical Generation Efficiency assumed to be 25%</p> <p>CHP Heat Generation Efficiency assumed to be 50%</p> <p>Biomass demand based on energy generation of 3.85kWh/kg based on woodchips at 22% Moisture Content</p> <p>System sized to meet 50% peak thermal demand, assumed to be 60W/m².</p>	<ul style="list-style-type: none"> ▪ AECOM ▪ SAP 2005 ▪ Supplier system efficiencies ▪ BSRIA 'rule of thumb'
Costing assumptions	<p><i>Residential</i></p> <p>£5000 per dwelling for fixed cost of district heating infrastructure, biomass fuel store etc plus £4000 per kWe.</p> <p><i>Commercial</i></p> <p>Fixed cost of £25/m² (floor area) for district heating infrastructure plus £4000 per kWe.</p>	<ul style="list-style-type: none"> ▪ Supplier quotes to AECOM (2006 – 2008).

Technology Combination Options

In addition to the 12 basic technology options outlined above, our model input sheet also includes a further 20 technology options made up from various combinations of the above. Allowable solutions are also introduced as a proxy technology measure to provide a way of using the model to help quantify money that could be raised using this mechanism.

For simplicity and because of the high level nature of the study – CO₂ savings and costs from the options outlined above are simply summed in the combined options. For example, where energy efficiency is specified with biomass boilers and PV, savings and costs from options 1, 5 and 7 above would be summed together. In actual fact the savings achieved from a range of measures would not be the sum of savings from three separate measures, however this approach is considered sufficiently robust for the purposes of this study. Combination options have been set up to group together only compatible technologies.

It was assumed that a basic level of energy efficiency should always be taken up – as a first step of a CO₂ reduction hierarchy, where low carbon energy supply and the use of renewable technologies come later in the hierarchy. Therefore savings from renewable technologies in the LZC sheet were calculated against the buildings where EE1 was already applied. Costs for the basic energy efficiency improvements have been added together with the cost of the LZC technology for every option, except where the advanced energy efficiency standard is applied.

Modelling the Impact of Targets

For each year in the study period, an appropriate scenario is chosen by the model for new or improved buildings on each development site, based on the lowest cost solution that achieves the policy target that is also compatible with the site specific constraints.

- The split between regulated and unregulated CO₂ emissions for commercial building types is assumed based on experience – in reality the split is highly variable. This could have implications in terms of the ability of technology options to deliver on policy targets within the model
- The same energy use benchmarks have been used for existing and new non-domestic buildings. There are no robust sources of information on variations in non-domestic building energy use by age or design characteristics.
- The size and form of commercial building types in the model is assumed. As a result the model does not deal well with commercial buildings that are integrated as part of mixed use developments (i.e. where the commercial element is one floor of a multi floor development). In these cases the calculated roof area available for solar panels will be greater than would be expected in reality and the model may assume an over reliance on solar technologies to deliver on policy targets
- Costs in the model input sheet are capital cost only. Our model does not consider maintenance and replacement costs over technology lifetime and allows no benefit for revenue gained from feed in tariffs or renewable heat incentives. These lifecycle costs and benefits are hugely important for some developers (housing associations and commercial owner occupiers) and need to be considered alongside results from the model.

Not every low carbon or renewable technology has been considered within this study – it has been assumed that building mounted wind turbines, hydro and fuel cells are either not technically feasible or financially viable at this stage.



Appendix B – Delivery Options

Appendix B

Renewable Energy Certificates (ROCs)

The Renewables Obligation requires licensed electricity suppliers to source a specific and annually increasing percentage of the electricity they supply from renewable sources. The current level is 9.1% for 2008/09 rising to 15.4% by 2015/1622. The types of technology and the number of ROCs achieved per MWh are outlined in the table below. The value of a ROC fluctuates as it is traded on the open market.

Technology	ROCs/MWh	Technology	ROCs/MWh
Hydro	1	Energy from Waste with CHP	1
Onshore wind	1	Gasification/Pyrolysis	2
Offshore wind	1.5	Anaerobic Digestion	2
Wave	2	Co-firing of Biomass	0.5
Tidal Stream	2	Co-firing of Energy crops	1
Tidal Barrage	2	Co-firing of Biomass with CHP	1
Tidal Lagoon	2	Co-firing of Energy crop with CHP	1.5
Solar PV	2	Dedicated Biomass	1.5
Geothermal	2	Dedicated energy crops	2
Geopressure	1	Dedicated Biomass with CHP	2
Landfill Gas	0.25	Dedicated Energy Crops with CHP	2 ²³
Sewage Gas	0.5		

Feed-in-tariffs

These are due to come into action in April 2010 for installations not exceeding 5 MW. The following low-carbon technologies are expected to be eligible:

- Biomass and biofuels
- Fuel cells
- Solar power, including photovoltaics
- Water (including waves and tides)
- Wind

22 What is the Renewables Obligation? (department for Business, Innovation and Skills website <http://www.berr.gov.uk/energy/sources/renewables/policy/renewables-obligation/what-is-renewables-obligation/page15633.html>, accessed August 2009)

23 Renewable Obligation Certificate (ROC) Banding (DECC websites <http://chp.defra.gov.uk/cms/roc-banding/>, accessed August 2009)

- Geothermal
- CHP with an electrical capacity of 50 kW or less

The electricity produced by these technologies will be bought by the utilities at above market prices. These prices will decrease over time to reflect the impact of increasing installation rates on end prices charged to consumers, the goal being to enable industries to “stand alone” at the end of the tariff period.

Salix Finance

This is a publicly funded company designed to accelerate public sector investment in energy efficiency technologies through invest to save schemes. Funded by the Carbon Trust, Salix Finance works across the public sector including Central and Local Government, NHS Trusts and higher and further education institutions. It will provide £51.5 million in interest free loans, to be repaid over four years, to help public sector organisations take advantage of energy efficiency technology .

Salix launched its Local Authority Energy Financing (LAEF) pilot scheme in 2004. The success of this programme has allowed the pilot to be rolled out into a fully fledged local authorities programme.

The Community Infrastructure Levy

The CIL is expected to commence in April 2010 and unlike Section 106 contributions can be sought ‘to support the development of an area’ rather than to support the specific development for which planning permission is being sought. Therefore, contributions collected through CIL from development in one part of the charging authority can be spent anywhere in that authority area. This makes CIL potentially an ideal mechanism for operating a carbon fund.

Carbon Emission Reduction Target

The Carbon Emissions Reduction Target (CERT) is a legal obligation on the six largest energy suppliers to achieve carbon dioxide emissions reductions from domestic buildings in Great Britain. Local authorities and Registered Social Landlords (RSL) can utilise the funding that will be available from the energy suppliers to fund carbon reduction measures in their own housing stock and also to set up schemes to improve private sector housing in their area.

The main different types of measures that can receive funded under CERT are:

- Improvements in energy efficiency
- Increasing the amount of electricity generated or heat produced by microgeneration
- Promoting community heating schemes powered wholly or mainly by biomass (up to a size of three megawatts thermal)
- Reducing the consumption of supplied energy, such as behavioural measures.

Section 106 Agreements

Section 106 agreements are planning obligations in the form of funds collected by the local authority to offset the costs of the external effects of development, and to fund public goods which benefit all residents in the area

The Community Energy Saving Programme

This is a £350million programme for delivering “whole house” refurbishments to existing dwellings through community based projects in defined geographical areas. This will be delivered through the major energy companies and aims to deliver substantial carbon reductions in dwellings by delivering a holistic set of measures including solid wall insulation, microgeneration, fuel switching and connection to a district heating scheme. Local authorities are likely to be key delivery partners for the energy companies in delivering these schemes.

CESP has two grant initiatives, both are available to not-for-profit community based organisations in England.

Prudential borrowing and bond financing

The Local Government Act 2003 empowered Local Authorities to use unsupported prudential borrowing for capital investment. It simplified the former Capital Finance Regulations and allows councils flexibility in deciding their own levels of borrowing based upon its own assessment of affordability. The framework requires each authority to decide on the levels of borrowing based upon three main principles as to whether borrowing at particular levels is prudent, sustainable and affordable. The key issue is that prudential borrowing will need to be repaid from a revenue stream created by the proceeds of the development scheme, if there is an equity stake, or indeed from other local authority funds (e.g. other asset sales).

Currently the majority of a council's borrowing, will typically access funds via the ‘Public Works Loan Board’. The Board's interest rates are determined by HM Treasury in accordance with section 5 of the National Loans Act 1968. In practice, rates are set by Debt Management Office on HM Treasury's behalf in accordance with agreed procedures and methodologies. Councils can usually easily and quickly access borrowing at less than 5%.

The most likely issue for local authorities will be whether or not to utilise Prudential Borrowing, which can be arranged at highly competitive rates, but remains ‘on-balance sheet’ or more expensive bond financing which is off-balance sheet and does not have recourse to the local authority in the event of default.

Best Value

Local authorities have the right to apply conditions to sales of their own land, whereby a lower than market value sale price is agreed with the developer in return for a commitment to meet higher specified sustainability standards. Rules governing this are contained within the Treasury Green Book which governs disposal of assets and in within the Best Value - General Disposal Consent 2003 ‘for less than best consideration without consent’. It is our understanding that undervalues currently have a cap of £2 million without requiring consent from Secretary of State.

Local Asset-Backed Vehicles

LABVs are special purpose vehicles owned 50/50 by the public and private sector partners with the specific purpose of carrying out comprehensive, area-based regeneration and/or renewal of operational assets. In essence, the public sector invests property assets into the vehicles which are matched in case by the private sector partner.

The partnership may then use these assets as collateral to raise debt financing to develop and regenerate the portfolio. Assets will revert back to the public sector if the partnership does not progress in accordance with pre-agreed timescales through the use of options.

Control is shared 50/ 50 and the partnership typically runs for a period of ten years. The purpose and long term vision of the vehicle is enshrined in the legal documents which protect the wide economic and social aims of the public sector along with pre-agreed business plans based on the public sector's requirements.

Many local authorities are now investigating this approach, with the London Borough of Croydon being the first LA to establish a LABV in November 2008. LABVs are still feasible if adapted to suit the current macro economy. The first generation of LABVs were largely predicated on a transfer of assets from the public sector to a 50/50 owned partnership vehicle in which a private sector developer/investor partner invested the equivalent equity usually in cash. The benefits were in some instances compelling.

This transfer of assets suited the public sector given yields and prices had never been stronger. There is now a need for a second generation of LABVs that deliver many of the recognised benefits of LABVs as set out above but protect the public sector from selling 'the family silver' at the bottom of the market.

The answer may lie in LABV Mark 2 – a new model that is emerging based on the use of property options that will act as incentives. A better acronym would be LIBVs (Local Incentive Backed Vehicle) in which the public sector offers options on a package of development and investment sites in close 'place-making' proximity. The private sector partner is procured, a relationship built, initial low cost 'soft' regeneration is commenced such as; understanding the context, local consultation, masterplanning, site specific planning consents etc. Thereafter, as and when the market returns, the sites and delivery process will be ready to respond, options will be exercised, ownership transferred and a price paid that reflects the market at the time.

JESSICA

The Joint European Support for Sustainable Investment in City Areas (JESSICA) is a policy initiative of the European Commission and European Investment Bank that aims to support Member States to exploit financial engineering mechanisms to bring forward investment in sustainable urban development in the context of cohesion policy.

Under proposed new procedures, Managing Authorities in the Member States, which in the case of London is the LDA, will be allowed to use some of their Structural Fund allocations,

principally those supported by ERDF, to make repayable investments in projects forming part of an 'integrated plan for sustainable urban development' to accelerate investment in urban areas.

In London the £100m JESSICA Holding Fund will be launched this year, made up of £50m from the European Regional Development Fund and £50m matched funding. Two Urban Development Funds will be procured and launched in 2010 – allocating £64m to decentralised energy and £36m to waste infrastructure improvements, and inviting potential projects to bid for funds. Funds will be invested in the form of equity, loans or guarantees, and returns arising from successful investments will be returned to the fund.

The London Green Fund

The London Green Fund is a revolving fund that will make investments in initiatives, including decentralised energy, that tackle climate change. The fund structure is expected to allow the creation of commercial templates, spurring markets in new financial asset classes, once the cash flows from investments begin to stabilise. It will do so by investing equity in projects at an early stage of their development, making financing more viable and cost effective.

The fund will take a long term and realistic view on both the scale and timing of financial returns on investment than would normally be taken by markets in the current credit environment. Once projects under a specific initiative have demonstrated a track record and return, the fund will be able to sell down its original investments in part or in full, releasing equity back into the London Green Fund.

Initial seed funding of £4 million from the LDA and GLA will be supplemented by the private sector as the fund becomes more established. The aim is to create a fund size of over £100 million with investment from central government, development banks, sovereign and infrastructure funds. It will be managed by a reputable external fund manager to introduce the required discipline, allowing projects to be fully analysed as to financial and environmental impact prior to commencement. At the same time, it will allow the LDA and the GLA to determine and set the high level objectives for the fund and each initiative, whilst retaining focus on delivery.

Low Carbon Buildings Programme

Phase 2 of the Low Carbon Buildings Programme is a capital grant scheme from the Department of Energy and Climate Change (DECC) totalling £50m for the installation of micro-generation technologies by organisations including local housing authorities, housing associations, schools and other public sector buildings and charitable bodies. The programme is open to all products and installer companies registered on the Micro-generation Certification Scheme (MCS). Applications can be made for up to 50% (up to a maximum of £200,000) of the cost of installing approved technologies, although the maximum grant levels can depend on the nature of the organisation. The local authorities should seek to install appropriate technologies on their own stock and should work to ensure that those who are eligible are aware of the Programme and what it can offer.

Green Renewable Energy Fund

An example of this is operated by EDF. Customers on the Green Tariff pay a small premium on their electricity bills which is matched by EDF and used to help support renewable energy projects across the UK. This money is placed in the Green Fund and used to award grants to community, non-profit, charitable and educational organisations across the UK.

The Green Fund awards grants to organisations who apply for funds to help cover the cost of renewable energy technology that can be used to produce green energy from the sun, wind, water, wood and other renewable sources. Funding will be provided to cover the costs associated with the installation of small-scale renewable energy technology and a proportion of the funding requested may be used for educational purposes (up to 20%). Funding may also be requested for feasibility studies into the installation of small-scale renewable energy technology.

There is no minimum value for grants, with a maximum of £5,000 for feasibility studies, and £30,000 for installations. All kinds of small-scale renewable technologies are considered. The closing dates for the applications usually fall on the 28th February and the 31st August.

Intelligent Energy Europe

The objective of the Intelligent Energy – Europe Programme aims to contribute to secure, sustainable and competitively priced energy for Europe. It covers action in the following fields:

- Energy efficiency and rational use of resources (SAVE)
- New and renewable energy resources (ALTENER)
- Energy in transport (STEER) to promote energy efficiency and the use of new and renewable energy sources in transport

The amount granted will be up to 75% of the total eligible costs for projects and the project duration must not exceed 3 years.

European Local Energy Assistance (ELENA) technical assistance facility

To facilitate the mobilisation of funds for investments in sustainable energy at local level, the European Commission and the European Investment Bank have established the ELENA technical assistance facility financed through the [Intelligent Energy-Europe](#) programme. ELENA support covers a share of the cost for technical support that is necessary to prepare, implement and finance the investment programme, such as feasibility and market studies, structuring of programmes, business plans, energy audits, preparation for tendering procedures – in short, everything necessary to make cities' and regions' sustainable energy projects ready for EIB funding.

Many EU cities and regions have recently started to prepare or are initiating large energy efficiency and renewable energy proposals to tackle energy and climate change challenges. However, most of them are still at the conceptual stage and their implementation is proving difficult because many regions and cities, particularly medium to small ones, often do not have the technical capacity to develop large programmes in this area. ELENA helps public entities to solve such problems by offering specific support for the implementation of the investment

programmes and projects such as retrofitting of public and private buildings, sustainable building and energy-efficient district heating and cooling networks.

Merchant Wind Power

A scheme of this type is operated by Ecotricity who build and operate wind turbines on partner sites. Ecotricity take on all the capital costs of the project, including the turbine itself, and also conducts the feasibility, planning, installation, operation and maintenance of the wind turbines. MWP partners agree to purchase the electricity from the turbine and in return receive a dedicated supply of green energy at significantly reduced rates.

Partnerships for Renewables is a company that has been set up to deliver turbines on public sector land. In return for a turbine the recipient receives an annual return on its investment. Importantly, installation would be limited to local authority owned land. Ecotricity operate a scheme whereby they build and operate wind turbines on partner sites. Ecotricity take on all the capital costs of the project, including the turbine itself, and also conducts the feasibility, planning, installation, operation and maintenance of the wind turbines. Partners agree to purchase the electricity from the turbine and in return receive a dedicated supply of green energy at significantly reduced rates.

Low Carbon Communities Challenge

Local authorities can apply for up to £500,000 for energy efficiency and renewable energy measures across their locality. This could help deliver carbon-saving projects such as area-based insulation schemes or community renewables. The two year programme will provide financial and advisory support to 20 'test-bed' communities in England, Wales and Northern Ireland, support inward investment and foster community leadership. The programme is open to local authorities and community groups and the Challenge is focused on communities already taking action, or facing change in the area as a result of climate change and those looking to achieve deep cuts in carbon over the long term.

The programme will provide around £500,000 capital funding (up to 10% can be spent on project management). The timescale on the scheme is short with the capital money needing to be spent very soon. The challenge will be run in two phases with applicants able to apply for either of them. Phase 1 will be for green 'exemplar' communities that have already integrated community plans to tackle climate change and Phase 2 is for communities already taking some action or facing change in their area.

Biomass Grants

If grown on non-set-aside land then energy crops are eligible for £29 per hectare under the Single Farm Payment rules (set-aside payments can continue to be claimed if eligible). The Rural Development Programme for England's Energy Crops Scheme also provides support for the establishment of SRC and Miscanthus. Payments are available at 40% of actual establishment costs, and are subject to an environmental appraisal to help safeguard against energy crops being grown on land with high biodiversity, landscape or archaeological value.

Local Authorities Carbon Management Programme

Through the Local Authority Carbon Management Programme, the Carbon Trust provides councils with technical and change management guidance and mentoring that helps to identify practical carbon and cost savings. The primary focus of the work is to reduce emissions under the control of the local authority such as buildings, vehicle fleets, street lighting and waste.

Participating organisations are guided through a structured process that builds a team, measures the cost and carbon baseline (carbon footprint), identifies projects and pulls together a compelling case for action to senior decision makers. Carbon Trust consultants are on hand throughout the ten months. Direct support is provided through a mixture of regional workshops, teleconferences, webinars and national events.

The Programme could provide a useful mechanism for the Council to address its carbon emissions of which energy planning and delivery will be an important part.



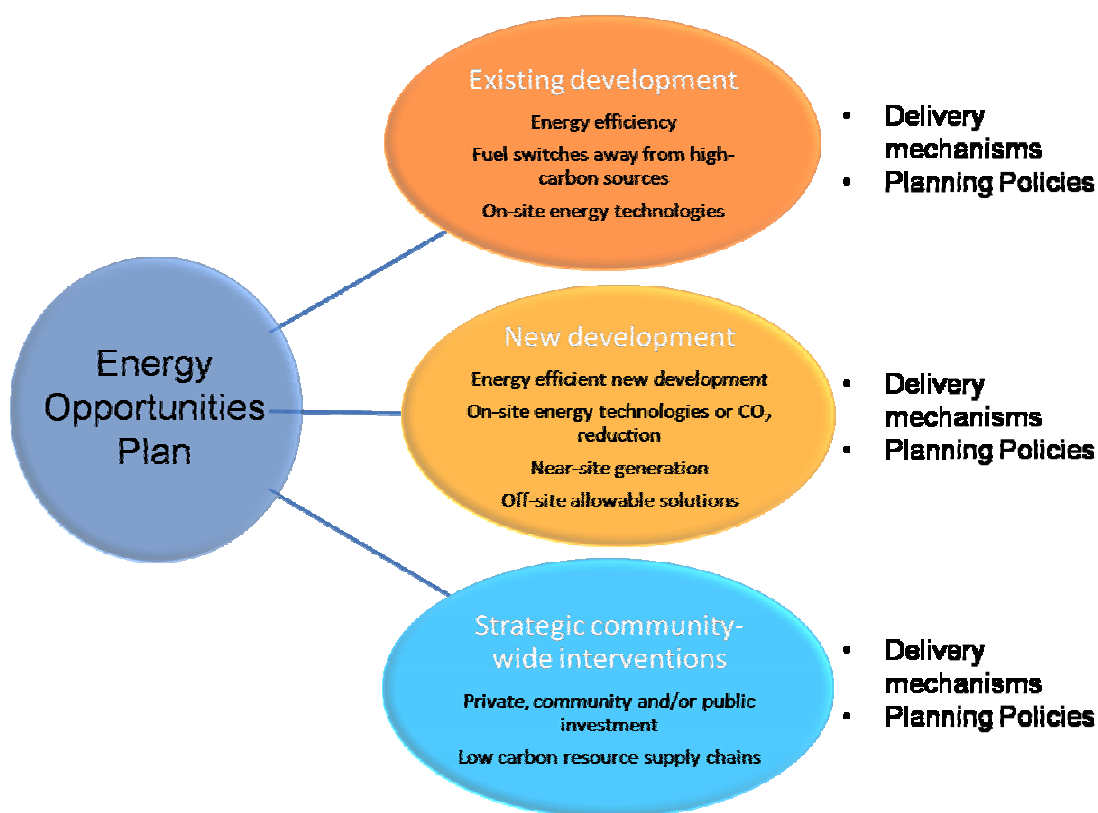
Appendix C – Summary of Policy Options

Appendix C

Introduction

Delivery of local energy opportunities depends on market context along with the role and will of Borough and London-wide delivery partners and communities. The role of the local planning authority (LPA) in delivery varies according to the type and scale of energy opportunity available. This section describes the opportunities and constraints for planning policy and delivery of energy-related CO₂ reduction and generation in Enfield, the delivery mechanisms and partners and the role of the LPA within the wider London context.

The study focuses on three broad energy opportunities, across which the planning and delivery context varies: existing development; new development; and strategic community-wide interventions. The Energy Opportunities Plan (EOP) should act as a resource for the development of delivery mechanisms and planning policies that are targeted at the three energy opportunities.



Process for delivering and planning energy opportunities

Possible policy options

- Percentage reduction in total site emissions
- Achievement of CSH or BREEAM standards
- Contributing to carbon offset funds
- Requiring connection to energy networks

These are not mutually exclusive and can potentially be used in combination. Below is an evaluation of existing policy options from other parts of England. Following further analysis and based on discussion earlier in this section we will propose policies for inclusion in the Core Strategy.

Percentage reductions in total site emissions

Policy basis

This policy approach has been widely adopted by local authorities to reduce energy demands and CO₂ emissions for proposed developments and is commonly referred to as the “Merton Rule”, after the Local Authority who first adopted this style of policy. Such policies require that developments of a certain type and above a certain size reduce their CO₂ emissions by specified proportion through the use of on-site renewables. The original Merton policy wording required developments to: “*incorporate renewable energy production equipment to provide at least 10% of predicted energy requirements*”, this was later clarified as relating to CO₂ emissions²⁴.

The original Merton Rule style policy is not compliant with the PPS1 Supplement which details: “planning authorities should:

- (i) set out a target percentage of the energy to be used in a new development to come from decentralised and renewable or low-carbon energy sources²⁵ where it is viable. The target should avoid prescription on technologies and be flexible in how carbon savings from local energy supplies are to be secured;” (Paragraph 26 (i))

It is therefore no longer appropriate to specify a specific reduction in CO₂ emissions from on site renewable energy only. Consideration should therefore be given to a “Merton Plus”²⁶ style policy which refers to CO₂ reduction from decentralised and renewable or low-carbon energy sources.

²⁴ Energy should not be used as the reference unit due to the differing CO₂ emissions factors for different fuels
http://www.merton.gov.uk/living/planning/planningpolicy/mertonrule/how_is_the_policy_applied.htm

²⁵ Decentralised and renewable or low-carbon energy is defined as “*Decentralised renewable energy or decentralised low-carbon energy or a combination of decentralised renewable energy and decentralised low-carbon energy*” (CLG (2007) *Planning Policy Statement: Planning and Climate Change* Glossary.

²⁶ <https://www.planningportal.gov.uk/england/professionals/en/1115315206013.html>

Although the old “Merton Rule” policy is now out dated it is worth pointing out the appeal of the policy approach. Of the 390 councils in England 325 have taken up the Merton Rule while all councils in Scotland and Wales followed their own version of the policy²⁷.

Advantages

- The original Merton Rule style policy was successfully implemented and enforced through planning conditions. AECOM's experience suggests that within London boroughs and certainly within the GLA, the policy is well understood and Council's understand how to implement and enforce the Merton Rule style policy (at least at the planning stage). It is considered that a Merton Plus style policy would be able to continue and expand on the success of the original policy and build on the base knowledge within local authorities.
- AECOM's experience suggests that the original Merton Rule policy has generally been successfully picked up by developers and addressed within planning applications, this is backed up by the review of energy strategies in the Borough. It is considered that, similar to the above benefit, the baseline knowledge gained by developers in implementing the Merton Rule puts this stakeholder in a good position to understand and implement a broader Merton Plus Policy.
- The Merton Rule has been cited as leading to increased uptake of renewables. It could be assumed that a “Merton Plus” style policy could would also encourage other decentralised and low-carbon energy sources.
- As detailed in the London Plan this policy style appears to work well and be complementary with other policies such as energy hierarchies and offsetting funds.

Disadvantages

- Neither the Merton Rule nor a Merton Plus policy would directly encourage energy efficiency or improved building fabric. Indirectly a reduced energy baseline is encouraged as a lower baseline means a lower level of decentralised and renewable or low carbon energy is required to meet the target percentage. These criticisms can be resolved by combining this policy with an energy hierarchy policy similar to that in the London Plan.
- Experience has demonstrated that within London it is possible to agree a renewables contribution that is lower than the defined 20% target, particularly within commercial developments. The reasons that the target renewables percentage cannot be achieved have to be defined and detailed in the planning application.
- Developers have criticised the Merton rule saying it stifles innovation and could hold back the development of properties, particularly during a recession. A Merton Plus policy provides further options for reducing carbon emissions thereby providing increasing opportunities for innovation.

²⁷http://www.merton.gov.uk/living/planning/planningpolicy/mertonrule/building_a_zero_carbon_future.htm

- We understand that there is limited experience of policing the implementation, enforcement or monitoring of the currently Merton Rule style policies within the final constructed developments. However, the London Borough of Newham has used a condition for ongoing energy monitoring on planning applications. London Borough of Camden and Milton Keynes have also extended the enforcement to require monitoring equipment and evidence before occupation. The Milton Keynes Supplementary Planning Document (SPD) details that planning conditions will require the agreed sustainability measures to be implemented prior to occupation of the development and documentary evidence of the relevant features and measures must be submitted to the Council. In addition, site inspections will also be carried out. This experience should be drawn upon and expanded for the implementation and enforcement of a Merton Plus style policy.
- The Merton Rule policy and Merton Plus policy are both only limited to new buildings with no associated / spin off benefits to reducing CO₂ emissions in existing buildings.
- It was necessary with the Merton Rule, and would be necessary for the Merton Plus to provide clarification of how the percentage reduction in carbon emissions is to be calculated. This can be challenging for both planners and applicants who may lack basic understanding of energy and CO₂.

Example

One of the most notable examples is in **London** where the Mayor of London implemented a 10% reduction in carbon emission requirement through its Sustainable Design and Construction Supplementary Planning Guidance, supplementing Policy 4A.9 of the London Plan²⁸. Importantly the GLA combined it with their energy hierarchy set out in Policy 4A.8. This hierarchy has evolved and the target raised to 20% in the latest London Plan, Consolidated with Alterations Since 2004 (adopted in February 2008).

Achievement of Code for Sustainable Homes or BREEAM standards

Policy basis

A policy requiring the achievement of specific Code for Sustainable Homes (CSH) or BREEAM ratings would indirectly impose energy targets. Section Ene 1 of both the CSH and BREEAM assessments addresses the energy consumption and resulting CO₂ emissions from a building. In the case of residential dwellings, credits are awarded on the basis of improvements over building regulations, for other buildings, credits are achieved based on the Energy Performance Certificate (EPC) rating.

²⁸ As detailed in the introduction of the Mayor's SPG the SPG could not set new policy but can be taken into account as a further material consideration so has weight as a supplement to the London Plan. The 10% requirement added a defined target renewable contribution to Policy 4A.9 Providing for renewables energy of the London Plan which previously has not set a percentage target.

Advantages

- CSH and BREEAM assessments consider the wider environmental impact of a building and therefore can achieve more holistic results in regards to delivering sustainable design and construction.
- The CSH and BREEAM assessments are regularly updated to reflect changes in the industry and feedback from developers and manufacturers. This iterative process ensures that they stay relevant and reflect measures that go beyond standard practice. It also allows adaptation to meet changing regulation, for example the definition of zero carbon.
- By simply requiring improvements over Building Regulations it provides developers with flexibility over how to meet the target as well as encouraging innovation in techniques and technologies.
- The energy elements of the CSH and BREEAM assessment methodologies are aligned to Building Regulations and therefore make it more straightforward for developers, who only need to carry out one set of calculations for the building.
- Achievement of the required target rating can be easily demonstrated through achievement of certification.
- The methodology and quality assurance for the achievement of the required rating is carried out by licensed assessors and the Building Research Establishment. The methodology is clearly specified in the technical guidance and linked to government approved software used to demonstrate Building Regulations compliance.
- A target relating to CSH and BREEAM ratings could be combined with any of the other types of targets outlined above.

Disadvantages

- The current version of the BREEAM assessment methodology only includes mandatory targets relating to the energy performance of a building, demonstrated by the EPC rating, for the 'Excellent' rating.
- A policy focussing on improvements over building regulations would not directly encourage energy efficiency or improved building fabric.
- A policy focussing on improvements over building regulations would not necessarily result in the implementation of decentralised energy networks, particularly as these could be more costly compared to other options. If decentralised networks are a priority for the Borough then such a policy in isolation may not be sufficient to ensure that site-wide systems are incorporated into strategic sites.
- A policy focussing on improvements over building regulations would not necessarily result in the incorporation of low or zero carbon energy technologies.

- The improvements to Part L of the Building Regulations will be challenging to developers, technically and financially, without additional planning requirements.

Example

Policy DC49 relating to sustainable design and construction in **Havering Borough Council's** LDF Core Strategy states that:

“Planning permission for major new developments will only be granted where they are built to a high standard of sustainable construction. Applicants for major developments will be required to produce documentation from the Building Research Establishment to confirm that the development will achieve a rating under the BREEAM rating scheme (or equivalent methodology), for non-residential developments of at least ‘Very Good’, or at least ‘Level 3’ Code for Sustainable Homes from 2008, ‘Level 4’ from 2010, ‘Level 5’ from 2013 and ‘Zero Carbon’ from 2016 for residential developments”

Havering have also released an SPD on Sustainable Design and Construction. The SPD states that a CSH and/or BREEAM pre-assessment must accompany the planning application to provide assurance that the design will achieve the required rating. An interim design stage certificate is required before construction can start on site and, following completion, the post-construction review (PCR) and subsequent formal certification is required.

Contribution into carbon offsetting funds

Policy basis

The premise of this approach is that a developer would pay into a fund a sum of money proportional to the predicted CO₂ emissions from the proposed development. This fund would then be used by the local authority to reduce CO₂ emissions elsewhere, for example through the creation/extension of district energy schemes. This approach has been proposed as one of the possible ‘allowable solutions’ which would form for the Government’s definition of zero carbon.

Some Councils have sought to implement such a fund through use of Section 106 agreements. These are private agreements negotiated, usually in the context of planning applications, between local planning authorities and persons with an interest in a piece of land, and intended to make acceptable development which would otherwise be unacceptable in planning terms²⁹.

In order to be legally compliant the scheme would need to adhere to the requirements of ODPM Circular 05/2005 Office of the Deputy Prime, Annex A paragraph A2 states that:

“Such obligations may restrict development or use of the land; require operations or activities to be carried out in, on, under or over the land; require the land to be used in any specified way; or require payments to be made to the authority either in a single sum or periodically”.

29 ODPM Circular 05/2005 Annex B

In setting an s.106 it must be demonstrated that it is directly related to the proposed development; necessary to make the proposed development acceptable in planning terms; fairly and reasonably related in scale and kind to the proposed development. The proximity restriction could mean that a significant number of otherwise desirable energy projects could not be funded. Also, there are many calls on s.106, such as affordable housing, meaning that the available funding 'pot' for energy is likely to be limited. However, the precedent set by a number of local authorities, such as Milton Keynes, demonstrate that this is a viable policy option.

The alternative funding option that may present itself is the Community Infrastructure Levy (CIL) which was introduced by the Planning Act 2008. Section 205(2) of the Act details that the overall purpose of CIL is to ensure that costs incurred in providing infrastructure to support the development of an area can be funded (wholly or partly) by owners or developers therefore providing significant opportunity for delivering decentralised low carbon energy. Regulations are currently being consulted on by government. The CIL is due to come into effect in April 2010.

Advantages:

- Opportunity to raise funds to improve the existing building stock or other low / zero carbon measures in the Borough.
- Opportunity to raise funds to provide low carbon infrastructure, such as heating networks of a district energy centre.
- Provide a method of approaching zero carbon through the use of off-setting similar to the proposed Allowable Solutions³⁰ thereby potentially starting the move towards zero carbon and Building Regs 2016/ 2019 standards.

Disadvantages:

- Potential pressures and balance on the s106 provisions between this and other requirements.
- Similarly, a significant number of planning applications do not have s.106 attached. The CIL may help to overcome this problem.
- Possible criticism over lack of transparency and for lengthy negotiations that tend to be associated with s106 provisions. This could be avoided by having a clear set fund amount being set in an SPD or similar.
- Seen by some as a local taxation system. The following concern was raised as part of the consultation for the Milton Keynes Core Strategy "The Milton Keynes Carbon Offsetting fund is a local taxation system that developers will use to avoid real and creative carbon zero solutions. Carbon offsetting will not support environmental sustainability³¹.

³¹ http://miltonkeynes-consult.limehouse.co.uk/portal/dev_plans/core_strategy/cspo_sept07/cs_po_sep07

- Potential for misuse, if developers pay into the fund rather than maximising the onsite carbon emissions. This can be resolved by combining the fund policy with a requirement for energy efficiency standards and decentralised and renewables or low-carbon energy policy.
- There is uncertainty around the legality and potential scope of funds, although the CIL may offer a solution.

Example

Milton Keynes have developed a Carbon Offset fund, supported by policy D4 of the Milton Keynes Local Plan (2005). The fund, which has been receiving payments since 2006, is detailed in MKC SPD Sustainable Construction – April 2007. The SPD states that any net increase in carbon dioxide emissions from a development must be calculated as tonnes per year. A one-off contribution is then required to the carbon offset fund, at a rate of £200 (index-linked) for each tonne carbon dioxide by means of a Section 106 agreement or unilateral undertaking. A calculation methodology is provided in the SPD³².

The Carbon Offset Fund is accompanied by a requirement for a Merton type policy for a minimum 10% CO₂ reduction to be provided from on-site renewable energy sources³³ and a requirement for energy efficiency. It is claimed that the Offset Fund, has saved nearly 570 tonnes of carbon dioxide across the Borough in the last year (April 2008- March 2009) through improving insulation in 508 properties³⁴. One of the key points raised by the Milton Keynes example was how the value of the fund was justified. The value was informed by the feasibility study undertaken at the outset by the United Sustainable Energy Agency (USEP) who now manages the fund. The fund was set at a value that enabled Milton Keynes to undertake the insulation work they wished to do.

Required connection to energy networks

Policy basis

The PPS1 Supplement states that planning authorities can expect proposed development to connect to an existing decentralised energy supply systems or be designed to be compatible for future connection.

The PPS adds that any policy relating to local requirements for decentralised energy supply to new developments should be set out in a Development Plan Document, not an SPD to ensure sufficient examination by an independent Inspector.

³² http://www.miltonkeynes.gov.uk/local_plan_review/displayarticle.asp?DocID=13942&ArchiveNumber

³³ <http://cmis.milton-keynes.gov.uk/CmisWebPublic/Meeting.aspx?meetingID=8711>

³⁴ <http://cmis.milton-keynes.gov.uk/CmisWebPublic/Binary.ashx?Document=27063>

Advantages

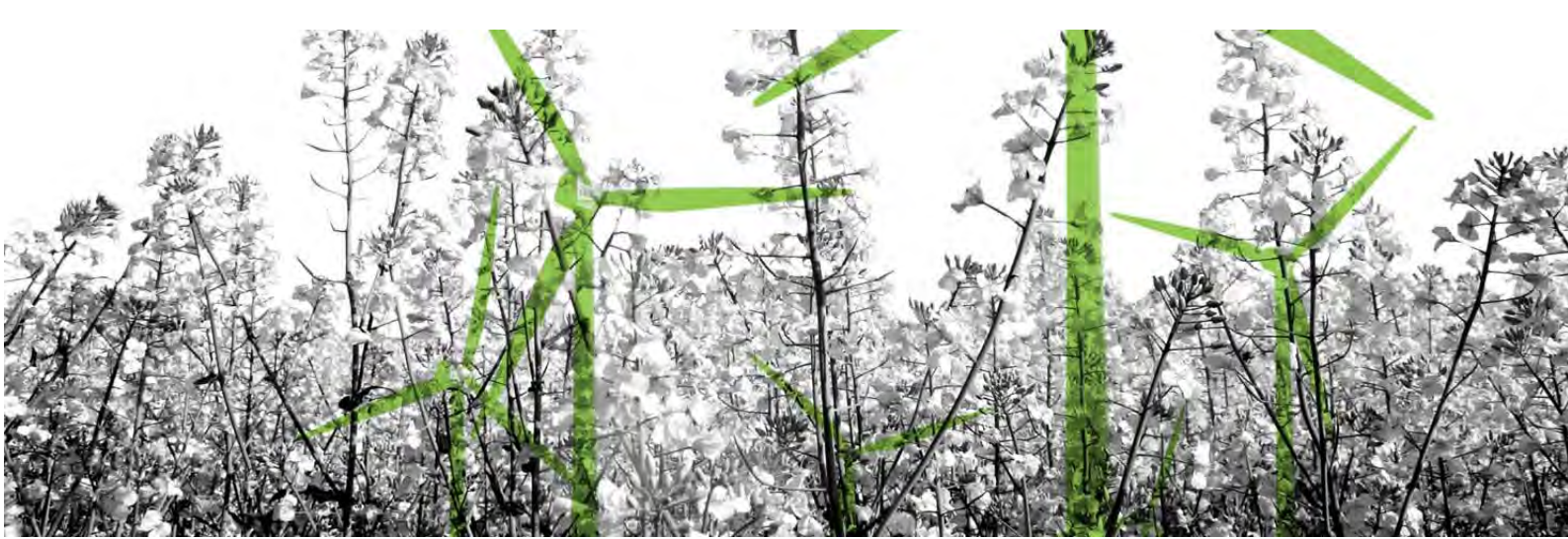
- Secures market and demand for the community heating systems in areas of development. This can be invaluable in securing project finance and justifying the expansion of an existing network.
- Provides good option for developments which may have a constrained site to approach zero carbon / significantly reduce their carbon emissions.

Disadvantages

- This policy can only be enforced in new developments. Although the Council can connect their own existing properties and give other existing developments the opportunity to connect.
- Arrangements for connection to existing nearby technologies such as combined heat and power (CHP) can be complex and involve a number of parties. This can result in delays to planning programmes can be deterrents to developers particularly where timescales for planning are tight. Careful consideration of the issues, good communication with the energy provider, utilities companies and other third parties such as Network Rail or a defined connection process is needed to smooth the process to avoid delay to planning and construction.

Example

A policy requiring connection to an energy network has been included in **Southampton's** Draft Core Strategy. This city has been operating a district heating system since 1986. The district heating systems are supported by Policy SDP 13: Resource Conservation of the Local Plan.



Appendix D – Workshop Summary

Appendix D – Workshop Summary

A workshop to introduce the project and discuss the early stage findings regarding opportunities and constraints for low carbon energy infrastructure in the Borough was held at the Council's offices on 1st December 2009. The attendance list and key feedback is outlined below

Attendees

Rob	Shaw	Associate Director	AECOM
Matthew	Turner	Senior Consultant	AECOM
May	Lam	Principal Planner	EBC - Place Shaping and Enterprise
Lauren	Laviniere	Senior Planning Officer	EBC - Place Shaping and Enterprise
Andrea	Latter	Energy Manager	EBC - Finance and Corporate Resources
Nick	Crook		EBC
Daisy	Johnson	Planning and Regeneration Officer	EBC - Place Shaping and Enterprise
Andrew	Whelan	Performance and Quality Manager	EBC - Environment and Street Scene
Suzanne	Johnson	Planning and Regeneration Officer	EBC - Place Shaping and Enterprise
Neil	Hook	Planning and Regeneration Officer	EBC - Place Shaping and Enterprise
Stephen	Tapper	Assistant Director	EBC - Place Shaping and Enterprise
Tracy	Turner	Interim Head of Resources	EBC - Environment and Street Scene
Valerie	Corrigan	Interim Head of Strategic Housing	EBC - Place Shaping and Enterprise
Geoff	Campbell	Highway Services	EBC - Environment and Street Scene
Tim	Harrison	Leisure Facilities Development Manager	EBC - Leisure, Culture and Youth
Aled	Richards		EBC
Sean	Newton		EBC
John	Burwill	Architect/Snr. Building Surveyor	Metropolitan Housing Trust
Jeremy	Arnold	Development Manager	One Housing Group
Robert	Greene	Development Manager	Dominion
Simon	Lenszner	Project Manager	Circle Anglia
Bill	Blincoe		Fairview
Nicky	Broderick	Associate Director Planning	Linden Homes Chiltern
Ben	Watts		London Development Agency
Jimmy	Hanley	Senior Project Manager	North London Waste Authority
Euston	Ling		North London Waste Authority
Ellen	Scrimgeour	Head of Business Growth	North London Business Link
David	Sargeant	Managing Director	London Waste
Iain	Main		Navigant Consulting
Hugh	Smith		LRS Consultancy

Feedback from Conversation Mapping Exercise

Key Question: How do we deliver CO2 emissions reductions in Enfield?

1. Importance of addressing the existing stock
 - a. Need to improve the fabric of existing buildings
 - b. Need to engage the private stock
2. Opportunities to introduce District Heating
 - a. Potential to address existing stock and combat fuel poverty
 - b. Some uncertainty over the reliability of these systems - how secure is the fuel supplies? Will the systems have backup?
3. Opportunities for renewable energy
 - a. Lots of options but need to be used appropriately
4. Zero Carbon Buildings
 - a. Issues over cost and viability
 - b. Needs to be combined with education of users – potential to use legal obligations or financial incentives?
5. Energy from Waste
 - a. Achieves low carbon energy as well as reducing waste sent to landfill – aiming to achieve zero waste to landfill by 2031
 - b. Financial benefits of turning waste into a resource
6. Transport
 - a. Promote sustainable transport choices
 - b. Importance of transport integration
7. Delivery mechanisms
 - a. Need to identify, quantify and cost opportunities so that the best use of money can be found
 - b. Funding mechanisms and opportunities need to be identified and accessed to provide the financial viability

Other points raised

- Link between low carbon homes and decent homes requirements
- Importance of promoting standards like BREEAM
- Potential to increase carbon sinks – planting trees and introducing green roofs
- Need to address scepticism about climate change to get mandate for action

Feedback from points raised and questions posed in the presentation

Existing Buildings

- Various Initiatives already underway or planned, including:
 - EcoTeams Initiative – Starting in 2010
 - Business Partnership – aimed at supporting SME through energy audits of non-domestic buildings
 - Home efficiency programme – Starting next year, will provide energy audits
- Opportunities for Registered Social Landlords
 - Tend to have a rolling programme to improve stock
 - Money is an issue - incentives provided by the local authority could help to speed up delivery
 - Different parts of RSLs oversee different parts of stock
- Problems with existing low energy systems in the Borough, specifically CHP systems currently installed in a number of swimming pools which are not operational due to problems with the plant
 - These could prevent an opportunity for expansion of heat networks but only if they are working
 - Need to understand the reasons for the problems – potentially seek to create a different approach such as an ESCO arrangement to provide heat – thereby placing operational risks on a third party

New Development

- Question mark over viability of delivering very low carbon housing, specifically where:
 - Land value is low
 - There are other requirements being placed on developments – e.g. higher space standards being requested in London

Energy Opportunities – Wind

- Proposals to utilise green belt for wind turbines could meet opposition
 - Some see this as a divisive issue that may not gain political support easily
 - This view may be changing – proposals for utilising wind at Ponders End have not been challenged
 - Could gain more support if Council were doing it for local benefit rather than if taken forward by private developers
 - Community ownership has worked for rural schemes but may not work in large urban communities

Energy Opportunities – Biomass

- A biomass gasification scheme has recently been proposed in Edmonton – 12MW system using C&D waste. Proposed location is in Gibbs road (included in OAPF)
- Contractor currently using the Edmonton waste site for chipping and processing wood waste

Energy Opportunities – Waste Heat

- LDA have spoken with Eon – there is the potential to take 10MW of heat without affecting the efficiency of electricity output

Energy Opportunities – Energy from Waste

- Plans for the future development of waste treatment for the 7 Boroughs in the NLWA have been submitted today, likely proposals
 - MRF facility to recover recyclables which can then be sold
 - AD (Anaerobic Digestion) system taking food waste and producing electricity
 - MBT (Mechanical Biological Treatment) facility to take remaining waste and produce SRF (solid Recoverable Fuel) which can be sold
 - Potential to use the SRF for energy systems within the Borough
- Contract expected to be in place by October 2012 following competitive dialogue process with tenderers to the PFI contract

Energy Opportunities – Solar

- Enfield Development Control is currently preparing an SPD on the application of renewable technologies which will include guidance on the appropriate use of solar technologies
- There is now a Sustainable Design Officer whose role will be to aid developers in delivering appropriate solutions