Renewable Energy & Low Carbon Development Study

Prepared for Lewes District Council
October 2010
Executive Summary

SCOPE OF THE STUDY

AECOM were commissioned by Lewes District Council to develop an evidence base to inform the development of carbon dioxide (CO₂) reduction and renewable energy policies to be included in the Core Strategy and supporting documents. As part of this work, AECOM worked to provide wider advice to the Council regarding the future potential for appropriate renewable energy developments.

This study also forms the evidence base to support the requirements of the Supplement to PPS1 on Climate Change, which states:

“Planning authorities should have an evidence-based understanding of the local feasibility and potential for renewable and low carbon technologies, including micro-generation, to supply new development in their area.”

This has been done by developing an understanding of the current situation and expected growth in Lewes District, reviewing policy direction and analysing the area’s energy resource potential. Through consideration of the policy context, physical context and delivery context, we have identified the local need for policy and action for Lewes District, as shown in the diagram below.

Figure E1: Policy Development Process
This report is divided into chapters that consider various aspects of the policy, as well as physical and delivery context. The final chapter suggests policy recommendations and actions for the Council and its partners. The structure of the report is as follows:

- **Chapter 1: Introduction** – Outlines the scope of the project and the approach to the study.
- **Chapter 2: Policy Context** – Reviews the relevant national, regional and local policy drivers and opportunities.
- **Chapter 3: Physical Context: Energy Demand from the Built Environment** – Examines the current and future physical context of the LPA area, considering the state of existing buildings, expected growth and new development and the overall LPA-wide energy demand profile.
- **Chapter 4: Physical Context: Low Carbon and Renewable Energy Potential** – Considers the renewable and low carbon resource potential at a site and district scale.
- **Chapter 5: Physical Context: Climate Change in Lewes District** – Considers vulnerabilities to climate change across the District, and how adaptation measures can be supported by planning.
- **Chapter 6: Delivery Context: Using Local Opportunities and Growth** – Analyses the local development context and the influence planning can have on carbon reduction and climate resilience in new development.
- **Chapter 7: Delivery Context: Delivery Mechanisms and Partners** – Considers delivery partners and mechanisms for CO2 reduction across the LPA area for every type of energy opportunity.
- **Chapter 8: Policy Recommendations and Conclusions** – Gathers together evidence from the previous chapters to forward policy recommendations for the Core Strategy and supporting documents.

**POLICY CONTEXT**

National policy in this area sets out very challenging targets for reduction of CO2 emissions, the accelerated installation of renewable and low carbon technologies and sustainable design of new development. These drivers were, until recent planning changes, reinforced by targets and policy at a regional level (Regional Spatial Strategy, which in the case of the South East region was the South East Plan) which were based on a region-wide evidence base regarding the potential opportunities to generate low carbon and renewable energy. Hence the level of aspiration and opportunity indicated by regional studies still remains relevant in the absence of the RSS. The Local Development Framework (LDF), in particular the emerging Core Strategy, provides a useful framework for the implementation of policy relating to building related CO2 emissions. This study is being conducted at a stage where it can directly recommend policy for inclusion in the Core Strategy.

The Supplement to PPS1 on climate change requires LPAs to investigate the potential for the inclusion of renewable and low carbon technologies in their LPA area. This approach has since been bolstered further through the release of a draft PPS for consultation that reinforces the need for local authorities to understand how community-wide low carbon energy systems can be planned and delivered, and how development site selection and design can reduce carbon emissions. Following the recent change in national government, the future policy context is uncertain, but the government has indicated that the wish to deliver high levels of carbon reductions and support delivery of green technologies at a local level.

Over the period of the Core Strategy, expected changes to Building Regulations will significantly decrease CO2 emissions from new development, therefore removing some emphasis in the role of planning authorities. The changes to Building Regulations are likely to create demand for ‘Allowable Solutions’ which involve the development of solutions outside the site boundary that can further reduce CO2 emissions associated with new development. Recent announcements suggest that LPA s are likely to need to play a role in coordinating a number of delivering solutions effectively. Planning authorities are also heavily influenced by the improvement of existing buildings, and support the delivery of community-wide and stand-alone renewable and low carbon infrastructure that isn’t relate to new development.
PHYSICAL CONTEXT: ENERGY DEMAND FROM THE BUILT ENVIRONMENT

To effectively reduce carbon associated with energy use, it is important to first understand the current and evolving energy demand profile of the District.

Energy Demand of Existing Buildings

Lewes District has average electricity use for the South East; however this is slightly higher than the UK average. Gas use in the District is below the average for the UK, though there will also be a carbon contribution from rural properties using other fuels where the gas grid is not available. The table below compares the average residential electricity and gas demand for Lewes District with the average for the South East and Britain. The following figures also show the spatial distribution of electricity and gas demand. The spatial variation of electricity and gas use gives us an insight into the areas of existing stock which are least efficient and should be a priority for improvement. The western area of the District shows a high electricity gas use. Moving further east, the gas use drops off considerably. The variance of energy consumption in homes is due to a number of factors, including tenure, house type, local improvement initiatives and the age of buildings.

Table E1: Energy consumption per residential consumer (BERR, 2007)

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<thead>
<tr>
<th></th>
<th>Average electricity sale per consumer</th>
<th>Average gas sale per consumer</th>
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<tr>
<td></td>
<td>Residential kWh</td>
<td>Residential kWh</td>
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<tr>
<td>Lewes District</td>
<td>4,503</td>
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</tr>
<tr>
<td>South East Average</td>
<td>4,543</td>
<td>17,022</td>
</tr>
<tr>
<td>Britain Average</td>
<td>4,198</td>
<td>16,906</td>
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</table>
Figures E2: Average Residential Electricity Consumption per meter in Lewes District
Figures E3: Average Residential Gas Consumption per meter in Lewes District
Access to the gas grid is generally good across the district, with the exception of a few rural areas where up to 20% of homes do not use gas as their main source of heating. The graph below shows the proportions of energy fuels used in Lewes District, with rural areas more reliant on oil, solid fuel or electricity for heating. This has resulted in a relatively high electricity use in the District compared with the national average. In these locations, sustainably sourced biomass may be a suitable alternative to conventional heat sources as its carbon emissions are significantly lower.

Figure E4: Fuel breakdown for domestic energy use in Lewes District (in kt of CO₂)

The energy demands of non-residential buildings in Lewes District compared with the residential demands are shown in the figure below. Relative to other parts of the UK, the non-residential contribution to energy demand is fairly low. This is due to the low concentrations of energy intensive industries in the District.

Figure E5: Electricity and gas demand in Lewes District, showing residential and non-residential breakdown
Future Performance of Existing Buildings

As part of this study, the likely increase in energy performance of existing buildings over the period of the emerging Core Strategy is considered. Through both national and local drivers, it is expected that the heat demand of existing buildings will decrease significantly, due to a range of relatively simple and cost-effective measures that can be applied to building structures. However, electricity demand is expected to remain fairly static, if not increasing slightly, due to additional demand from new technologies and appliances. The graph below shows the modelled make-up of carbon emissions from energy use in existing buildings over the period of the Core Strategy.

Figure E6: Expected change in CO\textsubscript{2} emissions over Core Strategy period due to energy efficiency measures

Energy Demands of New Buildings

Relatively low levels of growth are expected in Lewes District over the period of the Core Strategy, but it is important to understand the effect this will have on energy demand and carbon emissions. This study has modelled the likely energy demand of new buildings over time to complete an overall profile of evolving energy demand over time. New development will be subject to emerging Building Regulations that are likely to enforce increasing levels of energy efficiency and carbon reduction. The energy demands from new development compared with those of existing buildings are shown in the graph below.

Figure E7: Comparison of energy demand from existing and new buildings
Key Considerations for the Built Environment

An understanding of the current and future energy demand profile of Lewes District highlights a number of considerations for the Council and its partners:

- It is important to realise the scale of energy demand in order to both set planning targets and measure planning targets for renewable energy delivery based on a percentage of demand. Current and future energy demands have been calculated in this report for use in policy and delivery;
- The Council play a key role in increasing energy efficiency of existing buildings. Existing buildings make up the bulk of the future energy demand, and hence efforts must be made to reduce energy demand of existing stock.
- Existing non-residential buildings often receive less focus than existing homes. The Council should support initiatives to increase energy efficiency in non-residential buildings in their area, particularly large energy users.
- Planning can affect CO2 emissions by affecting the density of development and mix of house types. Higher densities should be encouraged where suitable.
- There is significant use of oil and coal fuels along with electric heating in rural properties off the gas grid. Efforts should be made to switch these fuel users to lower carbon fuels, ideally biomass.

PHYSICAL CONTEXT: RENEWABLE AND LOW CARBON POTENTIAL

Complementary to an understanding of energy demand levels and locations, is an understanding of the potential for the local generation of renewable and low carbon energy. This helps to identify key opportunities and also highlight delivery mechanisms.

Existing Renewable and Low Carbon Energy Generation

The application of renewable and low carbon technologies in Lewes District has largely been small scale but with a relatively high delivery rate due to the actions of local partners. The Ouse Valley Energy Services Company (OVESCo) is an Industrial and Provident Society for community benefit dedicated to localising energy generation in Lewes District since 2007. The presence of a local ESCo (Energy Services Company) has ensured that local renewable projects have gained delivery traction, and its presence is a major advantage to carbon reduction delivery in Lewes District. They have achieved substantial delivery of micro-generation in existing homes through targeted grant funding in partnership with Lewes District Council. Several other flagship projects in schools and new development also exist in the District.

Potential Sources of Renewable and Low Carbon Energy

This study assesses the scale of potential from different renewable energy sources in Lewes District. Various renewable and low carbon sources of energy were assessed, including wind (onshore and offshore, small and large scale), biomass resources, micro-hydro power, marine energy, combined heat and power and micro-generation on individual properties. Each resource is analysed with respect to the local delivery constraints and the influence that planning and the wider Council can have.

The potential for renewable and low carbon energy generation across Lewes District has both wide scope and scale of potential. The opportunities include:

- **Wind energy** – The rural areas to the north have the highest potential for wind energy, taking into account the likely limitations on wind energy development in the National Park area. The port at Newhaven may also provide an opportunity to install a large wind turbine in a light industrial environment.
- **Micro-hydro** – There are opportunities across the district, and these could be delivered alongside historical renovations of local mills.
- **Biomass** – The District has great potential for biomass production and distribution, with large areas of unmanaged woodland, local agriculture and land suitable for the growth of short rotation crops.
- **Microgeneration** – The presence of substantial conservation areas and listed buildings in the District will restrict delivery of micro-generation technologies to some extent, but as high micro-generation delivery rates have already shown, there is potential to assist local communities in designing in suitable systems.
• **District Heating Network and Combined Heat and Power (CHP)** – Their use is favourable in the urban centres of the District, namely the towns of Lewes, Newhaven, Seaford and Peacehaven/Telscombe.

• **Energy from waste** – An energy from waste plant and a wastewater plant with heat recovery are already planned in Newhaven and Peacehaven respectively, and these could link into wider district heating networks.

Based on the analysis and the relative potential of low carbon and renewable energy in the Lewes District, targets of 12% renewable heat and 30% renewable electricity have been recommended for the District by 2020 to drive delivery of opportunities and contribute locally to national targets. Despite this, it is recognised that the use of renewable energy for transport and the location of new development, in order to facilitate a reduction in unsustainable transport patterns, will also have significant implications for reducing CO2 emissions.

The low carbon energy opportunities are spatially demonstrated in the Energy Opportunities Map (EOM) below, which can be used as a tool by planners and developers to coordinate and explore possibilities.
Figure E8: Energy Opportunities Map for Lewes District
Key Considerations for Resource Potential

The consideration of resource potential has highlighted several key opportunities for Lewes District Council and partners:

- There are considerable renewable and low carbon resource opportunities across the District, with high carbon reduction opportunities linked to biomass, wind, CHP, hydro and micro-generation;
- The scale of potential and types of technologies that are likely to be viable varies across the District;
- Lewes Town and the coastal urban areas have good opportunities to generate and supply renewable and low carbon heat utilising district heating networks, and these opportunities should be supported through planning;
- Biomass is a strong resource for the area, but a biomass supply chain needs to be put in place to gather, process and supply biomass locally;
- The rural areas to the north of the district provide the most potential for medium scale wind energy, with some unconstrained areas (in terms of land designations) available for large scale wind development;
- The National Park area is most technically favourable for the development of large-scale wind, but the impact of turbines on the landscape value would need to be strongly considered;
- All opportunities are delivery dependent – resource potential in itself does not contribute to targets, therefore focus should be on enabling delivery;
- The extent of potential in Lewes District provides an evidence base to support the application of targets of 30% electricity and 12% heat from renewables by 2020; and
- An Energy Opportunity Map has been produced as a planning resource which will allow assessment and prioritisation of delivery opportunities.

PHYSICAL CONTEXT: CLIMATE CHANGE IN LEWES DISTRICT AND POTENTIAL ADAPTATION MEASURES

Climate Impacts in Lewes District

The consequences of climate change will be felt across the south-east region, with different landscapes facing their own unique sets of impacts. The most significant vulnerabilities identified for the south east include:

- An increased probability of severe flooding in winter due to prolonged periods of rainfall;
- Greater pressure on water resources, caused by reduced summer rainfall coupled with increasing water demands from development and agriculture;
- Heightened risk of coastal inundation due to rising sea levels and tidal surges;
- Inner urban areas becoming vulnerable to problems associated with urban heat islands in summer, although this is likely to have a limited effect in Lewes District due to the relatively low density of urban settlements;
- Severe weather events, including flash floods; and
- Coastal erosion from higher storm frequency

Lewes District is expected to suffer from a number of these vulnerabilities, including flooding impacts from both fluvial flooding and coastal inundation. Flood risk needs to be considered in relation to proposed growth and retrofit needs for existing communities. The effect of flooding on vulnerable infrastructure including medical facilities, emergency services, schools, major roads and transport infrastructure will need to be carefully assessed in future planning. The towns of Newhaven and Lewes both have services that fluvial and tidal flooding might impact upon as shown in the figure below. Some of these services include: a fire station, leisure centres, secondary schools, and primary schools. Climate change may also adversely impact on water availability in the District and also lead to increased challenges for biodiversity and agricultural industries.
Figure E9: Vulnerability of Infrastructure in relation to flood risk zones
Needed Climate Responses in Lewes District

This study also considers the socio-economic vulnerability of populations in Lewes District. There is an emerging body of evidence that demonstrates that certain communities are more vulnerable to the predicted impacts of climate change than others. The figure below shows the relative vulnerability of communities in the District according to a number of socio-economic indicators – including health, deprivation, and age – indicate the most vulnerable communities are located in the coastal urban areas, particularly in parts of Seaford and Peacehaven.

Figure E10: Social vulnerability based on three key indicators
In addressing these social vulnerabilities, planning has an important role to play. Areas that are less likely to have the means to mitigate and adapt to climate change are where the majority planning resources should be focused. Planning can affect changes to both the built and the natural environment by, for example, incorporating green infrastructure in urban and suburban areas, and designing and retrofitting building to prepare for impacts. These will be key strategies to naturally manage microclimates and rainfall, while at the same time ensuring built environments are more robust.

Key Considerations from Climate Change Adaptation

From consideration of local climate risks, the following is evident:

- Planning has a key role to play in helping new and existing communities and environments adapt to climate change;
- Lewes District is at risk from a number of climate impacts, including significant flood risk, coastal erosion, changes in microclimate, water supply impacts and effects on biodiversity and agriculture;
- Planning should consider which communities are likely to be most vulnerable to long-term effects caused by climate change;
- The integration of green infrastructure is an important strategy to control local climate effects;
- The Council should, where possible, encourage retrofitting of buildings in high risk areas to increase climate resilience; and
- Planning should influence both the location and design of new development to minimise climate risk.

DELIVERY CONTEXT: USING LOCAL OPPORTUNITIES AND GROWTH

Lewes District has a number of factors that makes it unique, including its landscape, its communities and its planning and development characteristics. This study considers the delivery context in Lewes District, exploring three key areas that are likely to shape the way opportunities are delivered and the prioritisation of those opportunities:

- Maximising Benefit from New Development and Growth
- Building on Local Resources and Enthusiasm
- Taking Advantage of Change

Maximising Benefit from New Development and Growth

As well as identifying the most appropriate locations and orientation of development, carbon efficient new developments will be delivered through a combination of energy efficiency measures and development driven renewable and low carbon energy infrastructure. This is in-line with the Government’s commitment to zero carbon development scheduled to be implemented in 2016. This would require around a 70% reduction above the TER with the remaining emissions potentially picked up through a range of ‘allowable solutions’ to offset the remaining energy requirements. Consequently, new development will deliver a proportion of renewable and low carbon energy which can contribute to the local renewable energy targets.

To illustrate how new developments might be constructed in a carbon-sensitive manner, this study modelled three development typologies, representative of those expected to be typical in Lewes District. The modelled typologies demonstrate what types of carbon reduction strategies and renewable technologies are most suitable in different situations and the likely resulting costs. The typologies considered are:

- **Site 1**: A large development (100+) within Lewes Town (in the National Park and therefore subject to designation constraints on suitable types of renewables).
- **Site 2**: A small rural development (less than 10) in the northern area
- **Site 3**: A medium size development in the coastal towns (infill)

The results from these scenarios show that for different typologies, different renewable energies are better suited. For (1) a large development, biomass heating and biomass CHP are comparable in terms of cost per tonneCO₂ saved, but
only biomass CHP is likely to meet Building Regulations standards after 2016 when zero carbon policy is scheduled to become mandatory. For a small rural development in the north (2), a small wind turbine (15kW) maybe be feasible and could result in around a 70% savings on regulated CO2 emissions for a small residential development, and represents the cheapest option for reducing CO2 for this typology. However, only biomass solutions are likely to deliver the savings required to meet 2016 zero carbon policy. A medium sized development on the coast (3), a large scale wind turbine is undoubtedly the most cost-effective solution for CO2 reductions.

As can be seen from the above modelling, Building Regulations are the primary drivers for higher energy performance standards and low carbon energy generation in new developments. Lewes District Council could, however, apply policies that act to facilitate, accelerate or increase the scope of targets, such as:

- District-wide carbon targets or sustainability targets;
- Site specific carbon targets or sustainability targets;
- Supporting and coordinating favourable carbon reduction measures; and
- Influencing the design process.

Building on Local Resources and Enthusiasm

Policies, such as those listed above, are possible in Lewes as it represents a unique district with more community support and local action groups than is found in most other areas in the UK. The Council has already taken advantage of these circumstances. In addition to working with community organisations and community members, the Council has spawned many renewable energy initiatives. Some noteworthy examples include award winning projects, such as: ‘Action in Renewables’ sustainability checklist encouraging low carbon design; and ongoing educational initiatives incorporating advice on installing renewable energy technologies. Lewes District Council has also signed on to the national 10:10 campaign, which aims to reduce carbon emissions by 10% in 2010. Programmes such as these have earned Lewes a reputation within the UK and abroad as a progressive green council, which actively engages with community partners. Transition Town Lewes (TTL) is part of a larger community of transition towns, which aim to respond to climate change and peak oil challenges. OVESCO is a not-for-profit company created for community benefit to: provide energy advice and administer grants on behalf of the Council for insulation and heating; administer grants for renewable heat and electricity in homes; provide a feed-in tariff; and seek out potential industrial scale alternative energy generation in the region. With so much enthusiasm and involvement from the council and community, this is an auspicious time for Lewes District Council to continue building momentum for its sustainability initiatives and deliver robust carbon reduction and renewable energy strategies. One of the places these strategies can have the largest impact is in planning new developments.
Taking Advantage of Change

While new development rates in Lewes District are expected to be relatively low, there are other changes expected due to new infrastructure or regeneration that could be taken advantage of. The construction of major infrastructure, including the Newhaven energy from waste plant, the Peacehaven wastewater treatment plant, and the offshore wind energy array provides opportunities to connected carbon reduction projects in surrounding communities. Regeneration of Newhaven and other improvements to public realm across the district may also provide key opportunities to retrofit low carbon systems.

Key considerations for locally driven opportunities

- Expected changes in Building Regulations will significantly decrease CO₂ emissions from new development, therefore removing some emphasis in this role from planning authorities;
- The changes to Building Regulations are likely to create demand for ‘Allowable Solutions’ which involve the development of solutions outside of the site boundary that can further reduce CO₂ emissions associated with new development. Local authorities are likely to need to play a role in coordinating and delivering Allowable Solutions;
- The Code for Sustainable Homes and BREEAM are national and independent assessment tools, which can be utilised to appraise sustainable design and construction in new development. The energy sections of these tools can be used as a policy tool. The Code and BREEAM also require other sustainability aspects to be addressed. The costs associated are considered reasonable in relation to the overall build cost for levels up to and including Code for Sustainable Homes Level 4 and BREEAM ‘Very Good’;
- Development scenarios have been developed that demonstrate the potential and cost of implementing carbon reduction opportunities in new development in Lewes District. These should be utilised to explore options and set higher targets, where possible, for strategic development sites and locations.
- Growth plans for the area should consider where new development can deliver the greatest carbon reduction opportunities, using the Energy Opportunity Map. As well as this map, carbon reduction opportunities will also need to be realised through the transport and accessibility consideration of a development. Such opportunities will be identified through the Sustainability Appraisal process and the transport study.
- Lewes District has a unique mix of community forums, local companies, and a progressive Council that can help push for ward the climate change agenda. The Council plays an important role in coordinating and channelling enthusiasm and resources.
- The delivery of new infrastructure – the energy from waste, wastewater treatment plant and possible upgraded electricity distribution infrastructure provides an opportunity to drive wider decentralised energy systems. These projects provide evidence that decentralised energy is reliable and has many ancillary benefits.
- Regeneration in Newhaven is an excellent opportunity to implement carbon reduction and adaptation measures.
DELIVERY CONTEXT – DELIVERY MECHANISMS AND PARTNERS

To ensure that opportunities are delivered, Lewes District Council and its partners play an essential role. Planning can set targets and develop supporting policies, but for these to be effective, they need to be supported by a delivery strategy that fosters a collaborative approach between the Council, key local delivery players including OVESCo and Transition Town Lewes, utilities, private developers, other stakeholders and the community.

This study describes the mechanisms available to Lewes District Council and its partners, to deliver the principal opportunities for decentralised renewable and low carbon energy opportunities identified on the energy opportunities map (EOM). These mechanisms should be considered in addition to the planning policy recommendations.

The figure below sets out some of the mechanisms and partners required to deliver change in Lewes District. Both refer to the three types of energy opportunity identified in this study: existing development; new development; and strategic community-wide interventions. Each uses the EOM as the starting point for informing the development of appropriate delivery mechanisms and planning policies.

**Figure E11: Overview of delivery mechanisms and partners for energy opportunities in Lewes District**

**Delivering improvement to existing buildings**

Improving the energy performance of existing buildings should be undertaken in several ways:

- Increase the uptake of energy efficiency measures with concentrated funding and a programme of improvement. The Council can encourage higher energy efficiency in existing buildings by working with partner organisations to distribute and focus funding.
- Home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement should be heavily promoted across the District, as these are the least efficient areas on a per home basis.
- Retrofitting of buildings to adapt to climate change should be coordinated in a similar way.
• Installing micro-generation technologies to a large proportion of existing properties. Delivery of low carbon and renewable technologies within existing buildings and communities cannot be required by planning, but can be encouraged by the Council and its partners.
• The Council and its partners have already actively installed micro-generation technologies in significant numbers of properties in Lewes District. Further initiatives could be taken through pro-active community education and leadership of the Council by installing significant installations on their own buildings.

### Table E3: Delivery options for existing development

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<tr>
<th>Options</th>
<th>Potential Partners</th>
<th>Potential Delivery Mechanisms</th>
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<tbody>
<tr>
<td>Increased energy efficiency</td>
<td>Lewes District Council</td>
<td>Provision of discounted CO₂ reduction solutions</td>
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<tr>
<td>Increased microgeneration</td>
<td>OVESCO</td>
<td>Hire purchase of CO₂ reduction solutions</td>
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<td>Adaptation measures</td>
<td>Energy companies</td>
<td>Rental of space for CO₂ reduction solutions</td>
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<td>Community groups</td>
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<td>Private installation companies</td>
<td>Sali x Finance</td>
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<td>Warm Front</td>
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<td>Low Carbon Communities Challenge</td>
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| Delivered carbon efficient new development

New carbon efficient development will be delivered through a combination of energy efficiency measures and development driven renewable and low carbon energy infrastructure in-line with the Government's commitment to zero carbon development in 2016. A proportion of carbon reduction is likely to be met 'on-site' with the remaining carbon reduction potentially being picked up through a range of 'allowable solutions'. As part of the allowable solutions, developers can look for opportunities to reduce carbon further either on-site or off-site. The scope and governance of allowable solutions is yet to be confirmed by Government, however, local Councils are in a unique position to both encourage maximum carbon reduction associated with new development through planning and to coordinate and highlight priority opportunities for delivery of allowable solutions.

The key opportunities for the Council are:
• Setting local planning policies for new development that capitalise on local opportunities for carbon reduction.
• Requiring specific investigations and targets on strategic sites where significant carbon reduction opportunities exist (three typologies have been considered in this study).
• Using spatial planning to locate and design new development areas that optimise potential for carbon reduction and integration of renewable or low carbon energy generation.
• Locating new development to minimise climate risk, and setting requirements to design in resilience to climate impacts.
• Leading, partnering or coordinating the development of key renewable and low carbon energy generation opportunities associated with 'allowable solutions' funding.
• Introducing a planning and delivery mechanism that prioritises delivery of energy opportunities through spending of money raised through a Community Infrastructure Levy (CIL), or similar developer contribution mechanism.
## Table E4: Delivery options for new development

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<th>Options</th>
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<td>Higher energy and sustainability standards</td>
<td>Lewes District Council, OVESCo, Energy companies, Community groups, Private installation companies, Homes and Communities Agency</td>
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<td>Micro-hydro energy</td>
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<td>Adaptation Measures</td>
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<th>Potential Delivery Mechanisms</th>
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<td>Conditions attached to local authority owned land sales</td>
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<td>Community Infrastructure Levy or local carbon buyout fund</td>
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<td>‘Allowable solutions’ or off-site opportunities</td>
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<td>Merchant wind</td>
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<td>Green Infrastructure Projects</td>
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### Delivering Strategic Community-Wide Interventions

In addition to Council action, planning policy and decision-making should support the market development of renewable energy and low carbon, where it does not 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; and
- Providing policies designed to support delivery mechanisms, such as a requirement for new development to connect to a district heating network.

The key opportunities for the Council and its partners are:

- Supporting decentralised renewable energy provision through support of private investment. Planning can encourage renewable energy installations in suitable areas through supportive policy, but the wider Council can also coordinate funding to support delivery of decentralised opportunities by private companies.
- Where market delivery is not forthcoming, Lewes District Council can lead delivery of energy infrastructure, potentially with support from OVESECo or other ESCos, the private sector, investors or communities. Opportunities include wind energy, micro-hydro schemes and district heating systems which may not be large enough to attract market investment.
- There are opportunities to establish a biomass supply chain, coordinating both forestry and agricultural waste and growth of bio-crops locally. The limited supply of biomass within Lewes District means that the Council will need to explore sub-region or region-wide opportunities with partners in neighbouring rural authorities. The market is unlikely to develop in one place alone, and hence there is an opportunity for the Council, community groups or a local ESCo to take a leading role. Possible partners include the Forestry Commission and the local Woodland Enterprise Centre.
- The Council has an opportunity to implement climate change adaptation measures on a district-wide scale. We recommend that these measures are developed and prioritised through a Climate Change Adaptation Strategy. This should be strongly linked with a green infrastructure and flood management strategy but also seek to understand local vulnerability issues associated with communities and infrastructure.
Table E5: Delivery options for strategic community-wide interventions

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<th>Options</th>
<th>Potential Partners</th>
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<td>Wind energy</td>
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<td>• Community Infrastructure Levy or local carbon buyout fund</td>
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<td>District heating and CHP</td>
<td>• OVESCo and other ESCos</td>
<td>• ‘Allowable solutions’ or off-site opportunities</td>
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<td>Biomass supply chain</td>
<td>• Community Action Groups, such as Transition Town Lewes</td>
<td>• Local authority led delivery company, partnerships and joint ventures</td>
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<td>Strategic Adaptation Measures</td>
<td>• Regional and sub-regional bodies</td>
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Delivery and Funding Mechanisms

As a means of facilitating energy and carbon efficient solutions, there are a wide range of delivery mechanisms that can be employed. Not all will be suitable for Lewes District and mix is likely to 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.

We have set out below clear requirements for further investigation and leadership, to ensure this work is taken forward. As a first step we recommend that Lewes District Council undertake the following next steps:

Leadership and skills

- The Council must take strategic leadership role to ensure the necessary political and stakeholder buy-in.
- It must develop skills across the Council and its partners. Delivery requires influence beyond planning, and a cross-working group in the Council should be empowered to take action.

Priority actions and projects

- The Council needs to set out a clear framework which gives relative certainty. Action should be prioritised on key development sites, council and public sector property and assets. Oversized energy generation should be considered on new development sites and in public sector and co-owned schemes to supply excess heat/energy to surrounding areas.
The Council should work with the other partners in the sub-region to develop opportunities for hydropower, larger wind energy and biomass energy.

Initiatives in energy efficiency priority areas should focus on home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement. In rural areas (off the gas grid), a fuel switch to biomass should be promoted and facilitated.

The Council should work with community partners to continue a micro-generation retrofit strategy. The Council should develop guidance on appropriate design strategies for conservation areas.

A set of priority district heating 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, phasing and type of development. Options for designation as a district heating priority area include:

- Lewes Town Centre, perhaps beginning with the Mountfield Road scheme;
- The South Coast Urban area as, perhaps beginning with a heat network around the proposed energy from waste scheme (capturing waste heat), and focussing on N ewhaven and P eacehaven where heat demands are higher (than S eaford). Regeneration of Ne whaven ma y also provide an opportunity to retrofit a district heating scheme.

Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of a Local Development Order (LDO) in order to add certainty to the development process and potentially speed up delivery.

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 and the role of schools. Newhaven port is a particular opportunity which should be explored in tandem with regeneration plans.

Opportunities for biomass, biofuels and biogas should be explored with partners in neighbouring authorities and local woodland stakeholders. The Council should facilitate the development of a biomass supply chain with other partners.

Projects and delivery partners need to be identified for climate change adaptation measures through a Climate Change Adaptation Strategy. The council should take this forward to drive retrofit opportunities and new green infrastructure and flood resilience projects in both buildings and public realm.

The Council and its partners should undertake further work to explore the role for the local authority in linking 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 Lewes District, but it will need to consider OVESCO, 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 fund co-ordination body that at can coordinate large e-scale projects, using possible contributions from CIL, allowable solutions or other funding grants. The body could take forward wind, hydro and district heating projects. A plan should be developed to ensure funding is directed towards the best solutions in a coordinated way.

Communities are likely to play a crucial role in the delivery of energy infrastructure. Community projects could be coordinated using existing forums such as Transition Town Lewes.
POLICY AND PLANNING RECOMMENDATIONS

Based on the policy, physical and delivery context in Lewes District, the following planning actions and recommended policy options have been made in relation to the three areas of energy opportunity: existing development, new development and strategic community-wide interventions. In the case of policy options, for inclusion within the LDF, further assessment and evaluation will need to be undertaken by the District Council in order to determine whether the approach is appropriate for inclusion within a wider planning strategy for the District.

Existing Development

Planning Recommendation: Improvement of Existing Buildings

In terms of planning specific recommendations for existing buildings, we recommend that the Council develop supporting policies and guidance in a Supplementary Planning Document (SPD), or targeted brochure, that encourage improvement of existing buildings, and apply these where the planning process is triggered in extension or conversion applications. Currently, requiring improvements through policy is seen to be in conflict with national planning policy and is yet to be tested. However, the Council, especially Development Management, can play an active role by working with building owners and developers to prompt the opportunity to retrofit carbon reduction and adaptation measures. Guidance could be outlined in an SPD or guidance document.

The installation of micro-generation technologies in conservation areas should also be supported by guidance that shows how selection and placement of micro-generation technologies should be undertaken to ensure conservation priorities are not harmed.

New Development

Planning Recommendation: Spatial Planning

Through a spatial planning process, opportunities for growth and new development should be prioritised where they are likely to drive low carbon solutions: by being in an opportunity area near a viable district heating network, where development sites are of a size to drive their own decentralised systems, or where clear opportunities exist to implement wind energy or support hydro developments. What follows are policy recommendations that can facilitate energy efficient designs and sustainable development.

Policy Option: Influencing Design of New Development

Efficient Design and Integration of New Development

All new development should, where possible, be located and designed in a way in which advantage can be taken of opportunities for decentralised, low and zero carbon energy.

All new development should act as a catalyst for improvements to the energy efficiency of existing buildings, as well as increasing the supply of decentralised, low-carbon energy in existing buildings.

All new development should, where appropriate, be required to connect to existing or planned decentralised heat and/or power schemes.

Design, Layout and Location

Development proposals should respond to opportunities identified in the Energy Opportunities Map.

All new developments should ensure buildings are designed to be warmed by the sun, orientating buildings to maximise sunlight and daylight and using natural lighting and ventilation to reduce carbon emissions.

The council should support the design or location of buildings to enable people to get access to amenities with fewer or shorter car journeys. In addition the council should support development which makes efficient use of land with good access to public transport to reduce private travel and therefore carbon emissions.
Policy Option: Sustainable Design and Construction Standards

Note: This policy should only be applied once a full evidence base against all sustainability aspects has been developed.

New residential developments in Lewes District are required to meet full ‘Code for Sustainable Homes’ standards or equivalent. These requirements will not come into effect until successive updates to Part L of the Building Regulations become mandatory:

- Code level 3 or above, will be required for all new homes once updates to Part L come into effect from 1 October 2010.
- Code level 4 or above, will be required for all new homes once updates to Part L come into effect (currently scheduled for 2013).

All new non-residential developments in Lewes District over 1000m² gross floor area should aim to achieve the BREEAM “Very Good” standard or equivalent, with immediate effect (relevant versions of BREEAM are available covering offices, retail, industrial, education and healthcare).

If this policy option is to be applied it should require submission of final Code certificates and post-construction BREEAM certificates, as appropriate.

Policy Option: Climate Change Adaptation

All new development will be expected to be adaptable to climate change in terms of the design and layout of both buildings and associated external spaces. In achieving developments which are adaptable to climate change, developers should have regard to the following:

- How their design, orientation, materials and construction will minimise overheating and cooling needs.
- How development will incorporate green infrastructure, including tree planting, green roofs and walls, and soft landscaping, where possible.
- How Sustainable Drainage Systems (SuDS) can be implemented when possible, aiming to achieve greenfield run-off rates. Runoff should be managed as close its source as possible in line with the following hierarchy:
  - Store rainwater
  - Use infiltration techniques (porous surfaces) when possible
  - Attenuate rainwater in ponds for gradual release
  - Attenuate rainwater by storing it in tanks for gradual release
  - Discharge rainwater into existing waterway.

Policy Option: Strategic Sites

Where suitable strategic sites come forward, we recommend the Council require the following:

- That an energy strategy, including phasing requirements, should be developed for the entire site and surrounding area. This will guide the development of low carbon infrastructure in a coordinated way, and ensure that individual developments on the site can be taken forward in a carbon and cost-efficient manner.
- All energy strategies for sites in or near feasible district heating areas, as identified in the Energy Opportunities Map, should include feasibility assessment for district heating and CHP.
- Based on feasibility study results, carbon reduction targets relative to Building Regulation standards or the Code for Sustainable Homes/BREEAM targets should be set for strategic sites to drive additional carbon
reductions. Calculations showing the achievement of the required carbon reduction should be provided to the Council using the standard methods outlined in Building Regulations.

**Strategic Community-Wide Interventions**

**Planning Recommendation:**

The Council should engage with the South Downs National Park Authority to develop a clear policy on wind development and bio-crop growth within the National Park. We recommend that policy for wind energy be tied to a flexible visual impact assessment process, rather than a blanket restriction. What follows are policy recommendations to facilitate the adoption of an effective mix of Lewes-specific renewable energies.

**Policy Option: Renewable Energy**

Lewes District demonstrates significant potential for inclusion of district heating and micro-generation and should aim to meet at least the national heat target of 12% or above.

Lewes District should assist in the delivery of its portion of the 30% electricity from renewables by 2020 using its potential for combined heat and power, energy from waste, wind energy, hydro energy, and micro-renewables.

Applications for low carbon and renewable energy installations should generally be supported in the area, except where adverse effects would be seen. The area is seeking new renewable energy generation capacity to deliver an appropriate contribution towards the UK Government’s binding renewable energy target.

**Policy Option: Delivering the Energy Opportunities Map**

Decentralised, low carbon and renewable energy is a priority for the Council. Planning applications for new development in Lewes District will need to demonstrate how they contribute to delivery of the ‘Energy Opportunities Map’.

**Policy Option: Priority areas**

The Council will favourably consider applications for development which will support the following energy priority areas:

*District Heating Priority Areas*

The Energy Opportunities Map (EOM) highlights the favourable areas for district heating networks. These areas should be considered by the delivery body as priority areas for installing district heating systems.

The Council will support the delivery of district heating in these areas and will work with all relevant stakeholders, including residents, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward more detailed proposals for district heating in these areas.

Development within the priority area should install the secondary elements of a district heating network (i.e. from the wider network to properties), unless it can be shown not to be viable or feasible, and work closely with the ESC to ensure compatibility of systems. Should development come forward prior to a district heating network being in place, developers should provide a containerised energy centre to provide temporary supply. Where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre to serve proposed or multiple developments.

New residential and commercial development should be designed to maximise the opportunities to accommodate a district heating solution where feasible, considering: density; mix of use; layout; and phasing.
Wind Power Priority Areas

The Energy Opportunities Map (EOM) highlights potential favourable locations for wind turbines. The Council will look favourably on the addition of new wind turbines at the medium or large scale as part of any redevelopment of industrial parks, commercial areas or public realm located a suitable distance from residential areas. The location of wind turbines in these areas should not be to the detriment of local wildlife. Applications would be encouraged from community groups and individuals in priority areas.

Sites within the South Downs National Park are subject to (evolving) policy from the National Park Authority.

Planning Recommendation:

The Council should develop a clear Climate Change Adaptation Strategy to fully understand local vulnerabilities and structure the response to climate change risk. This should be taken forward as a collaborative approach between planning and wider council services, and should link to requirements under National Indicator 188 (if in operation).

Policy Option: Strategic Adaptation

The Council will support and encourage the integration of climate change adaptation strategies in the district, including the provision of green infrastructure, SUDS and flood risk management features.

The development of a flood storage area to the south of Lewes Town will be supported. Design of the area should support local biodiversity and amenity aims as far as possible.
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Appendix A: Funding Mechanisms
1. Introduction

1.1 INTRODUCING THE STUDY

AECOM have been appointed by Lewes District Council, to develop an evidence base to inform the development of climate change, sustainable construction and renewable energy policies to be included in the Core Strategy and supporting documents for the authority.

Figure 1 shows the area covered by Lewes District Council and the broad landscape characteristics of the area. Lewes is a diverse District, comprising the historic County Town of Lewes and urban coastal development along the coast to the south of District, with rural hinterland and several villages in the northern area. Most of the population live in the four urban centres of Lewes Town, Seaford, Newhaven and Peacehaven and Telscombe. The district has large areas of sensitive landscape and habitats, including 16 Sites of Special Scientific Interest, numerous nature reserves, and the new South Downs National Park which covers approximately 55% of the District. There are also 35 Conservation Areas in the District, including parts of Lewes town itself.
1.2 SCOPE OF THE STUDY

This study seeks to ensure that the objectives set out in the Core Strategy can be delivered in a more sustainable, carbon efficient way. The development of this evidence base responds directly to requirements set out in Planning Policy Statement 1: Planning and Climate Change (Supplement to Planning Policy Statement 1). The PPS 1 Supplement requires local authorities to understand the potential for incorporating renewable and low carbon technologies in their authority area:

“Planning authorities should have an evidence-based understanding of the local feasibility and potential for renewable and low-carbon technologies, including micro-generation, to supply new development in their area.” – PPS1 Supplement on Climate Change.

Under the current PPS1 Supplement Local Authorities should:

1. Along with criteria based policies, identify suitable sites for decentralised renewable or low carbon energy;
2. Expect a proportion of energy supply for new development to be secured from decentralised and renewable or low carbon energy:
   • Set targets where necessary;
   • Where opportunities allow, bring forward development area or site-specific targets;
   • Set thresholds and development types to which the target will be applied; and
   • Ensure a clear rationale for the target and it is properly tested.

Since the release of the PPS1 Supplement on Climate Change, a new PPS has been released for Consultation entitled ‘Planning for a Low Carbon Future in a Changing Climate’. The draft PPS combines and updates the PPS1 supplement and PPS22 on Renewable Energy. The draft PPS states:

Local Authorities should assess their area for opportunities for decentralized energy. The assessment should focus on opportunities at a scale which could supply more than an individual building and include up-to-date mapping of heat demand and possible sources of supply. Local planning authorities should in particular look for opportunities to secure:

i. Decentralized energy to meet the needs of new development;
ii. Greater integration of waste management with the provision of decentralized energy;
iii. Co-location of potential heat suppliers and users; and
iv. District heating networks based on renewable energy from waste, surplus heat and biomass, or which could be economically converted to such sources in the future.

The draft PPS also encourages local authorities to work with regional authorities and neighbouring authorities to identify and understand the potential for all types of renewable and low carbon energy infrastructure in the area, then put in place policies to support the delivery of such infrastructure. The draft PPS also requires LDFs to set out how the area will be planned to adapt to the opportunities and impacts arising from changes in climate.

This study aims to provide a robust evidence base following both the current PPS1 Supplement on Climate Change and the emerging direction of the Draft PPS ‘Planning for a Low Carbon Future in a Changing Climate’. Through an understanding of the current situation in Lewes District, review of policy direction and analysis of the district’s potential, this report sets out the premise and justification for policies to be included in the emerging Core Strategy. The study considers proposed new development and changes to the Local Planning Authority (LPA) area over the Core Strategy period (until 2026).

Currently, the Core Strategy is in the early stages of development, and no strategic sites with proposed uses have yet been defined that can be examined for their potential, to meet advanced carbon reduction targets as required by the PPS1 supplement. However, some sites may come forward that are capable of exceeding LPA-wide policy requirements, so the process for identification of these sites and identification of key delivery opportunities is also discussed in this report, and should be utilised by the LPA to set site specific planning policies as sites come forward.

1.3 POLICY DEVELOPMENT PROCESS

The challenge of reducing CO2 emissions and mitigating the effects of climate change is global in nature. At a national level, government policy and targets outline the overall approach to CO2 reduction, but in response to the PPS1 Supplement it is the responsibility of local authorities and local planning to seek to understand and capitalise on local opportunities to deliver CO2 reduction, associated with the built environment. To develop policy and targets on a local level, it is important to understand three areas of context: policy context, physical context and delivery context. While the policy context is consistent on a national level, the local response needs to be tailored according to regional and local policy context, the physical constraints and opportunities of a local area and the market and delivery opportunities available. A tailored local evidence base enables a direct and meaningful application of national aspirations for CO2 reduction.

Figure 2 below demonstrates the policy development process. This process has been used to structure this evidence base report.
It should be noted that where possible information and statistics have been collected at a District level and cited in the report. However, this has not always been possible and therefore the next most localised geographical area with available information and statistics has been used. This has generally been at a County level.

1.4 THREE SCALES OF OPPORTUNITIES

While it is essential to recognise opportunities and constraints on a local level, it is also important to relate these to the various mechanisms and scales of intervention. The scope and influence of change can be understood as three energy opportunities:

1. Existing Development: The potential to improve performance of existing buildings, through both energy efficiency and inclusion of on-site low carbon and renewable technologies.

2. New Development: The potential to deliver CO₂ efficient buildings on new development sites along with on-site low carbon and renewable technologies.

3. Strategic Community Wide Interventions: Considering the existing and new built environment together in the wider environmental context and the opportunities this brings for development of low carbon energy systems and interventions on a strategic scale.

Figure 3 demonstrates the three energy opportunities that are referred to and utilised in the structure of this report. The influence of planning and of Local Planning Authorities on these three opportunities differs in scope and scale, but policy options can be applied to affect all of these opportunities. Through spatial planning, LPAs play an important role in realising the strategic opportunities at a larger scale, and utilising this wider vision to inform opportunities at a site scale. For example, on a site by site basis, certain low carbon technologies such as district heating may not be viable, but in the wider context, these can become viable when linking to existing areas and neighbouring development sites. LPAs play a key role in identifying and coordinating these opportunities. The wider LPA context also provides a scale of opportunity for utilisation of low carbon and renewable energy resources and infrastructure in landscapes and open spaces as well as the built environment. This wider context informs the level of natural resource available for utilisation.
either through independent or development-driven delivery of infrastructure, including levels of fuel resource available, such as biomass and waste for energy production, and viability of renewable resource utilisation, such as wind speeds and solar intensity.

Figure 3: Three energy opportunities
1.5 REPORT STRUCTURE

The rest of this report is set out as follows:

- **Chapter 2: Policy Context** – reviews the relevant national, regional and local policy drivers and opportunities.
- **Chapter 3: Physical Context: Energy Demand from the Built Environment** – examines the current and future physical context of the LPA area, considering the state of existing buildings, expected growth and new development and the overall LPA-wide energy demand profile.
- **Chapter 4: Physical Context: Low Carbon and Renewable Energy Potential** – considers the renewable and low carbon resource potential at a site and district scale.
- **Chapter 5: Physical Context: Climate Change in Lewes District** – considers vulnerabilities to climate change across Lewes District, and how adaptation measures can be supported by planning.
- **Chapter 6: Delivery Context: Using Local Opportunities and Growth** - analyses the local development context and the influence planning can have on carbon reduction and climate resilience in new development.
- **Chapter 7: Delivery Context: Delivery Mechanisms and Partners** – considers delivery partners and mechanisms for CO₂ reduction across the LPA area for every type of energy opportunity.
- **Chapter 8: Policy Recommendations and Conclusions** – gathers together evidence from the previous chapters to forward policy recommendations for the Core Strategy and supporting documents.
2. Policy Context

2.1 INTRODUCTION TO THIS CHAPTER

Policies regarding renewable energy and CO₂ reduction are rapidly evolving as our understanding of the challenge of climate change becomes clearer and appropriate responses are being established at different administrative levels and through varying mechanisms. This, along with the multifaceted nature of energy uses, generation methods and fuel sources, makes for a complicated policy context where approach and importantly targets are not necessarily consistent or compatible. Below is an outline of the key national policy, which with recent publications is at the forefront of renewable energy and CO₂ reduction policy, followed by discussion of how regional policy and local policies currently relate. At the end of this section, we explore the assessment mechanisms of Code for Sustainable Homes and BREEAM, which are available to planners for use within policy targets and requirements to assist in the assessment of sustainable construction integration in new development.

2.2 NATIONAL POLICY

The challenge of climate change, and the need to reduce greenhouse gases and stabilise carbon dioxide in the atmosphere to 450 ppm (parts per million) has intensified in recent years. At the international level, the Kyoto Agreement is currently being updated (using the “Bali Roadmap”) and was to be agreed in Copenhagen in December 2009. Following failure to agree a framework for carbon reduction at Copenhagen, this is hoped for at the upcoming conference in Mexico in November 2010. An agreement will commit the UK to an updated carbon dioxide reduction path, as well as technology development and transfer and financial investment, which will need to be reflected in planning policy. In addition, the UK Government is committed to reducing greenhouse gas emissions by 80% from 1990 levels by 2050, and at least 34% by 2020, through the Climate Change Act. The Act is supported by the UK Low Carbon Transition Plan, a National strategy for climate and energy, which sets out the Government’s approach to meeting their CO₂ reduction commitments. As building related CO₂ emissions currently account for approximately 25% of all CO₂ emissions, improving energy efficiency and supplying buildings with low and zero carbon is a priority. Furthermore, it is predicted that around two thirds of the current housing stock will remain in 2050, highlighting the importance of improving existing housing stock as well as ensuring new buildings are highly efficient. The Transition Plan includes commitments to reducing greenhouse gas emissions from existing housing stock by 29% on 2008 levels by 2020 and by 13% for places of work.

A crucial part of our strategy to reduce CO₂ emissions is a step-change in the resources used to generate electricity and heat, through a switch away from gas and coal, to a much higher reliance on renewable energy. Installations of renewable and low carbon energy infrastructure will need to be both significant and widespread, with every local authority area looking to utilise opportunities. The UK is currently committed to meeting carbon reduction targets set out by the European Commission in the EU Renewable Energy Target which requires a 20% reduction in CO₂ associated with electricity, heating and transport through conversion to renewable energy sources. As the UK’s portion of this target, it is expected to supply 15% of its energy from renewable sources. The translation of this target across to the various energy generation areas is not equal in proportion, and is instead related to the opportunities and delivery constraints associated with each. Accordingly, the following proportions of renewable energy supply are expected for the three sectors:

- 30% of electricity
- 12% of heat
- 10% of transport.

This study is concerned with the use of electricity and heat in the built environment, and excludes the use of renewable energy for transport.
Traditionally, drivers and targets for renewable energy have focused on electricity supply. We are now seeing an expansion in focus to district heat supply as well. The Draft Heat and Energy Saving Strategy (2009) aims to ensure that emissions from all existing buildings are approaching zero by 2050. Proposed mechanisms for achieving this include a new focus on district heating in suitable communities, and removing barriers to the development of heat networks, encouragement of combined heat and power and better use of surplus heat through carbon pricing mechanisms. Alongside the drivers for CO\textsubscript{2} reductions and the inclusion of renewable wanes, there are also targets and strategies in place to encourage the inclusion of Combined Heat and Power (CHP) schemes in new and existing neighbourhoods. In 2000 the Government set a new target to achieve at least 10,000 MWe of installed Good Quality CHP capacity by 2010. In support of this target, the Government has set a target to source at least 15% of electricity for use on the Government Estate from Good Quality CHP by 2010. The Government released a ‘combined heat and power strategy to 2010’ in April 2004 which encourages a rapid increase in the implementation of CHP. Local authorities play a key supporting role in the implementation of CHP.

Planning Policy Statement 1: Delivering Sustainable Development (PPS1) (2005) places an emphasis on promoting more sustainable development, with a supplement to PPS1 on climate change released in December 2007. It advised planning authorities to provide a framework to encourage low carbon and renewable energy generation in their local development documents and confirmed that there are situations where it is appropriate for LPA to expect higher standards than building regulations. Paragraphs 31-33 explain that in local circumstances that at warrant higher standards must be clearly demonstrated, such that there are clear opportunities for low carbon developments or that without requirements, development would be unacceptable for the proposed location. Paragraph 32 suggests that local requirements should focus on the development area or site-specific opportunities and that the requirement should be in terms of achievement of nationally described standards such as the Code for Sustainable Homes. Paragraph 33 requires that decentralised energy or other sustainable requirements should be set out in a DPD. Care must also be taken to demonstrate that the requirements are viable, will not impact on the supply and pace of housing development and will not inhibit the provision of affordable housing. The consideration of targets both on a LPA-wide scale and for strategic sites is the focus of this study.

Planning Policy Statement 22: Renewable Energy (PPS22) (2004) is becoming outdated and superseded by more current guidance however it is still important to refer to this guidance and targets on renewable energy. It sets out policies that cover technologies such as onshore wind generation, hydro, photovoltaics, passive solar, biomass and energy crops, energy from waste (but not energy from mass incineration of domestic waste), and landfill and sewage gas. PPS22 sets out the Government’s energy policy, including its policy on renewable energy, which is set out in the Energy White Paper. The Energy White Paper aims to put the UK on a path to cut its carbon dioxide emissions by some 60% by 2050, with real pro gress by 2020, and to maintain reliable and competitively priced electricity supplies. The development of renewable energy, alongside improvements in energy efficiency and the development of combined heat and power will make a vital contribution to these aims. The Government has already set a target to generate 10% of UK electricity from renewable energy sources by 2010. The White Paper sets out the Government’s aspiration to double that figure to 20% by 2020, and suggests that still more renewable energy will be needed beyond that date.

Paragraph 6 of PPS22 refers to policies in Local Development Documents. The paragraph states that Local planning authorities should only allocate specific sites for renewable energy in plans where a developer has already indicated an interest in the site, has confirmed that the site is viable, and that it will be brought forward during the plan period. Planning applications for renewable energy projects should be assessed against specific criteria set out in regional spatial strategies and local development documents. Regional planning bodies and local planning authorities should ensure that such criteria-based policies are consistent with, or reinforced by, policies in plans on other issues against which renewable energy applications could be assessed. It should be noted that while regional strategies have been revoked, the evidence base that informed the policies is still relevant.

Paragraph 8 of PPS22 states that Local planning authorities may include policies in local development documents that require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments. These policies are required to ensure that requirement to generate on-site renewable energy is only applied to developments where the installation of renewable energy generation equipment is
viable, should not put an unnecessary burden on developers by, for example, specifying that all energy to be used in a development should come from on-site renewable generation. Guidance on the formulation of these policies and best practice can be found in the companion guide to PPS 22. These targets and LPA requirements within policy are still pertinent and important for this study.

In recognition of the overlap and synergies between the PPS1 supplement and PPS22, a new draft PPS on ‘Planning for a Low Carbon Future in a Changing Climate’ was released for consultation in March 2010. The PPS aims to combine and update the PPS 1 supplement and PPS22. The draft PPS calls for Regional Authorities to set ambitious targets for renewable energy and a clear strategy to support their delivery. Regional studies will be conducted to a consistent methodology to highlight comparative contributions that LPAs can offer in terms of renewable and low carbon energy developments, while incorporating local context through criteria-based policies. The draft PPS sets out that LPAs should also set out opportunities for decentralised energy and district heating and support opportunities for community-led renewable and low carbon developments, including production and management of bio-energy fuels. It clarifies that authority-wide targets for carbon reduction associated with new development are likely to be unnecessary following planned changes to building regulations in 2013 (see below), though recognises targets could be set for the period prior to that change. It encourages LPAs to select development sites by considering their potential to exploit low carbon energy sources and to identify and set policy for strategic sites where there are significant opportunities for carbon reductions. It also urges LPAs to set out how their area will be planned to adapt to climate change, considering local vulnerabilities and possible adaptation methods. At the time of writing the new Government has yet to make clear their intentions as to whether or not this draft PPS will be progressed through to adopted policy.

The Government has also announced its intention for Building Regulations to require that the dwelling emission rate (DER) of new residential development to be 25% better than Target Emissions Rate (TER) in 2010, 44% better in 2013 and meeting a zero carbon target by 2016, with non-residential development expected to meet the zero carbon target by 2019. The enforcement of CO2 reductions through building regulations, removes the emphasis somewhat from planning. Previously stand-alone policies for CO2 reduction, such as ‘Merton-style rules’ for inclusion of certain percentages of renewable energy supplies, have been used for new development, but such policies are likely to be superseded by proposals for changes to Building Regulations to some extent. However, LPAs can still require sites to go beyond Building Regulations where suitable.

The proposed residential Building Regulations correspond to the DER targets set out in the energy section of the Code for Sustainable Homes for levels 3 (25% reduction) and level 4 (44% reduction), however the definition of zero carbon is likely to differ from the level 6 of the Code (the Code is discussed in greater detail in the section at the end of this chapter). It is a common misconception that full Code levels will be required under the government proposals, but in fact it is just the equivalent of the energy section of the Code that will be applied through Building Regulations (the energy category is one of nine different categories in the Code). Expected changes to Building Regulations are discussed in more detail in section 2.5 below.

The Government has recently undertaken consultation on the Definition of Zero Carbon Homes and Non-Residential Buildings. The consultation proposes meeting part of the zero carbon requirements through offsite measures. The document suggests that between 44% and 100% of the CO2 emissions reduction must be met on-site, and that for the remaining emissions a range of onsite and offsite solutions are possible. Currently, it is expected that developers will be required to meet a 70% reduction in TER on-site. The consultation also proposes a maximum cost per tonne of CO2 for offsite measures. The final version of the definition has yet to be published, although once it is it is due to be updated in 2012.

Circular 05/2005 (Planning Obligations) states that the objective of the planning system is to deliver sustainable development and that obligations are in tended, among other things, to secure a contribution from a developer to compensate for loss or damage created by a development or to mitigate a development’s impact.
The **Energy Act** (2008) gives power to the Secretary of State to establish or make arrangements for the administration of a scheme of financial incentives to encourage small-scale low-carbon electricity generation. The holders of distribution licences may also be required under this Act to make arrangements for the distribution of electricity generated by small-scale low-carbon generation and to make a payment to small-scale low-carbon generators (or to the Gas & Electricity Markets Authority). This Act also allows the Secretary of State to make regulations to establish a new scheme to facilitate and encourage renewable heat generation and to establish methods to administer and finance the scheme.

The **Planning Act (2008)** paves the way for a new planning system for approving nationally significant infrastructure projects, and introduces the concept of National Planning Statement (NPS). Twelve NPSs are envisaged including one covering renewable energy. This Act also adds a duty on councils to take action on climate change within their development plans.

In addition, the **Planning and Energy Act (2008)** enables local planning authorities to set requirements for energy use and energy efficiency in local plans, including:

- a proportion of energy used in development in their area to be energy from renewable sources in the locality of the development;
- a proportion of energy used in development in their area to be low carbon energy from sources in the locality of the development; and
- Development in the area to comply with energy efficiency standards that exceed the energy requirements of building regulations.

### The Coalition Government’s Change in Direction

With the recent change in government, it is important to understand how their thinking might change with respect to climate change. The best indication thus far comes from the release of The Coalition Programme. Similar to the previous government, this document seems supportive of climate change mitigation and adaptation strategies. There are, however, some specific changes they have signalled they are interested in changing. These include:

**Carbon Targets**

The new government supports the increase in European Union carbon reduction target of 30% by 1990 levels by 2020 and seek to increase the Renewable Energy Targets. On the other hand, national targets and climate change adaptation indicators, such as NI185, NI186 and NI188, may be abolished with the Comprehensive Area Assessment.

**Driving Action**

The new government have indicated that they support local carbon reduction measures and intend to establish a full system of feed-in-tariffs, encourage energy efficiency, and create green financial products that will help the UK work towards a greener future. The Coalition Programme explicitly addresses each of these goals as follows:

- “We will encourage community-owned renewable energy schemes where local people benefit from the power produced. We will also allow communities that host renewable energy projects to keep the additional business rates they generate.”
- “Through the ‘Green Deal’, we will encourage home energy efficiency improvements paid for by savings from energy bills.”
- “As part of the creation of a green investment bank, we will create green financial products to provide individuals with opportunities to invest in the infrastructure needed to support the new green economy.”
Bringing Emphasis to the Local Level

Overall, the new government sees local authorities as the most likely bodies to understand what their districts need most. Therefore, they have introduced “open source planning,” which provides neighbourhoods with more influence over local development. The coalition has also mentioned that “Incentives for local authorities to deliver sustainable development” will be introduced. They have gone so far as to give local authorities increased financial autonomy to “do anything they consider likely to promote the economic, social and environmental well-being of their areas unless explicitly prohibited elsewhere in legislation.” They have also abolished Regional Spatial Strategies (see relevance to this below).

2.3 REGIONAL POLICY

During the course of this study, a change in National Government has resulted in a review of the role of regional policy and the removal of Regional Spatial Strategies. However, preceding regional policy and their baseline studies are included here, as they provide an important context for how Lewes District and East Sussex as a whole are expected to perform in relation to other areas of the South East.

As set out by the draft PPS on ‘Planning for a Low Carbon Future in a Changing Climate’ discussed above, resource assessments for renewable energy and low carbon developments are to be considered at a regional level in order to inform local action. The regional assessment of renewable resource and the updating of targets have recently been completed and were published in June 2010. The resource assessments conducted as part of this study follow the approved DE CC methodology which will be utilised for the whole of the South East, and hence results and opportunities identified should be consistent with those emerging from the Regional study.

The now revoked South East Plan (May 2009) contained a suite of policies relating to climate change and renewable energy. Policy CC2: Climate Change stressed the central role which planning policy was expected to address climate change and set carbon reduction targets broadly consistent with those in the Climate Change Act:

“Local authorities … will include policies and proposals in their plans, strategies and investment programmes to help reduce the region’s carbon dioxide emissions by at least 20% below 1990 levels by 2010, by at least 25% below 1990 levels by 2015 and by 80% by 2050. A target for 2026 will be developed and incorporated in the first review of the Plan.”

Policy C3 required plans and programmes to incorporate actions which helped stabilise the South East’s ecological footprint by 2016 and reduce it by 2026. Actions included:

• increased efficiency of resource use in new development
• adaptation of existing development to reduce its use of energy, water and other resources
• Changes in behaviour by organisations and by individuals.

Policy CC4 required LPAs to promote best practice in sustainable construction and helped to achieve the national timetable for reducing CO₂ emissions from residential and non-residential buildings. As such, the design and construction of all new development, and the redevelopment and refurbishment of existing building stock was expected to adopt and incorporate sustainable construction standards and techniques.

Policy NRM13 also set out regional renewable energy targets for electricity as set out in Table 1. Policy NRM14 sub-regional targets for land-based renewable energy provided further detail as to how renewable generation was expected to be delivered across the region. The proportion that was allocated for the East and West Sussex sub-region is highlighted in Table 2. The Figure below shows an indication as to the mix of resources proposed to meet the sub-regional target. It shows a high proportion of wind energy was expected in the South East, along with biomass fuelled heating, and smaller proportions of solar power, landfill gas utilisation and anaerobic digestion of biomass. These targets, based on a resource assessment undertaken in 2001 were, however, considerably lower than the targets set out by the UK Renewable Energy Strategy, which is calling for approximately 30% of electricity being sourced from renewables.

<table>
<thead>
<tr>
<th>Year</th>
<th>Installed capacity (MW)</th>
<th>% Electricity Generation Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>620</td>
<td>5.5</td>
</tr>
<tr>
<td>2016</td>
<td>895</td>
<td>8.0</td>
</tr>
<tr>
<td>2020</td>
<td>1130</td>
<td>10.0</td>
</tr>
<tr>
<td>2026</td>
<td>1750</td>
<td>16.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub region</th>
<th>Installed Capacity (MW)</th>
<th>% of regional target</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Renewable energy target</td>
<td>57 9.2%</td>
<td></td>
</tr>
<tr>
<td>2016 Renewable energy target</td>
<td>68 7.6%</td>
<td></td>
</tr>
</tbody>
</table>
Although no targets for the proportion of renewables used for heat generation were set out in the South East Plan, it did acknowledge that ‘heat generation and use is also often the most efficient and cost-effective means of using renewable energy’.

The South East Plan also provided guidance on the location of renewable energy development through Policy NRM15. This policy stated; ‘renewable energy development, particularly wind and biomass should be located and designed to minimise adverse impacts on landscape, wildlife, heritage assets and amenity. Outside of urban areas, priority should be given to development in less sensitive parts of countryside and coast, including on previously developed land and in major transport areas... informed by landscape character assessment where available... and in... protected and sensitive landscapes including Areas of Outstanding Natural Beauty or the national parks, development should generally be of a small scale or community-based’. In general, however, renewable energy developments should be supported by local authorities, as set out in Policy NRM16. The policy stated that ‘Local development documents should include criteria-based policies that should consider the following issues:

i. The contribution the development will make towards achieving national, regional and sub-regional renewable energy targets and carbon dioxide savings
ii. The potential to integrate the proposal with existing or new development
iii. The potential benefits to host communities and opportunities for environmental enhancement
iv. The proximity of biomass combustion plant to fuel source and the adequacy of local transport networks
V. Availability of a suitable connection to the electricity distribution network.’

Policy NRM12 also encouraged the use of CHP in all developments and district heating infrastructure in large scale developments in mixed use. The policy also referred to the fact that the ‘use of biomass fuel should be investigated and promoted where possible’. This was supported by Policy NRM7 which focused on woodland and promoted the use of wood resources, ‘including wood fuel as a renewable energy source’.

The South East Plan also set out requirements to improve the energy performance of new development in Policy NRM11: Development Design for Energy Efficiency and Renewable Energy. It encouraged the ‘use of decentralised and renewable or low-carbon energy in new development’ and ‘in advance of local targets being set in development plan documents, new developments of more than 10 dwellings or 1000m² of non-residential floorspace should
secure at least 10% of their energy from decentralised and renewable or low-carbon sources unless, having regard to the type of development involved and its design, this is not feasible or viable’. In addition, local authorities should use design briefs and supplementary planning documents to promote development design for energy efficiency, low carbon and renewable energy.

2.4 LOCAL POLICY

The council’s LDF has a vital role in ensuring future development is delivered in a sustainable manner and reflects the growth requirements set out in the South East Plan. The Core Strategy is the most important document within the LDF. Core Strategies set out long-term visions for an area over a period of at least 15 years, as well as spatial objectives and strategic planning policies to guide development in accordance with the strategic vision and objectives.

In September 2006, the District Council published the Core Strategy - Preferred Options document for public consultation, but this has been subsequently withdrawn based on a number of recent and significant changes to national and regional planning policy and the District Council has started afresh in preparing a Core Strategy document. In May 2010 the District Council issued the first formal consultation material for the Core Strategy, in the form of a series of Issues and Emerging Options Topic Papers. The Preferred Strategy document is expected to be issued for consultation in late 2010/early 2011.

In the absence of the LDF, the saved policies from the Lewes District Local Plan (2003) are currently in application. The renewable energy policy in the Local Plan was not saved, and hence expired in September 2007. With the recent revocation of the South East Plan, policy regarding renewable energy and low carbon development currently reverts to that set out in national policy statements, such as PPS22 and the supplement to PPS1.

Lewes District Council in collaboration with the Energy Conservation and Solar Centre and the Energy Savings Trust also developed a ‘Renewable Energy and Energy Efficiency’ SPD which acts as a guidance document for householders and small businesses. The SPD provides information on key small-scale renewable technologies, and discusses their suitability in Lewes District and key planning considerations.

A strong emphasis is placed on the delivery of renewable energy and low carbon development in most of the Council’s plans and strategies, including the Energy Policy and the Climate Change Adaptation and Mitigation Plan, as well as the Sustainable Community Strategy – Local Voices, Local Choices.

2.5 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

The sections above have considered the wider policy context, and some key findings have emerged that should be considered in the development of local policies for Lewes District:

- There are very strong and challenging policy drivers for both the reduction of CO2 emissions and the inclusion of renewable and low carbon technologies from a national level;
- As identified in regional studies, East and West Sussex play an important role in meeting targets on a regional scale, though the contribution is expected to be less than other counties. While Regional policy has been recently revoked, these studies still indicate the relative potential for carbon reduction in the area.
- The emerging Core Strategy is able to provide an important frame work for the implementation of policy relating to building related CO2 emissions. This study is being conducted at a stage where it can directly recommend policy for inclusion in the Core Strategy;
- PPS1 Supplement requires LPAs to identify the potential for the inclusion of renewable and low carbon technologies in their LPA area, and to identify strategic sites where there is good potential for additional CO2 reductions. Therefore, LPAs need to both consider policies on an area-wide scale and policies for specific sites where additional opportunities exist for additional CO2 reductions.
3. Physical Context: Energy Demand from the Built Environment

3.1 INTRODUCTION TO THIS CHAPTER

This chapter considers the existing and future performance of buildings in Lewes District in terms of demand for energy (both electricity and heat). Firstly, it considers the current performance of buildings, and then considers how this energy demand from existing buildings is likely to change over time. Secondly, it considers the level of growth expected over the Core Strategy period (until 2026). The energy modelling described in this Chapter was undertaken using AECOM energy use models and building typologies developed through professional research projects.

3.2 TOTAL CO2 EMISSIONS FOR LEWES DISTRICT

The government department for Energy and Climate Change (DECC) provides spatial data (based on ‘Middle Super Output Areas’) for both electricity and gas use, and also provides oil and coal demand to a local authority area level. DECC energy use data for 2007 has been used to compare CO2 emissions in Lewes District with the South East region and with the rest of the UK. The breakdown of emissions by sector can be seen in the following table.

The DECC figures show that:
- Between 2005 and 2008, the District reported a 6.5% reduction in per capita CO2 emissions.
- CO2 emissions per capita in Lewes District were 27% lower than the average for the UK in 2007.
- Lewes District has a higher proportion of domestic emissions compared with the rest of the UK.
- The proportion of emissions from road transport are higher in Lewes District than the UK average.
- Emissions from industrial and commercial buildings are lower than the average in the UK. Non-residential energy demand makes up less than a third of the total energy demand.

Table 3: Baseline CO2 emissions in the UK and Lewes District for 2007 (Source: Emissions of CO2 for local authority areas, DECC)

<table>
<thead>
<tr>
<th>Year</th>
<th>Tonnes CO2 per annum (2007)</th>
<th>Per Capita</th>
<th>Percentage of Total</th>
<th>UK</th>
<th>Per Capita</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry &amp; Commercial</td>
<td>157,610</td>
<td>1.7 26.9</td>
<td>236,400,890</td>
<td>3.9 45.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>223,850</td>
<td>2.4 38.2</td>
<td>25,040</td>
<td>2.2 28.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road Transport</td>
<td>202,460</td>
<td>2.1 34.5</td>
<td>60,710</td>
<td>2.4 26.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Use, Land Use Change and Forestry</td>
<td>1,990</td>
<td>0.0 0.3</td>
<td>-1,815,019</td>
<td>0.0 0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Emissions</td>
<td>585,910</td>
<td>6.2 8.5</td>
<td>516,671,621</td>
<td>[-0.4]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This chapter considers the current and future energy demand from the built environment, which forms a considerable portion of Lewes District’s CO2 emissions. Consideration of other emissions is excluded from the scope of this project.

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2 Local and Regional CO2 emissions Estimates for 2005 – 2007, DECC
3.3 ENERGY PERFORMANCE OF EXISTING BUILDINGS

The following sections consider the current performance of existing homes and other buildings.

3.3.1 RESIDENTIAL BUILDINGS

Energy Demand of Existing Homes

The table below shows the residential electricity and gas demands for the Lewes District in 2007 (latest figures available), and compares them to the averages for the South East and the UK. Lewes District has average electricity use for the South East; however this is slightly higher than the UK average. Gas use in Lewes District is below the average for the UK, though there will also be a carbon contribution from rural properties using other fuels where the gas grid is not available. Table 5 gives the residential energy demands in 2006 (the beginning of the core strategy period from which energy use is modelled in this project).

Table 4: Energy consumption per residential consumer (BERR, 2007)

<table>
<thead>
<tr>
<th></th>
<th>Average electricity sale per consumer</th>
<th>Average gas sale per consumer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Residential kWh</td>
<td>Residential kWh</td>
</tr>
<tr>
<td>Lewes District</td>
<td>4,503</td>
<td>15,948</td>
</tr>
<tr>
<td>South East Average</td>
<td>4,543</td>
<td>17,022</td>
</tr>
<tr>
<td>Britain Average</td>
<td>4,198</td>
<td>16,906</td>
</tr>
</tbody>
</table>

Table 5: Annual Energy demand from residential buildings (BERR 2006)

<table>
<thead>
<tr>
<th>Residential Electricity Demand (GWh)</th>
<th>Residential Gas Demand (GWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>198 597</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residential CO₂ Emissions from Electricity Demand (ktonnes)</th>
<th>Residential CO₂ Emissions from Gas Demand (ktonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>84 123</td>
<td></td>
</tr>
</tbody>
</table>

The figures below show the average electricity and gas use spatially to demonstrate how building types and user behaviours can change use of energy. The spatial variation of electricity and gas use gives us an insight into the areas of existing stock which are least efficient and should be a priority for improvement. The figures below show relative performance spatially. The western area of Lewes District shows high electricity and high gas use. Moving further east, the gas use drops off considerably.
Figure 5: Average Electricity Consumption per meter in Lewes District
Figure 6: Average Residential Gas Consumption per meter in Lewes District
Use of other fuels
The use of different fuel types used in Lewes District has been broken down in the following figure. The percentage of oil, solid fuel and other products is average for the UK, though the electricity use is approximately 3.5% higher than the UK average. It should be noted that electricity from the grid is more carbon intensive than gas supply; therefore while electricity and gas demand are roughly equivalent in terms of giga-watt-hours (GWh) of energy use, the CO₂ emissions associated with electricity are approximately double.

Figure 7: Fuel breakdown for domestic energy use in Lewes District (in kt of CO₂)

Access to the gas grid is generally good across the district, with the exception of a few rural areas where up to 20% of homes do not use gas as their main source of heating. In these locations, sustainably sourced biomass may be a suitable alternative to conventional heat sources as its carbon emissions are significantly lower.

Understanding Performance of Existing Homes
There are several sources of information available which help us analyse the state of existing stock in Lewes District. BERR provides a national data set of energy use of residential buildings. Information is also available from Housing Condition Surveys. This study has reviewed the following reports:


Home Energy Conservation Act
All local authorities have been given the status of Energy Conservation Authority (ECA) by the Home Energy Conservation Act and are mandated to carry out voluntary cost effective and practical measures that will reduce home energy consumption by 30% over 10 to 15 years, that is, by 2006 or 2011\(^3\). The measures as defined by HECA include a combination of any or all of the following:

a. Improve levels of insulation, that is:
   - Add or increase loft insulation to a thickness of 200mm
   - Add cavity wall insulation, where applicable
   - Add or increase insulation of hot water cylinders, tanks and pipes

\(^3\) Consultation on the Review of the Home Energy Conservation Act 1995 (HECA), DEFRA (October 2007)
b. Install or upgrade heating systems to gas powered programmable central heating

c. Upgrade all windows to double glazing

d. Install low energy lighting and energy efficient electrical appliances

e. Provide good quality advice to householders.

ECAs are also obliged to report annually on the uptake of energy conservation measures. The report must include costs, CO₂ savings and annual improvements achieved in the energy efficiency of the housing stock.

In response to the requirements of HECA, local authorities have devised several innovative schemes and kick-started initiatives which include: the establishment of community businesses, provision of loans and use of negotiated bulk discounts, as well as innovative approaches to giving advice and raising awareness. These schemes vary from one authority to another. These schemes have been developed to encourage the uptake and implementation of energy efficiency measures for the private housing sector with the goal of achieving a 30% improvement in energy efficiency of the stock.

The graph below gives a summary of the improvement in energy efficiency as reported by the Councils between 1997 and 2007, according to HECA reports.

**Figure 8: Cumulative annual improvement Improved Energy Efficiency (2001 - 2007) as reported in Council HECA Reports**

**Figure 9: Annual improvement in energy efficiency (2001 - 2007) as reported in Council HECA Reports**
Factors Affecting Performance

The performance of existing buildings depends on a number of other factors including:

1. **Tenure**: The type of tenure and the utility billing arrangements have effect on the energy use of a property. The English House Condition Survey (DCLG, 2007) revealed that social sector homes on average have been the most energy efficient and have also shown the highest rate of energy efficiency improvement since 1996. Between 1996 and 2007, Registered Social Landlord (RSL) dwellings have consistently had a higher average (Standard Assessment Procedures (SAP) rating compared to the other three tenures. SAP ratings are the national government’s recommended system for energy rating homes based on energy costs and CO₂ emissions. This is demonstrated by the figure below.

![Figure 10: All dwelling, energy efficiency, average SAP rating by tenure (England), 1996 – 2007 (Source: CLG, English House Condition Survey)](image)

The greater proportion of local authority and RSL housing will tend to be associated with higher proportions of satisfactory housing. A high proportion of homes, approximately 37,000 homes or 78%, are privately owned in Lewes District, as shown in the figure below. 12% of the housing stock is managed by the local authority (8%) and registered social landlords (4%), with the remaining 10% being privately rented properties.

![Figure 11: Tenure of residential building stock in Lewes District private dwellings (Source: 2007 Sub-regional study on housing stock, 2008)](image)
Fuel poverty in the district is 20% lower than the national average. There are an estimated 4,300 (11%) dwellings in fuel poverty in Lewes District; the privately rented sector has the highest rate of fuel poverty at 13%, followed by the owner occupied sector at 11%. Housing association dwellings have the lowest rate at 6%.

**Fuel Poverty in East Sussex**

![Fuel Poverty in East Sussex](image)

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**Local Initiatives:** The penetration of local energy efficiency measures will differ across local authorities. In 1996, Lewes District Council set a target to achieve a 31.2% improvement in domestic dwelling energy efficiency by 2007. A 22% improvement was achieved, largely through the following initiatives:

- A £3.4 million spending plan has been undertaken to improve the energy performance of the social housing stock in the district, which now has an average SAP rating of 66.8, in comparison to the national average for social housing of 58.7.
- All homes now have double glazing and cavity wall insulation. 95-99% of lofts have 200-350mm of insulation.
- Since 2000, 80% of houses have been fitted with condensing gas boilers, at a rate of about 200 per year. The Council also has a Home Energy Advisor which uses data to give information on energy efficiency and also gives householders individual energy advice.

The Council has developed a Healthy Homes Partnership (with other East Sussex authorities) which has increased the uptake of energy efficiency grants, advice, and other measures. A range of new energy efficiency grants has been introduced by the Council with the aid of housing sector renewal money. OVESCO, which was set up to localise energy generation in the district, administers the heating and insulation grants on behalf of the Council. An additional £145,000 has been allocated towards the creation of grants such as Warm Front Top-ups.

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4 HECA Act 1995 Eleventh progress report (2007) for the period 1 April 2006 to 31 March 2007
5 Source: telephone conversation with Adrian Woolridge, Social Housing Contracts Manager
Fuel Poverty Grants, New Renewable Energy Grants and Emergency Repair Grants. A further £145,000 of Decent Homes Assistance funding was secured to extend grants and Healthy Homes Initiatives.

In partnership with OVESCO, Lewes District administers a range of renewables grants that deliver micro-generation for existing buildings. Renewable energy grants are available for those in Council Tax band A-D. The renewables initiative grants (RI) provides more funding for those outside of Council tax band A-D and not on benefits or those who are fuel poor. Between 2007 and 2009, an average of 60 grants was offered, mainly for solar thermal systems and wood burning stoves. A further 70 grants are expected to be administered for 2010. This level of deployment of micro-generation technologies is very significant and should be commended.

In Lewes District, the average SAP rating for private dwellings (both owner occupied and privately rented) is now 48\(^6\), equivalent to the national average for private housing in the UK\(^7\).

3. Building type: The mix of housing types varies considerably. It indicates a high proportion of detached homes and bungalows and a relatively low number of flats and high rises. The energy demand of a home varies greatly based on building type. Buildings with a high amount of adjoining exterior walls (like flats or terraced housing) are more efficient due to reduced heat loss. Differences in energy efficiency due to ho usetype are demonstrated in the figure below. Figures 13b shows that around 44\% of the private housing stock in Lewes District is detached or semi-detached (around 38\% of the total housing stock in the district), suggesting that targeting these building types for energy efficiency improvements could have an effect on total CO\(_2\) emissions from buildings in the district. There is a much higher proportion of bungalows in the district compared to the national stock; this will have implications for the type of energy efficiency measures that are applicable in the district.

![Figure 13a: Energy efficiency of different housing types](source BRE)

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\(^6\) Lewes District Council House Condition Survey draft report, Professional Partnership Services, January 2004

\(^7\) English House Condition Survey 2007 Annual report, CLG, September 2009
Figure 13b: Building types for Lewes District private dwellings, compared to the distribution of private dwelling types nationally. (Source: 2007 Sub-regional study on housing stock, CPC, 2008 and English House Condition Survey 2007 Annual report, CLG, September 2009)

Age of Buildings: Thermal performance of buildings has improved with time, particularly following the introduction of Part L of the Building Regulations and progressive increases in its minimum requirements.

The age of private dwellings in the District is outlined in the table below. The age distribution of the stock is more modern than the national average with almost 49% of dwellings having been built after 1964 compared to 40% in England. The stock is dominated by houses, with relatively few flats (12% compared to 18% nationally). The range of building types are shown in the graph above. The Council has a relatively young dwelling stock when compared with equivalent regional or national data. However, just under a third of the housing stock was built before 1945.

Table 6: Age distribution of houses

<table>
<thead>
<tr>
<th></th>
<th>Pre-1919</th>
<th>1919-1944</th>
<th>1945-1964</th>
<th>Post 1964</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lewes District</td>
<td>16.2%</td>
<td>14.8% 20.3%</td>
<td>48.7%</td>
<td></td>
</tr>
<tr>
<td>England</td>
<td>25%</td>
<td>19% 17%</td>
<td>40%</td>
<td></td>
</tr>
</tbody>
</table>

3.3.2 NON-RESIDENTIAL BUILDINGS

The energy demands of non-residential buildings in Lewes District are shown in the table below. Relative to other parts of the UK the non-residential contribution to energy demand is fairly low. This is due to the low concentrations of energy intensive industries in the District. Comparing the 2006 modelled figures with that in 2007 (the latest data) non-residential electricity demand decreased significantly from 188GWh to 159GWh. The reason for this is unknown as the Council knows of no major industrial close-downs in that period. For the purposes of this study, the 2006 baseline figures have been used and the variance is assumed to be due to data discrepancies. Figure 14, below, compares the contribution of non-residential energy demand to residential energy demand.
LEWES DISTRICT LDF EVIDENCE BASE – RENEWABLE ENERGY AND LOW CARBON DEVELOPMENT

Table 7: Energy demand from non-residential buildings in Lewes District (2006)\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Lewes District</th>
<th>South East</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Residential Electricity Demand (GWh)</td>
<td>188 (0.76%)</td>
<td>24,632</td>
</tr>
<tr>
<td>Non-Residential CO(_2) Emissions from Electricity Demand (ktonnes)</td>
<td>101 (0.76%)</td>
<td>13,168</td>
</tr>
<tr>
<td>Non-Residential Gas Demand (GWh)</td>
<td>152 (0.64%)</td>
<td>23,669</td>
</tr>
<tr>
<td>Non-Residential CO(_2) Emissions from Gas Demand (ktonnes)</td>
<td>26 (0.64%)</td>
<td>4,087</td>
</tr>
</tbody>
</table>

Figure 14: Electricity and gas demand in Lewes District, showing residential and non-residential breakdown

Lewes District Council has signed up to the 10:10 campaign, with the aim of reducing CO\(_2\) emissions from its stock by 10% in 2010. The Climate Change Adaptation and Mitigation Plan 2009-2016 – 10:10 Progress Report identifies measures that can be implemented in the existing Council stock to save 97.83 tonnes of CO\(_2\) annually (equivalent to 2% of CO\(_2\) emissions from existing Council stock), at a cost of £83,375. These include measures such as voltage optimisation, upgrading of systems such as boilers and thermostatic valves, installation of low energy LED lighting and of renewable energy systems.

The Council is aware that they are unlikely to reach the NI.185 target for 2010/11 or the 10:10 target (which runs through to June 2011). The remainder of the savings will be achieved by identifying further energy savings and carbon measures from the specialist technical audits to be undertaken at Wave Leisure facilities, the principal sheltered Housing sites and Council offices.


25
3.4 FUTURE PERFORMANCE OF EXISTING BUILDINGS

The carbon profile of existing buildings will not remain static over time. Instead, we can expect changes in energy demand due to energy efficiency measures, through uptake of micro-generation technologies to supply homes with renewable energy, changes in behaviour and switches in fuel type. This section considers the likely change in the energy demand profile of existing buildings until 2026.

3.4.1 RESIDENTIAL

The uptake of energy efficiency measures in existing housing stock is relatively low, with most measures taking a number of decades to reach saturation. However, Lewes District has made significant progress in funding micro-generation schemes for existing homes. Schemes such as the Energy Efficiency Commitment (EEC) and its successor the Carbon Emissions Reduction Target (CERT) aim to promote the uptake of measures by requiring utility companies to promote and facilitate energy efficiency improvements. CERT (2008 – 2011) is significantly more ambitious than previous phases of the obligation, doubling the level of activity seen under EEC 2005 - 2008. It also sees a shift in emphasis, with the target set in terms of carbon savings rather than terawatt hours. Under CERT, energy suppliers nationwide must, by 2011, deliver measures that will provide overall lifetime CO₂ savings of 154 MtCO₂ – equivalent to the emissions from 700,000 homes each year. It is expected to lead to energy supplier investment of some £2.8bn.

Suppliers must focus 40% of their activity on a ‘Priority Group’ of vulnerable and low-income households, including those in receipt of certain income/disability benefits and pensioners over 70 years old. By increasing the energy efficiency of UK households, CERT will not only help households from falling into fuel poverty but is also expected to help alleviate fuel poverty.

Estimates for energy efficiency in Lewes District have been based on a study of the likely penetration of measures by 2020, which are based on historic, current, and new uptake schemes. These predictions have been done on a national scale and utilise expected uptake of a range of energy efficiency measures. Extrapolating these expected rates of energy efficiency increase from the 2006 energy demand baseline, as shown in the figures below, it can be seen that electricity demand is likely to increase slightly, as demand for more energy-intensive appliances outweighs energy efficiency measures. Gas demand on the other hand is likely to decrease as energy efficiency measures are applied. The figures below demonstrate the expected change in electricity and gas consumption over time in line with ‘business as usual’ rates of improvement of existing buildings, as predicted by BRE.

Figure 15: Expected changes in electricity demand from existing residential buildings over the core strategy period

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3.4.2 NON-RESIDENTIAL

The assessment of energy efficiency in the non-residential sector is difficult due to the range of building forms, construction, and usage types. A large amount of advice is available from bodies such as the Carbon Trust on reducing building and process energy, but it is not simple to quantify the UK potential, or uptake rates due to lack of data at a national scale. Based on Carbon Trust targets for non-residential buildings, this study has developed estimates for energy efficiency improvement through behavioural change, and through capital cost measures. The trend for commercial and industrial development is one of increased efficiency in both electricity and gas use as set out in Figures 17 and 18 on the following page.

While the Carbon Trust has developed targets for energy reduction in non-residential buildings, the initiatives are less visible and less coordinated than those for residential buildings. Lewes District Council will need to play a key role in encouraging energy efficiency in existing non-residential buildings to help to meet these targets.

Figure 17: Predicted Change in Electricity Demand of Non-Residential Buildings
3.5 ALL BUILDINGS SUMMARY

The graph below demonstrates the expected change in energy demand of existing buildings over the study period (2006-2026), due to nationally driven energy efficiency measures in both residential and non-residential buildings.

Figure 18: Predicted Change in Gas Demand of Non-Residential Buildings

Figure 19: Expected change in electricity and gas demand over Core Strategy period under ‘business as usual’ energy efficiency measures

Figure 20: Expected change in CO$_2$ emissions over Core Strategy period under ‘business as usual’ energy efficiency measures
3.6 INCREASING IMPROVEMENTS OF EXISTING BUILDINGS

The estimations in the change in performance of existing buildings above show a ‘business as usual’ estimation, where energy efficiency measures continue to be encouraged on a national scale with existing measures and initiatives undertaken by the Council. This estimation reflects an expected uptake in energy efficiency measures based on which measures are most cost-effective and most easily retrofitted. A higher up-take of energy efficiency measures may be possible with targeted funding and initiatives.

The table below compares the expected CO₂ saving of a ‘high rate’ of energy efficiency improvement (as predicted in the study by BRE ¹), compared to the baseline situation outlined above. The CO₂ savings that can be achieved through improvement of existing buildings are very substantial and should be a priority for change in Lewes District.

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¹ Delivering Cost Effective Carbon Saving Measures to Existing Homes. BRE for DEFRA. 2007.
Table 8: Comparison of carbon dioxide reduction due to higher energy efficiency levels being applied in existing stock in Lewes District

<table>
<thead>
<tr>
<th>Demand (GWh)</th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline Scenario</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Electricity Demand</td>
<td>198</td>
<td>199</td>
<td>200</td>
<td>200</td>
<td>201</td>
</tr>
<tr>
<td>Residential Gas Demand</td>
<td>597</td>
<td>556</td>
<td>516</td>
<td>475</td>
<td>449</td>
</tr>
<tr>
<td>Non-Residential Electricity Demand</td>
<td>188</td>
<td>181</td>
<td>173</td>
<td>166</td>
<td>159</td>
</tr>
<tr>
<td>Non-Residential Gas Demand</td>
<td>152</td>
<td>148</td>
<td>144</td>
<td>140</td>
<td>136</td>
</tr>
<tr>
<td><strong>High Reduction Scenario</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Electricity Demand</td>
<td>198</td>
<td>197</td>
<td>195</td>
<td>194</td>
<td>192</td>
</tr>
<tr>
<td>Residential Gas Demand</td>
<td>597</td>
<td>544</td>
<td>491</td>
<td>439</td>
<td>404</td>
</tr>
<tr>
<td>Non-Residential Electricity Demand</td>
<td>188</td>
<td>171</td>
<td>154</td>
<td>138</td>
<td>127</td>
</tr>
<tr>
<td>Non-Residential Gas Demand</td>
<td>152</td>
<td>144</td>
<td>135</td>
<td>127</td>
<td>121</td>
</tr>
<tr>
<td>Potential CO₂ Saving</td>
<td>0</td>
<td>8,313</td>
<td>16,626</td>
<td>24,510</td>
<td>29,752</td>
</tr>
<tr>
<td>through increased energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>efficiency (tonnes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.7 FUTURE GROWTH IN LEWES DISTRICT

This section outlines expected growth in the Lewes District area. Understanding the scale of expected development is crucial to understanding the probable changes in the energy profile.

3.7.1 RESIDENTIAL GROWTH

The South East Regional Spatial Strategy (RSS) (now revoked) set out a housing target of 4,400 homes for Lewes District to be delivered between 2006 and 2026. The Council, in developing its Core Strategy, will set out options for where that growth could take place and how much growth each area could accommodate. A key document in this process is the Strategic Housing Land Availability Assessment (SHLAA) which is the main mechanism for identifying potential housing sites and assessing their deliverability. The SHLAA has reached the stage whereby an initial filtering

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12 At the time of writing this report it is recognised that regional housing targets no longer exist. However, in the absence of any locally derived housing target and given that the housing target from the South East Plan is consistent with housing delivery rates in the District over recent years it seems prudent to use the 4,400 figure, between 2006 and 2026, for the purposes of this study.
of sites has taken place and the draft site assessments have been undertaken by the consultants. Hence, it has been possible to identify the developable and deliverable sites, based on the draft findings, in this study. It should be noted that SHLAA sites identified as developable or deliverable does not guarantee a housing development on those sites, but it simply scopes options.

For the purposes of this study, it is assumed that the RSS targets are met, and hence the RSS housing delivery projections have been used to model housing growth in Lewes District. As of April 2009, the residual housing delivery target was 3431 homes, equating to an average of 200 homes per year until 2026. This average rate has been used to predict future growth and energy demand. Sites identified as developable or deliverable through the SHLAA have been used to spatially model possible development locations in the maps in this study.

3.7.2 NON-RESIDENTIAL GROWTH

The amount of non-residential growth that will accompany housing growth is less certain, so broad assumptions have been made in this study. Lewes District Council is currently undertaking an Employment Land Review which will inform the Council of the future needs of the local economy and indicate growth for the future. At this stage growth projections have still to be finalised, but from initial findings the amount of net additional employment floorspace that is expected to be delivered in the District is expected to be fairly low. In recent years, Lewes District has experienced a relatively significant amount of employment growth in terms of net additional floorspace being delivered (with approximately 8000m² in 2008 and 4000m² in 2009) but for the purposes of this study it is assumed future growth will be significantly less (initial findings from the ELR consider this to be the case). Accordingly, an annual average of 4000m² has been assumed for the period of 2006-2011, with 1000m² per annum assumed after that until the end of the core strategy period. In addition to this net increase in employment floorspace a number of existing employment premises are expected to be replaced with more ‘fit for purpose’ and modern premises.

The District Council has yet to prepare its Infrastructure Position Paper and subsequent Delivery Plan. Hence, it has not been possible to establish whether or not additional schools, community or health care facilities will need to be provided in the District (beyond what has already got planning permission). For the purposes of this study, we have assumed the only non-residential growth will be of an employment nature.

3.8 EXPECTED ENERGY DEMAND FROM NEW DEVELOPMENT

New development will increase energy demands in Lewes District. Part L of the Building Regulations is expected to require that buildings meet increasing minimum energy efficiency standards. These standards have been applied to the quantum and assumed a house type mix set out in section 3.4 and modelled using AECOM residential profiles prepared for DCLG, and CIBSE industry benchmarks for non-residential development. In addition, increased energy performance in line with the proposed changes to Building Regulations Part L requirements which will take effect in 2010, 2013 and 2016 have been taken into consideration, along with the expected changes to regulations affecting non-residential buildings leading up to zero carbon in 2019. The expected additional energy demand is set out in the tables below.

3.8.1 RESIDENTIAL DEVELOPMENT

The density of housing and the mix of house types expected in new development have a considerable effect on energy demand. Modelling within this study reflects two scenarios — where development follows a house type mix mirroring that of the existing housing type mix (based on the 2001 Census), or where density of new development is increased to over 50 dwellings/hectare. The table below shows the existing house type mix, and the modelled higher density house type mix.
### Table 9: Modelled House Type Mix

<table>
<thead>
<tr>
<th>Housetype</th>
<th>Detached</th>
<th>Semi-Detached</th>
<th>Terraced</th>
<th>Apartment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Mix</td>
<td>36.60%</td>
<td>26.50%</td>
<td>9.40%</td>
<td>17.50%</td>
</tr>
<tr>
<td>Higher Density Mix</td>
<td>25.00%</td>
<td>21.00%</td>
<td>27.00%</td>
<td>27.00%</td>
</tr>
</tbody>
</table>

### Table 10: Cumulative Energy Demand from New Residential Development (GWh)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maintaining current mix of house types</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity Demand</td>
<td>3.5</td>
<td>8.9</td>
<td>12.3</td>
<td>15.3</td>
</tr>
<tr>
<td>Gas Demand</td>
<td>6.3</td>
<td>4.5</td>
<td>7.9</td>
<td>20.8</td>
</tr>
<tr>
<td><strong>Using the higher density mix of house types</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity Demand</td>
<td>3.4</td>
<td>8.6</td>
<td>11.9</td>
<td>14.7</td>
</tr>
<tr>
<td>Gas Demand</td>
<td>5.9</td>
<td>3.6</td>
<td>6.8</td>
<td>19.6</td>
</tr>
</tbody>
</table>

The change in density across the District demonstrates how more efficient house types can automatically reduce energy demand and consequently reduce CO₂ emissions. Due to Lewes District Council’s slow growth rate, the CO₂ savings do not look significant; however, 600 kWh saved does contribute to the district’s energy efficiency goals. Therefore, land use planning and development density can affect CO₂ emissions, and hence higher densities should be encouraged where suitable.

### 3.8.2 Non-Residential Development

CIBSE TM46 benchmarks were used to model energy demand of future non-residential buildings, increased energy efficiency measures mirroring expected changes to building regulations for non-residential buildings. This is illustrated in the tables below.

### Table 11: Cumulative Energy Demand from New Non-Residential Development (GWh)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Demand</td>
<td>1.2</td>
<td>5.5</td>
<td>1.8</td>
<td>2.1</td>
</tr>
<tr>
<td>Gas Demand</td>
<td>6.0</td>
<td>7.3</td>
<td>7.6</td>
<td>8.0</td>
</tr>
</tbody>
</table>

The scale of total energy demand from non-residential buildings is relatively low. However, new non-residential buildings can individually have a very high energy demand, though this will vary greatly depending on the type of building. Consequently, non-residential development is often ideal for use as an ‘anchor load’ or fixed energy user to regulate supply through a district heating scheme.
3.9 TOTAL ENERGY DEMAND PROFILE

The following table summarises the combined energy demand profile of Lewes District. This summary assumes new development follows existing house type patterns and that switch of fuels in rural areas from coal and oil does not occur before 2026.

Table 12: Expected Cumulative Energy Demand in Lewes District over time (GWh)

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Residential Electricity Demand</strong></td>
<td>198</td>
<td>99</td>
<td>200</td>
<td>200</td>
<td>201</td>
</tr>
<tr>
<td><strong>Existing Residential Building Gas Demand</strong></td>
<td>597</td>
<td>556</td>
<td>516</td>
<td>475</td>
<td>449</td>
</tr>
<tr>
<td><strong>New Residential Electricity Demand</strong></td>
<td>0.0</td>
<td>3.5</td>
<td>8.9</td>
<td>12.3</td>
<td>15.3</td>
</tr>
<tr>
<td><strong>New Residential Building Gas Demand</strong></td>
<td>0.0</td>
<td>6.3</td>
<td>14.5</td>
<td>17.9</td>
<td>20.8</td>
</tr>
<tr>
<td><strong>Existing Non-Residential Electricity Demand</strong></td>
<td>188</td>
<td>81</td>
<td>173</td>
<td>166</td>
<td>159</td>
</tr>
<tr>
<td><strong>Existing Non-Residential Gas Demand</strong></td>
<td>152</td>
<td>48</td>
<td>144</td>
<td>140</td>
<td>136</td>
</tr>
<tr>
<td><strong>New Non-Residential Electricity Demand</strong></td>
<td>0.0</td>
<td>1.2</td>
<td>1.5</td>
<td>1.8</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>New Non-Residential Gas Demand</strong></td>
<td>0.0</td>
<td>6.0</td>
<td>7.3</td>
<td>7.6</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>Total Electricity Demand</strong></td>
<td>386</td>
<td>384</td>
<td>383</td>
<td>380</td>
<td>378</td>
</tr>
<tr>
<td><strong>Total Heat Demand</strong></td>
<td>749</td>
<td>717</td>
<td>681</td>
<td>641</td>
<td>614</td>
</tr>
</tbody>
</table>

The following graph demonstrates the effect of new development on the expected energy profile. It demonstrates that while new development will make up a significant proportion of the energy demand profile, it is still far outweighed by energy demand from existing development.
3.10 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

The sections above have considered the energy profile of Lewes District, both now and in the future. Key considerations emerging from this chapter are:

- It is important to realise the scale of energy demand in order to both set planning targets and measure planning targets for renewable energy delivery based on a percentage of demand. Current and future energy demands have been calculated in this chapter for use in policy and delivery;
- The Council play a key role in increasing energy efficiency of existing buildings. Existing buildings make up the bulk of the future energy demand, and hence efforts must be made to reduce energy demand of existing stock.
- Existing non-residential buildings often receive less focus than existing homes. The Council should support initiatives to increase energy efficiency in non-residential buildings in their area, particularly large energy users.
- Planning can affect CO2 emissions by affecting the density of development and mix of house types. Higher densities should be encouraged where suitable.
- There is significant use of oil and coal fuels. Efforts should be made to switch these fuel users to lower carbon fuels, ideally biomass.
4. Physical Context: Renewable and Low Carbon Potential

4.1 INTRODUCTION TO THIS CHAPTER

This chapter considers the scale of potential for the introduction of renewable and low carbon technologies in Lewes District. Opportunities and constraints vary on a local level according to the features of the natural environment and the built environment.

Regional guidance

Note: While regional spatial strategies have been revoked, regional guidance has been used as an evidence base throughout the study, as the data is still relevant to the District.

There are two recent background studies that include an assessment of the renewable resource potential that are of relevance to Lewes District. The South East Regional Renewables Review (June 2009) evaluates the applicability of the assumptions made in the Development of a Renewable Energy Assessment and Targets for the South East (2000) (which provided the basis for establishing the renewable energy targets set out in the South East Plan) against the latest thinking and provides an update to the resource assessment.

Progressing Renewable Energy in the SE of England (2008) was undertaken for the South East England Development Agency and in addition to reviewing the contribution and opportunity to meet renewable energy targets, it provides analysis on the drivers and barriers to the emerging renewable and low carbon energy sector.

In January 2010 new guidance was published by the Department of Energy and Climate Change on undertaking Renewable and Low-carbon Capacity Assessment Methodology for the English Regions (2010). A new capacity assessment is currently being undertaken in the South East following this methodology; however, the findings from this ongoing study will not be available in time to inform this study. Although focused at a more detailed scale, this study has also been informed, and is compliant with, the new guidance.

Neighbouring Areas

The emerging PPS on low carbon planning promotes the incorporation of the renewable and low carbon opportunities in adjoining areas and an informed cross-boundary approach that supports coordination. Neighbouring Lewes District and also forming part of the county of East Sussex are the local authorities of Wealden to the east and Brighton and Hove to the west. Mid Sussex District, which is within the county of West Sussex, also borders Lewes District to the west.

A West Sussex Sustainable Energy Study (2009) has recently been completed for the majority of the county to inform the opportunities and spatial planning requirements for renewable and low carbon energy in five of the West Sussex local authorities. The assessment suggests that the county’s current renewable and low carbon technologies currently contribute to a reduction in carbon emissions of around 2.4% per year. The study also highlights that the greatest potential for further carbon savings come from onshore wind development and biomass from energy crops. These, combined with small contributions from other low carbon sources could potentially deliver a carbon saving of around 46.6%. This does not however take into consideration landscape sensitivity, which is likely to significantly...
restrict delivery of wind development and energy crop planting and may limit possible carbon savings to around 12.3%. This is significantly short of the Government’s aspiration of an 80% cut by 2050 (though the target also includes transport emission reductions and offshore renewable projects). The study goes on to demonstrate the impact on the net increase in emissions from the level of new development proposed to 2026, based around 4 scenarios and the potential to establish heating networks. The study also makes a number of policy recommendations, including code-based carbon reduction targets for new development and a hierarchy for consideration of heating/cooling systems.

Although the **Renewable Energy Potential Study** (2009) for the neighbouring local authority of Wealden provides a breakdown of the mix of technologies required to meet higher targets and there is high level discussion over the relative merits and opportunities for different renewable and low carbon options within the district, details of the district’s capacity for reducing energy related carbon emissions has not been included. The study does, however, make a series of recommendations relating to proposed changes to Building Regulations, including a general policy to reduce carbon emissions by 20% for all buildings if changes to Building Regulations are delayed, and a policy for general target of 20% reduction in total CO₂ emissions (regulated and unregulated emissions) from low and zero carbon when Building Regulations are tightened to 25% below current levels. This general % reduction target diminishes as Building Regulations become more stringent.

Although Brighton and Hove are yet to complete an assessment of renewable and low carbon energy capacity, their Core Strategy Submission Document requires that all new residential developments of 3 or more units (including conversions and mixed use schemes) achieve zero carbon status.

Eastbourne, slightly further along the coast but with similar characteristics to the coastal area of Lewes District, has developed (with AECOM) a **Renewable Energy Potential Study** (2009). This study develops an Energy Opportunity Map that illustrates the assessment of renewable and low carbon energy potential to explore the relationship between potential opportunities with development. The study also sets out a series of recommendations for the local authority in implementing policies and delivering greater contributions in carbon reduction from renewable energy generation.

**This Study**

This study will bring together an understanding of the current renewable and low carbon sector in Lewes District and undertake an assessment of future potential and how this relates to proposed development. This analysis can then be used alongside other planning and delivery considerations to develop a set of recommendations, policies and actions, in order to prioritise initiatives to reduce energy related carbon in the District.

The next section reviews the contribution that renewable and low carbon technology currently makes within Lewes District, after which, the sections set out the potential within the local authority of a range of technologies covering:

- Physical potential and constraints
- Delivery opportunities and constraints
- Possible carbon reduction over core strategy period
- Influence of planning
- Case study (where relevant)

### 4.2 CURRENT RENEWABLE AND LOW CARBON ENERGY GENERATION IN LEWES DISTRICT

The application of renewable and low carbon technologies in Lewes District has been development site specific and largely small scale. The Ouse Valley Energy Services Company (Ovesco) is an Industrial and Provident Society for community benefit dedicated to localising energy generation in Lewes District since 2007. The presence of a local ESCo (Energy Services Company) has ensured that local renewable projects have gained delivery traction, and its presence is a major advantage to carbon reduction delivery in Lewes District. They have achieved substantial delivery of microgeneration through targeted grant funding on existing homes of:

- Solar thermal panels for hot water;
- Ground Sourced Heat Pumps (GSHP) and Air Sourced Heat Pumps (ASHP);
- Pellet fuelled stoves or room-heaters;
- Wood burning stoves (not for multi fuel stoves);
- Biomass fuelled boilers;
- Small wind turbines; and
- Others renewables that ‘may’ be considered such as Photovoltaics (PV) to generate electricity on a case by case basis.

Details of the renewable energy installations that have been delivered on existing properties through activity by the Council and OVESCO are given in chapter 3.

In addition to micro-generation on existing homes, there are also several exemplar projects in Lewes District where the community and interested owners and developers have delivered small-medium scale renewable energy schemes. Other renewable energy projects in the district include Beech wood Hall where the community hall has a 6kW turbine in addition to ground source heat and solar heating to provide hot water. Ringmer Community College and Sixth Form has also incorporated 66 x ‘KC120’ solar photovoltaic panels generating with a peak capacity of around 7.5kWe of electricity. These panels generate around 10% of the school’s electricity requirements. This is supplemented by a 2.5kW wind turbine. Sussex University has also erected a small wind turbine and Plumpton Agricultural College also benefits from micro-renewables.

Anticipated Development

Perhaps the most significant low carbon development underway, in terms of energy generation, is the Newhaven Energy from Waste facility. With a capacity of 210,000 tonnes per annum (specifically kept low to encourage reuse and recycling), the facility will take East Sussex’s non-recyclable or compostable waste to generate electricity for a reported 16,000 homes. While the facility will generate significant amounts of low carbon electricity, it is understood that there are currently no plans to utilise waste heat from the facility as a renewable and local form of heat energy. The facility, which has an installed capacity of around 18MW, was granted planning permission in 2007 after a lengthy application process. The facility is due to be operational in 2011.

Also with planning permission, but as yet not operational is the proposed 850kW wind turbine at Glyndebourne. It is anticipated that the 70m high turbine will generate enough electricity to reduce the estate’s carbon emissions by around 70%, saving 855 tonnes of CO2 per annum.

In addition to the targeted grant funding for micro-generation and efficiency measures, Ovesco provide advice to Lewes District Council and have identified a number of potentially viable projects. In 2009 the priorities were identified as, including:

- Wind energy at
  - Peacehaven
  - Seaford Head
  - Harbour Heights
  - Kingston Ridge
  - Walland School

- Hydro power at
  - Isfield
  - Anchor Inn
  - Barcombe Mills

- PV
  - Wallands School
  - Chalke School
  - Harveys Brewery
  - Newhaven Industrial Estate
  - Prior School

- GSHP
  - Harveys Brewery
4.3 ESTIMATING DISTRICT WIDE LOW CARBON AND RENEWABLE ENERGY POTENTIAL

Before estimating the potential for the delivery of low carbon and renewable energy associated with future development, it is important to understand the opportunities and constraints around the use of different generation technologies across the Local Authority. Opportunities are likely to vary across the Authority, and its ability to meet the challenge set out above may be constrained.

As identified in the regional study, the greatest opportunities for renewable energy in the Region are large onshore wind power, landfill gas and biomass (from energy crops, imported biomass, agricultural wastes and managed woodland). Anaerobic digestion of waste and sewage by-products also contributes along with solar power. The South East study does not consider or set targets for renewable heat, but there is also considerable potential for biomass fuelled heating, district heating and combined heat and power (CHP) in the southeast. This chapter also considers the likely scale of renewable energy that will be brought forward by new development and the amount likely to be retrofitted to existing development.

This study focuses on the potential for renewables and low carbon technologies associated with wind, biomass, anaerobic digestion, district heating and combined heat and power and (with the planned introduction of feed-in tariffs) micro-generation. Other low carbon and renewable technologies that are applied at a site scale associated with new development are discussed in Chapter 5. The following renewable technologies are excluded from the District-wide analysis for reasoning as follows:

- **Geothermal energy**: There is no known geothermal resource for large scale installations in Lewes District. Ground source heat pumps are viable on a site scale and are considered in the micro-generation and new development sections of this report.
- **Energy from sewage**: Energy from sewage needs to be taken forward at a wider scale and is very dependent on existing infrastructure. There is a current proposal for a new wastewater treatment plant at Peacehaven, which is taken into consideration in this study, but further potential for energy from sewage has not been scoped.
- **Energy from waste**: Waste is managed at a county level and the waste management facility proposed Newhaven is already utilised for energy from waste (electricity only). Further potential for energy from waste should be considered at a regional or county level, but is considered outside the influence of Lewes District Council alone.

4.4 ONSHORE WIND

Wind energy is a key opportunity to generate relatively large amounts of renewable electricity in the UK. Across the country, large-scale wind turbines are seen as a key part of carbon reduction. Wind turbines vary in size and the comparative amount of electricity they can generate. Different scales of turbine trigger different planning and delivery considerations. Accordingly, new guidance Renewable and Low-carbon Capacity Assessment Methodology for the English Regions (2011) recommends subdividing assessments of wind resource potential off site and site scale. Medium-large scale turbines are small scale turbines. Meium-large scale turbines are small scale turbines mounted on buildings. Within this differentiation there remains a wide range of turbines, although for the purposes of this study, and in line with the DECC methodology for regional renewable energy assessments we have considered these two broad types.
This study considers the wind energy potential from both medium-large and small wind turbines across Lewes District specifically from a desk-top study based on GIS modelling using data available below. It should be noted that this study is not a sufficient evidence base for the actual siting and delivery of wind turbines, but it gives a high level assessment of promising geographical areas to look into further.

4.4.1 MEDIUM-LARGE SCALE WIND TURBINES

Physical potential and constraints

The South East Regional Renewables Review found that assumptions used to inform the targets in the South East Plan underestimated the potential of onshore wind developments, primarily due to technological advances increasing viability from slower wind speeds and small wind farms. The rate of deployment of turbines was, however, less than had been envisaged in Development of a Renewable Energy Assessment and Targets for the South East due to non-technical barriers including planning. The recently completed Review of Renewable and Decentralised Energy Potential in South East England (2010)\(^\text{13}\), prepared for the South East England Partnership Board, outlines the potential for all sources of renewable energy in the South East region. It identifies wind as a key resource for Lewes District, with the potential to provide approximately 34% of the East Sussex’s total potential.

However, in considering the potential for further development of wind energy, it is first important to understand the available wind resource and where the optimum locations for generation might be. Large to medium scale wind turbines are likely to be commercially viable at an average wind speed of 5m/s or above (measured at an elevation of 45m). For the purposes of this study, we have tested the viability of large-scale 2.5MW turbine with a blade height of

around 130m. Higher wind speeds will be more desirable as available power from the wind is a cube function of wind speed velocity power output, and the potential of these sites should be investigated first.

The figure below shows the range of wind speeds across the Lewes District at 45m above ground level. It shows that a large proportion of the district achieves high enough average wind speeds for large turbines to be viable. The greatest potential is on the higher ground along Ditchling Beacon and Firle Beacon.
Figure 23: Average wind speed at 45m
A process of physical constraint mapping has been used to identify which sites are likely to have potential for large wind turbine location. Through GIS analysis, the constraints that have been included are listed below and conform with the DECC guidance:

- Non-accessible areas
  - Roads (A, B and motorways)
  - Railways
  - Water bodies
  - Built up areas
  - Airports

- Exclusion areas
  - Ancient semi-natural woodland
  - Sites of historic interest (but no buffer to be applied)
  - Buffer around road and rail line = turbine tip height +10%
  - Buffer around built up areas = 600m
  - Buffer around airports and airfields = 5km
  - Civil Air Traffic Control constraints

- Designated landscape and nature conservation areas, including the following classifications.
  - National Park
  - AONB
  - SAC
  - SSSI
  - RAMSAR
  - SPA
  - NNR
  - SINC
  - BAP habitats

Guidance specifies National Parks, and Broads and Areas of Outstanding Natural Beauty as having the highest status of protection. The Infrastructure Planning Commission (IPC) can exceptionally grant consent to development in these areas, if the development is demonstrated to be in the public interest.\(^{14}\) Local development policies discussing landscape character should be considered. However, local landscape designations should not be used in themselves to refuse consent, as this may unduly restrict acceptable development.\(^{15}\)

Constraints are mapped onto the wind speed map in the figure below and are discussed further below.


Figure 24: Average wind speed at 45m with constraints
The above map demonstrates that the development of medium-large scale wind energy is feasible in several areas in the Lewes District, particularly on high land to the south-east and west of the District and in some areas to the north and east. Newhaven Port has also been identified as a possible site. While wind speeds in the national dataset suggest low wind speeds in this area, we are not confident in the accuracy of the wind data set along the coastline. From anecdotal reports, the port area experiences high winds, and hence this commercial setting has been identified as a potential turbine location. However, all sites have some potential constraints. The sites with the most promising wind speeds are located in the National Park, and may be constrained by emerging planning policy (as discussed further below). The sites identified in the north and east of the District perhaps offer better potential. All sites in the north are in the buffer zone where consultation will be required with Gatwick airport on possible radar interference, but due to the distance from the airport, development could be possible.

Newhaven Port has also been highlighted as an opportunity on the map. It should be noted that the GIS mapping conducted as part of this study is constrained by the detail of datasets relating to urban areas. A noise buffer has been placed around all urban areas to mitigate against possible adverse effects of wind turbine noise. It should be noted that this is an extremely conservative buffer, particularly in urban locations that are likely to have higher background noise levels in any case, which would mask any noise from turbines. In commercial or industrial areas, any noise generated by large scale wind turbines is likely to be masked by higher background noise levels and these premises would also be unaffected at night. Therefore, the generic ‘urban areas’ used in the GIS analysis cannot buffer out commercial or industrial sites unnecessarily, where wind development may in fact be possible. Newhaven Port has been identified as such an area where a large wind turbine is unlikely to have adverse effects on noise pollution. The Lowestoft case study below demonstrates how wind can be delivered in a port environment.

Further detailed feasibility studies would have to consider a number of additional siting constraints in addition to these before any site could be confirmed, including:

- **Local Wind Resource Survey** - Wind speeds of 5.5m/s or above at turbine hub level are needed to operate a large scale wind turbine efficiently. The national dataset for wind speeds at a height of 45m above ground level was used to examine wind speeds across Lewes District. This study is not a sufficient evidence base for the actual siting and delivery of wind turbines, but it gives a high level assessment of promising areas to look into further.

- **Noise implications** - Concerns over noise can be related to perception rather than actual experience\(^{16}\). The noise impact of large scale wind turbines will depend on local sources of noise such as from major roads, rail lines, industrial areas etc. There are no required distances between wind turbines and residences, but 600m is a rough guideline that is often used and has been adopted within this assessment. Distances between turbines and non domestic buildings are not subject to the same restriction. More detailed studies will be required to map noise and identify areas of least impact for turbine development.

- **Aeronautical and Defence Impacts** – Wind turbines may interfere directly with the operation of aeronautical and defence equipment, for example, when located near aero drome protected surfaces, run way takeoff points or within military low-flying zones. Radar systems associated with airports and military sites are also a significant issue; for example, radar technology that is unable to differentiate between rotating turbine blades and an approaching aircraft have contributed to the rejection of a number of wind applications in the UK. Consultation will have to be undertaken with MOD and nearby airport authorities to determine particular constraints in the area and possible mitigation strategies, such as software upgrades to the radar technology. It is emphasised that the presence of local airports or military sites is not necessarily a critical constraint when considering the exploitable wind resource, but consultation is advised on a case by case basis.

- **Grid connection and Sub Station Requirements** – It will be necessary to carry out a detailed assessment of the opportunities and constraints presented by existing infrastructure in relation to each turbine site. And this information should feed into any development programme for turbines. Planning applications for sites close to a suitable grid connection should be prioritised.

• **Flood risk** - Development of wind turbines on areas of high flood risk is currently restricted by PPS 25. This could potentially impact upon the construction of Turbines in the flood risk areas. The recently revised PPS 25 has reclassified wind turbines as essential infrastructure. This, in principle, largely permits turbine development in flood zones and as such flood zones have not been considered a constraint in the above analysis.

• **Blade Glint Modelling** - This can be an issue at certain times of day when the wind is blowing, but effects can usually be mitigated against and have not been specifically considered at this stage. This would need to include driver distraction issues, in partnership with the Highways Agency and local highways services.

• **Telecommunication Impacts** - Wind turbines can interfere with radio signals, television reception and telecommunications systems. This has not been specifically assessed at this stage, but with consultation measures can be put in place to mitigate these effects.

• **Landscape and Visual Impact** - A detailed visual and landscape impact assessment has not been conducted at this stage. The specific sites of the turbines would have to be carefully considered to ensure that they do not detrimentally impact key views and that they are integrated into the surrounding landscape.

• **Bird Migration** - An important element that will need consideration is the annual migration of birds, particularly due to the presence of important environmental sites in the area. A detailed migration survey must be conducted over a year period.

• **Transport Access Assessment per turbine** - Blade section is the longest/largest full section to be delivered on site. Some sites are restrictive.

• **Additional losses to turbine energy output** - A more detailed analysis would be required into the effect of local topography, clustering effects, inconsistent wind speeds, and local climatic conditions on the energy yield of the turbines.

• **Impact upon land use and land management** - The amount of land consumed by wind turbines is relatively small. Nevertheless, further study should be carried out to ensure that the turbines do not have a negative effect upon land use potential.

• **Ground Condition Survey** – The feasibility of the construction of a large turbine would have to be supported by geotechnical investigations

• **Gas pipelines and other sub terrain analysis** - The current assessment has not assessed the presence of utility pipelines beneath the sites which would have considerable impact on the ability to site turbines.

• **Archaeological Constraints** - Any impacts on archaeology in the area will have to be assessed in more detailed studies.

• **Listed Building and Conservation Area impact** – a detailed impact assessment has not been conducted at this stage and would be required for any further study.

### Delivery opportunities and constraints

Perhaps the most significant constraint to wind development is the protected landscape within the South Downs National Park and former Area of Outstanding Natural Beauty (AONB). The SE EPB study has estimated a potential of zero in all designated areas in the South East on agreement with Natural England.

Although wind turbine development is not prohibited in these areas, Natural England who are the designating body for these National Parks and AONBs have duties to advise on any development proposals affecting the statutory landscapes highlighted in *Making space for renewable energy* (2010) that 'the presence of statutory protected landscapes will substantially reduce the degree to which wind energy development can be accommodated'.

Natural England considers that AONB and National Parks afforded equivalent importance. For development to take place in these areas it is important that the special qualities and purposes of designation are not compromised. They recommend that:

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17 Planning Policy Statement 25: Development and flood risk, Annex D

'The process of assessment and judgement is the same as for non-designated areas: the difference arises from taking into account the value society places on the special qualities of these areas and the additional determinative test of assessing whether major development is likely to compromise the objectives of designation'.

The DECC guidance contains a five point list for assessing the potential for renewable energy deployment within international and national landscape:

- Step 1: Identify the purposes of the landscape/ nature conservation area (reasons for designation)
- Step 2: Identify which technologies might affect these purposes/ integrity of the designation
- Step 3: Identify how each technology might affect the purposes/ integrity
- Step 4: Identify the type and level of renewable and low carbon infrastructure that could be accommodated without compromising the purposes/ integrity of the designations
- Step 5: Provide guidance on how to integrate renewable/ low carbon energy without compromising the purposes/integrity

Although Natural England advises local authorities against creating a buffer around protected landscapes, they do however recognise the sensitivity of the setting of these areas and that wind turbine development within such areas, can compromise the objectives of original designation.

The newly formed National Park, which will be the sole local planning authority for the South Downs National Park area from April 2011, has yet to develop policies relating to renewable energy development within such areas. The Joint Management Committee for the AONB did however set out in the South Downs Planning Guidelines (2008), the Committee’s position on a range of renewable energy development that are likely to guide future policy for the National Park, including wind turbines:

“The Joint Committee will object to proposals for a wind turbine or turbines, within or outside the South Downs, intended to supply electricity to the national grid or to urban areas outside the South Downs unless it can be demonstrated to the satisfaction of the Joint Committee that the proposed installation would not, individually or in conjunction with other existing installations, be to the detriment of the natural beauty, character, amenity and/or nature conservation interest of the South Downs through visual intrusion, noise, activity or associate infrastructure such as overhead lines.”

In addition the South Downs Management Plan anticipates, that “there will be no areas within the South Downs that can accommodate wind energy development without detriment to the natural beauty of the South Downs.”

As such, it is unlikely that large scale wind development will be acceptable within a large part of the Lewes District in the future. However, it should be noted that the recently approved 850kW (large-scale) wind turbine at Glyndebourne is located within the National Park. It is suggested that the Council should work with the National Park Authority to determine where, if anywhere, medium-large scale wind turbines could be acceptable in the Park without adversely affecting the purposes of the Park. It may be that some areas surrounding urban areas or in less visible parts of the Park could be suitable for wind energy development.

There are other potential opportunities to the north and east of the District outside of the National Park. The area to the north falls within 30km of Gatwick Airport, and as such any development would have to be undertaken in consultation with the CAA, but would not necessarily prohibit the erection of medium-large wind turbines. The area to the east, on the other hand is unconstrained and viable for wind development.

There is a good opportunity to integrate large-scale wind energy at Newhaven Port due to its light industrial surroundings. With the offshore wind turbines proposed on the Hastings Bank, which may be manufactured in and distributed from Newhaven, the area could become iconic for wind development. An onshore wind turbine at the port could, therefore, become a key identity statement for the area. An economic focus on renewable energy industries could also be a focus for regeneration plans for the area. Commercial interest for a single large wind turbine has also
been expressed in the area around Newhaven port in the past but has not thus far been successful due to the absence of a committed local delivery partner. Although the high level mapping suggests that these areas may not have viable wind speeds, specific coastal locations may benefit from sea breezes. As such this site has been considered for its potential.

Possible carbon reduction over core strategy period

The DECC guidance for regional renewable energy assessments recommends that in areas where wind speeds are high enough for large wind turbines to be viable, that the capacity for turbines should be derived by applying a density benchmark of 9MW/km². Deriving the annual output of all the potential turbines it is possible to estimate the annual carbon equivalent saving using a factor of 0.57kg/kWh for CO₂ reductions from displacing electricity supplied from the grid with renewable electricity. The table below shows the theoretical wind energy potential in the Lewes District, firstly in all areas which are technically viable (including the National Park) and secondly just in the unconstrained area in the northern rural areas. The potential is significant, but very dependent on planning support and appropriate delivery mechanisms.

Table 13: Wind Generation Capacity

<table>
<thead>
<tr>
<th></th>
<th>Capacity (MW)</th>
<th>Annual Electricity Generated (GWh)</th>
<th>Annual Carbon Saving (ktonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted capacity</td>
<td>516</td>
<td>2,399,364</td>
<td>773</td>
</tr>
<tr>
<td>Excluding designated areas</td>
<td>39</td>
<td>104</td>
<td>59</td>
</tr>
</tbody>
</table>

The SEEPB study¹⁹ used a similar methodology for estimating large scale wind, but gives a higher estimate of potential in undesignated areas, estimating a capacity of 275MW (110 large turbines) in Lewes District. This seems to be an over-estimate given the limited areas of uncontained potential in the District. The reason for the higher scale of this estimation is unknown, but is assumed to be data error.

Influence of planning

The areas of Lewes District most viable for large wind development fall within areas covered by the South Downs National Park. With the National Park Authority taking responsibility for planning in the areas of Lewes District covered by the National Park designation by 2011, future policies relating to wind energy development will have great influence on wind energy generation potential. Although the National Park’s planning position in relation to renewable energy development has yet to be defined, early discussions with the Authority suggest that a similar approach will be taken as has been applied to the AONB. As such wind turbines feeding into the national grid would be opposed. In any case, the best sites for wind turbines are also likely to be in areas of heightened visual and landscape sensitivity.

The former AONB Joint Committee’s position on wind development was, however, to support smaller turbines providing power to small groups of buildings, as long as the natural beauty of the South Downs was not compromised. If the National Park adopted a similar policy, and working in conjunction with the Landscape Character Assessment, it may be possible to identify less sensitive areas where wind energy could be acceptable. More details on small scale wind development are outlined below.

Setting a new precedent for large wind turbine development, the coastal district of Waveney erected an iconic 2.75MW turbine within the urban fabric of the town of Lowestoft. Situated within the port area of the town, and located with less sensitive industrial and commercial uses as neighbours, the hugely popular turbine demonstrates that wind energy development can be acceptable in areas often considered to be out of bounds. With a hub height of 80m and rotor tips reaching 126m, ‘Gulliver’ as the turbine is affectionately known, is the one of the largest turbines in England, generating electricity for around 1500 homes and displacing a reported 6000 tonnes of carbon each year.

4.4.2 SMALL-SCALE WIND ENERGY

Physical potential and constraints

Smaller wind turbines have a significantly reduced visual impact, and whilst their output is significantly less, medium-scale wind can contribute to the Authority’s renewable energy generation capacity. Recent reports have shown that medium-scale wind is not suitable for urban or suburban locations due to the effects of turbulence at low levels on power output. However, agricultural land, characterised by large fields with a relatively uninterrupted yaw which will minimise the impact of turbulence on power output, presents better opportunities.

Figure 25 shows the areas of Lewes District where small wind turbines might be viable.
Figure 25: Average wind speed at 10m
The yearly average wind rose for Heathrow, South East England, the closest annual wind rose available from the Met Office to Lewes District, indicates that as with the rest of the UK the predominant direction of wind is from the southwest, see Figure below. Wind rose data from Glyndebourne, just outside Lewes Town, suggests it has a very similar profile to that of Heathrow’s. Medium-scale turbines that cannot afford to carry out a year-long monitoring exercise examining wind speed and direction should therefore be sited to take maximum advantage of winds originating from this direction.

**Figure 26: Met office wind rose for the Heathrow, Southern England**

**Delivery opportunities and constraints**

The conversion of potential to delivery requires consideration of a number of factors including:

- Finance - Farming is generally in decline in the UK due to increasingly limited margins and a potential income source from renewable electricity would be welcome. However, it is expected that a significant barrier to investment in small scale renewables will be the upfront investment. As such, some form of fiscal support such as an ‘energy loan’ is likely to be required to provide funding. Such a loan could be set up through the use of a revolving door energy fund such as SALIX or other funds applicable to renewables. In addition to funding such a service would need to provide information and advice and expect a return in investment from energy saving and ROCs (Renewable Obligation Certificates) receipts.

- Partnerships with turbine providers and installers can help leverage efficiencies of scale.

- Landscape and visual sensitivity will again be issues in Lewes District, and is discussed more below.

There are a number of potential sites, being explored by Ovesco that might bring forward smaller wind turbines at:

- Peacehaven
- Seaford Head
- Harbour Heights
- Kingston Ridge
- Wallands School

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22 Salix [http://salixfinance.co.uk/home.html](http://salixfinance.co.uk/home.html)
In addition to the above, and given that there are reliability issues with turbines in urban areas, perhaps the greatest opportunity for smaller wind turbines comes from farms.

The SEEPB study\(^{23}\) suggests that small scale wind in Lewes District has the potential to deliver 27% of East Sussex’s total in non-designated areas (which equals 22.5 MW installed capacity, or 31 GWh) and 6% in designated areas (4.7 MW installed capacity; 6.58 GWh).

**Influence of planning**

Smaller turbines are less visually intrusive and, as such, may be more suitable in the sensitive landscape in Lewes District. The former South Downs AONB Joint Committee’s Planning Guidelines were largely supportive of smaller wind developments\(^{24}\). It is likely that the National Park Authority will establish a similar approach, although this is yet to be decided.

‘The Joint Committee will normally not object to, or will support, proposals for single small turbines intended to provide power to individual, or a number, of properties, community buildings, businesses etc within the South Downs, provided it can be demonstrated to the satisfaction of the Joint Committee that the proposed installation would not, individually or in conjunction with other installations, be to the detriment of the natural beauty, character and amenity of the South Downs through visual intrusion, noise, activity or associated infrastructure such as overhead lines.’

Natural England note, however, that caution needs to be applied when considering cumulative developments.

‘The scale of development is a key factor when assessing the degree that wind energy can be accommodated within a protected landscapes. Small-scale wind energy developments are generally less likely to compromise the objectives of designation, but this is not always the case, especially if there are cumulative impacts caused by several small-scale developments in the same area.’

New legislation was released for consultation in November 2009 on ‘Permitted development rights for small scale renewable and low carbon energy technologies, and electric vehicle charging infrastructure’ (consultation closed in February 2010). This would remove the need for planning applications for some small scale turbines up to 15m. Although more restrictive limits are proposed for sensitive areas where the Government considers they would be warranted, these are not extended to National Parks as it is the Government’s view that development in these areas would not be dense enough to ‘unduly harm their visual character’.

**4.5 OFFSHORE WIND POTENTIAL**

**Physical potential and constraints**

The generation of energy by offshore wind installations has not been considered as a contributing renewable source within this study as the targets for South East England specifically split offshore and onshore wind and the offshore resource does not fall within the jurisdiction of Lewes District Council. However, as offshore wind could be important to the economic base in Lewes District, it is important to understand the scale of potential. The figure below demonstrates the potential for offshore wind in terms of wind speed. Other considerations including grid connections, sea depth and ground conditions also factor in offshore wind turbine siting.

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Figure 27: Offshore wind speeds
The unique ground conditions of the Hastings Bank, between Brighton and Newhaven, make offshore wind development favourable in the area. Earlier this year, the Crown Estate approved the development of an offshore wind farm on the Hastings Bank consisting of 100 wind turbines, producing enough electricity for approximately 250,000 households.

This project has the potential to benefit Lewes District in a number of ways. First, the current capacity of the existing infrastructure will need to be expanded to handle the increased electricity generated. This presents an opportunity for other renewable electricity in the region to “piggyback” on the improved infrastructure. As mentioned in the previous section, with plans to transform Newhaven Port into a manufacturing base for offshore wind turbine parts and technology, building an iconic wind turbine onshore would contribute to attracting innovation to the area. The Hastings Bank wind farm development will not assist Lewes District in meeting its energy targets, but presents a good opportunity to showcase the Lewes District as a sustainable, forward thinking location.

Influence of planning

Because offshore wind farms are located in national waters, the role of local authorities to influence their implementation is significantly diminished. However, planning can play a meaningful role in realising the onshore benefits associated with offshore development, including the redevelopment of Newhaven Port. Policies that support the transformation and regeneration of the region into an alternative energy hub and attract investment and green jobs in the area can help Lewes District become more economically, socially and environmentally sustainable.

4.6 MARINE ENERGY (WAVE AND TIDAL)

Electricity can be derived from the sea by harnessing the energy from the movement caused by waves or changes in the level of the tide. Although marine energy is expected to play a role in meeting national renewable energy targets set out by the Renewable Energy Strategy, they are not counted as contributing to local renewable energy targets. This is because marine resources are state controlled rather than under the jurisdiction of the local authority. The marine energy potential on the Lewes coast are, in any case, limited as demonstrated below.

Physical potential and constraints

The Atlas of UK Marine Energy Sources: A strategic environmental assessment report (2008) illustrates the annual mean wave power in the UK. Figure shows the section relating to southern England, highlighting that the mean wave power along the Lewes coast is between 1.1 and 5.0 kW/m of wave crest. Although no definitive analysis has been carried out on the capacity limits for the UK wave resource, the power of the waves on the Lewes District coast are at the lower end of the scale and, as such are the least likely areas to attract interest from energy development. Real time wave information can be found at http://www.channelcoast.org/data_management/real_time_data/charts/?chart=81

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Figure 18: Annual mean wave power in the UK - full wave field
The Atlas of the Tidal Energy Resource on the South East Coast of England (prepared for SEEDA by Marine and Technology Consultants, May 2007) provides an assessment of tidal energy potential. The Lewes coastline is long with little curvature and the potential resource from tidal stream is below 1000 MWh/year, which is likely to be too low for commercial exploitation. Tidal range resource in the UK is focused in a limited number of locations which include the Bristol Channel (including the Wales and Devon coasts), Liverpool and Morecambe bays, the Solway Firth, The Wash, The Duddon, The Wyre and the Conway.

Figure 29: Potential mean power generation for areas of significant tidal stream resource in the SEEDA region. The data presented is an approximate value of the electrical power that a twin-rotor tidal turbine might deliver in one year.
Delivery opportunities and constraints

The scale of potential to exploit marine energy opportunities is too small to be viable. Other areas of the UK coast present much greater opportunities that should be explored first. There may be some opportunities for demonstration technologies or research around Newhaven which could tie in with a focus on low carbon technologies as part of economic regeneration plans.

Possible carbon reduction over core strategy period

It is unlikely that marine energy resources will contribute to any carbon reduction in the Lewes District in the core strategy period.

Influence of planning

Given the nature of marine energy and the restricted potential for development, the influence of planning will be limited. Contributions in the form of allowable solutions may present an opportunity to invest in marine energy. The government is committed to spending £60m on research and development into wave and tidal energy to help improve viability.
4.7 HYDRO ENERGY POTENTIAL

The UK has a long history of generating motive power from water for industrial purposes. Indeed, there are over 20,000 old mill sites across the UK, many of which have potential to generate renewable energy. Using small scale turbines, the energy from rivers can be harnessed with less disruption to water flow than large scale hydro schemes. The introduction of government targets for renewable energy generation, combined with technological development has increased the feasibility of micro hydro generation, both at historic mill sites or in hilly areas with spring-fed streams.

Micro hydro energy generation has a number of advantages. As well as being a renewable source of power, the ecological impacts of small-scale turbines are usually small compared to large dam-based hydro power. Compared to wind power, micro hydro power sources offer more constant generation. In addition, maintenance costs are reasonably low and systems generally have a long lifetime of over 25 years. Moreover, the cost of reactivating historic sites can often be reduced by reusing existing structures such as the weir.

Physical potential and constraints

The SEEPB study has highlighted Lewes District as having significant hydro potential when compared to other authorities in the County (75% of the potential in East Sussex comes from Lewes District). Both OVESCO and the Environment Agency have investigated the potential for hydro power in Lewes District, particularly by examining the potential of specific sites.

OVESCO have identified nine potential micro-hydro sites, predominantly former mills that could potentially support hydro schemes, as shown in the figure below:
- Barcombe Mill
- Old Oil Mills - Anchor Inn Barcombe
- Fletching
- Plumpton Water Mill
- Isfield Water Mill
- Shortbridge Water Mill
- Plumpton Upper Water Mill
- Ashcombe Wind Mill
- Tidemills Newhaven

The Environment Agency (EA) recently released a report titled Opportunity and environmental sensitivity mapping for hydropower in England and Wales, which provides a high level assessment of scale of potential and the sensitivity of micro-hydro schemes. This includes fish passage as well as other ecological and amenity considerations. The Environment Agency study identified 33 sites in Lewes District most of which have the potential between 1-10kW (very low potential), although three are between 10-20kW (low potential), two between 20-50kW (medium potential) and two between 50-100kW (high potential). All but one of these were ranked as highly sensitive (the exception being one in the northwest of the District) although the EA acknowledge that with detailed site investigation it may be possible to mitigate any adverse impacts. As such, focus should start with those sites that offer the greatest power potential in the first instance. The map below shows the relative potential of the micro-hydro sites identified in the District.
Figure 30: Environmental sensitivity of potential hydro schemes

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Environment Agency Opportunity and environmental sensitivity mapping for hydropower – Part B South West and South East (undated)
The map below compares the relative potential of the sites identified by OVESCO as having potential with those identified by the EA.

Figure 31: Hydro Potential Facilities
Delivery opportunities and constraints

The conversion of potential to delivery requires consideration of a number of factors including:

- **Land ownership** – access in terms of ownership of land can be an issue for site development
- **Extraction Licence** – required on hydro schemes on rivers via the Environment Agency to ensure the water levels in rivers are not compromised.
- **Fish Passage** – the Environment Agency requires fish passes to be installed which can increase the construction costs of any future schemes.
- **Restoration of historic mills** – this is a potential opportunity to both celebrate local heritage and to generate renewable energy.
- **Community delivery** – micro-hydro projects are an ideal example that can be led and funded by local communities. The case study below demonstrates how community partnerships have delivered a scheme.
- **Access** – the accessibility of the sites to construction and maintenance vehicles and machinery is varied. Although some sites have good existing access others would require the construction of potentially costly new routes
- **Scheme Design** – each weir would require a bespoke design which responds to the unique flow characteristics and site constraints.
- **Location of new development** – the delivery of schemes could be associated with new developments adjacent to potential sites. Given the location of the potential sites in Lewes District (predominantly rural) new development is unlikely to be acceptable adjacent to the majority of the sites.

Possible carbon reduction over core strategy period

Hydro energy turbines range in size and their load capacity (the ratio of average to maximum output) is dependent on the flow of water (the head) through the turbine. As described above, the Environment Agency identified around 33 sites in Lewes District most of which have the potential between 1-10kW, three are between 10-20kW, another two between 20-50kW and final two between 50-100kW. For the sake of demonstration, assuming all sites are developed and taking an average capacity as identified by the Environment Agency, and with a load capacity of 52% (industry standard), the total possible renewable electricity generation from micro-hydro for the district would be in the region of 1,184MWh giving a total carbon saving of 495 tonnes per year as shown below.

Table 14: Theoretical Maximal Carbon Savings from Hydro

<table>
<thead>
<tr>
<th>Hydro turbines</th>
<th>Installed Capacity (kW)</th>
<th>Operational Capacity (kWh/year)</th>
<th>Capacity Saving (tonnes per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 x 5kW</td>
<td>130kW</td>
<td>592,176kWh</td>
<td>338</td>
</tr>
<tr>
<td>3 x 15kW</td>
<td>45 kW</td>
<td>204,984</td>
<td>117</td>
</tr>
<tr>
<td>2 x 35kW</td>
<td>70 kW</td>
<td>318,864</td>
<td>182</td>
</tr>
<tr>
<td>2 x 75kW</td>
<td>150 kW</td>
<td>683,280</td>
<td>389</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,799,304</strong></td>
<td></td>
<td><strong>1026</strong></td>
</tr>
</tbody>
</table>

However, given the environmental sensitivity of most of these sites, and considerations such as distance to connect to the grid and other delivery constraints it is unlikely that the majority of these sites will be viable. Some mill sites, including those already being investigated by OVESCO will be an excellent delivery opportunity to revitalise the heritage value of the sites and may be an opportunity for community groups to get involved in renewables delivery. If all nine Ovesco-identified sites are developed successfully, they could collectively provide around 660MWh annually, saving 376 tonnes of CO2.
Table 15: Potential Carbon Savings from Hydro

<table>
<thead>
<tr>
<th>Hydro turbines</th>
<th>Installed Capacity</th>
<th>Operational Capacity</th>
<th>Carbon Saving (tonnes per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 x 5kW</td>
<td>219,000</td>
<td>80,49</td>
<td></td>
</tr>
<tr>
<td>3 x 15kW</td>
<td>394,200</td>
<td>204,984</td>
<td>88</td>
</tr>
<tr>
<td>1 x 75kW</td>
<td>657,000</td>
<td>341,640</td>
<td>147</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,270,200</strong></td>
<td><strong>660,504</strong></td>
<td><strong>284</strong></td>
</tr>
</tbody>
</table>

Potential mill sites and the sites identified as of a higher potential by the Environment Agency should be the focus for micro-hydro development in Lewes District. However, it should be noted that relatively to other possible renewable technologies, the amount of renewable electricity produced by micro-hydro sites in the area is low and could have significant capital costs. The real strength of these projects lies in historical preservation, community engagement and education.

**Influence of planning**

This study highlights the spatial distribution for potential hydro sites. To be most viable they need to be located within reasonable proximity to a grid connection, and most potential sites are, naturally, predominantly rural. Given the spatial options, major new development is unlikely to be situated in a way to take direct advantage of hydro sites, but might make contributions through allowable solutions to help support schemes. With OVESCO actively seeking opportunities and successful models of community delivery emerging, planning and the local authority generally can positively support the delivery of micro-hydro schemes while ensuring they also meet heritage and environmental objectives.

**Case study**

Torr Hydro, the UK’s first community owned hydropower scheme, is situated on the site of a textile mill built in 1790, with the turbine sitting in the original mill pit where the water wheel would have been. Water flowing into the weir from the Rivers Sett and Goyt rotates the blades of the turbine with a maximum output of 63kW given a 3m head and a 3m/s flow. It is the ambition of Torr Hydro to generate 240,000kWh (240MWh) of electricity which is around 43.5% of the maximum. The scheme cost around £330,000, with community shares generating around £125,000 and grant funding providing a further £165,000. The shareholders are mostly local people and businesses plus people from further afield who wish to support renewable energy schemes.
4.8 BIOMASS POTENTIAL

Biomass is an organically based fuel, which can be utilised to produce low carbon energy. While burning it does produce CO₂ emissions, during growth and production of organic matter CO₂ is also absorbed from the atmosphere, so over its whole lifecycle it is regarded as a renewable fuel source.

Biomass can contribute to generation of heat through either individual biomass boilers in homes or district heating systems, and it can contribute to the generation of both heat and power through the use of a combined heat and power system (CHP). The use of CHP requires a higher tonnage of biomass fuel to produce the same amount of usable heat, though it also produces electricity. Some types of biomass can also be used to produce biogas through an anaerobic digestion process.

Some biomass products are waste products from other activities including agriculture and forestry, while biomass can also be specifically produced through growth of bio-crops. There is concern in the industry that excessive specification of biomass technologies on a site-by-site basis will lead to either long-distance import of biomass material or the sacrifice of food-producing arable land to grow dedicated biomass crops. There is a need to take a region-wide approach to biomass sourcing and supply to ensure that biomass is both available for energy use, but that its use is managed and sustainable and that waste biomass sources are utilised first.

The South East Regional Renewables Review concluded that there is potentially more biomass potential than was originally estimated as a base for the South East targets, by approximately 50%, and is being delivered at a faster rate than expected in the assessment that underpinned the South East Plan targets.

The following sections consider various types of biomass available:

- Biomass suitable for direct combustion in biomass boilers or biomass CHP
  - Waste wood from industrial uses
  - Forest residues
  - Fuel crops including miscanthus and short rotation coppice such as willow
  - Straw

- Organic waste suitable for utilisation in anaerobic digestion processes
  - Pig and poultry farming sectors
  - Meat and Poultry Processors
  - Brewing
  - Water industry

Four sources of biomass have been explored:

1. Predicted arisings of low grade wood from improved management of forestry in Lewes District. Currently, much of forestry in the district is unmanaged and could be brought back into productive use as a biomass fuel resource;
2. Potential contribution of dedicated biomass crops such as miscanthus or willow, grown in short rotation on agricultural land in the area. It is unknown how much biomass is currently grown for fuel in the LPA area, though it is assumed to be negligible. The use of Grade 3 agricultural land for cultivation of biomass crops is considered optimal as it does not impact on the most productive areas yet is of sufficient quality for crops to grow;
3. Use of straw arising from agricultural activity in the area; and
Physical potential and constraints for biomass for direct combustion

Biomass available from woodland management

The South East is one of the most forested areas in England. There are approximately 2,175ha of woodland in the study area (Lewes District), which through effective management could generate 7,613odt (oven dried tonnes) of biomass fuel from trimmings. This equates to approximately 1.7% of the 446,396odt of biomass generated through woodland management that the Biomass Resources and Concentrators study estimates could be generated across the South East. Assuming that all the woodland is managed and waste wood was made available for biomass energy through an appropriate supply chain, this could potentially generate 39,172MWh of heat energy. If all the biomass was used in a biomass CHP unit this could generate enough electricity for over 4,000 homes and heat for over 5,000 homes each year. If used directly for heating this would be enough to supply around 11,000 homes with heat each year. The SEEPB study falls in line with these numbers, as it suggests that East Sussex could contribute 10% of managed woodlands to the South East’s overall total electricity or heating delivery (or some combination thereof).

The figure below shows the location of woodland resource in Lewes District. It should be noted that some of this woodland may not be appropriate as a resource as it could be designated ancient woodland. The county generally has many areas of woodland scattered throughout. Biomass resource should be managed on a County or Regional scale, as management phasing will mean that different areas of forest have waste arising at different times. Biomass supply chain coordination is a good opportunity for the LPA to establish a local supply scheme. For example, West Sussex’s 37,000 hectares of woodland, which is the second-most dense woodland in the county, could be included as part of a regional supply chain.

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Figure 32: Wood-based Biomass potential
Biomass Potential from Fuel-crops – short rotation coppice (e.g., Miscanthus)

The South East Regional Renewables Review recognises that there is significant potential for renewable energy from dedicated fuel crops. The South East Regional Renewables Review outlined that using 5% of the total agricultural area would generate more primary energy than the existing woodland resource.

The figure above shows the grades of agricultural land across Lewes District. The preferred land type for cultivation of bio-crops is grade 3 and 4 (though lower yields are expected on grade 4). Grade 1 and 2 land is unsuitable due to competition with food crops. The vast majority of agricultural land in the study area, approximately 19,738ha is grade 3, which is considered ideal for fuel crops as it preserves the most productive land, grade 1 and grade 2, solely for agricultural crops but still of sufficient quality to grow well. While grade 4 land is not as ideal as grade 3, the 5,040ha of it in Lewes District can still be used to grow biofuel crops.

The yield of biomass resource from fuel crops is more efficient than forestry arisings, generating between 10 and 12 oven dried tonnes (odt) per hectare rather than around 2-4 odt. If 5% of the Grade 3 and 4 agricultural land was dedicated to growing fuel crops this would generate approximately 12,400 odt with the potential to generate 67,107 MWh. This would provide electricity for approximately 6,579 homes and heat for 8,414 homes if used in a biomass CHP, or heat to 17,763 homes in a district heating system directly through using biomass boilers. The recent SEEPB study\(^{29}\) noted that short rotation crops are likely to contribute 12% of the electricity or heating for East Sussex.

Diverting significant areas of good quality arable land from food cultivation to industrial growth for fuels could prove counter-productive to wider aims of sustainability and local self-sufficiency. Nonetheless, as part of a wider strategy for regional and District energy self-sufficiency, sourcing a proportion of fuel from woody bio-fuels offers the potential to reduce CO\(_2\) emissions in Lewes District. Key opportunities are offered by urban centres that offer sufficient demand to make a Biomass CHP system viable, and development of strong local sources of biomass will be essential.

It is expected that energy crops would be developed later than the utilisation of woodland trimmings and waste wood. This will be driven by the market price of energy crops. Currently the market price of miscanthus is comparable to that of straw so it is not yet considered economically viable in the South East of England. It is expected that increased competition for limited fossil fuel resources and a rising cost of carbon will drive an increase in the demand for biofuels. In order to achieve a target of 12% renewable heat, Lewes District should firstly seek to harness waste wood and forestry arisings, along with straw before supplementing supply with local bio-crops. Where local supply-chains are not in place, fuel can be imported from elsewhere, but this is not desirable from a carbon perspective.

Biomass Potential from Cereal Crop Residue / Straw

In the SEEPB study\(^{30}\), it suggests East Sussex has the potential to contribute 11.4 MW (85.8 GW h) to the region’s total agricultural arisings potential. It also outlines Lewes District’s specific potential as 1.4 MW (10.7 GWh) by 2031. This is approximately 12% of the County’s total.

Livestock rearing is a significant consumer of locally generated straw and it is not expected that 100% of straw would be available for combustion. Although there may be some straw available to utilise as a biomass resource it is unlikely to be significant. In addition, the use of straw for combustion for the generation of electricity, with or without the use of heat, will be dependent on the cost and availability of straw. The price of straw has been steadily rising over recent years and currently ranges from £38 to £50 per tonne depending on time of year. A high price of straw will limit the viability as a combustion fuel. As such, the scale of straw combustion is not likely to be economically feasible. A small CHP plant might require around 100,000 tonnes of straw per year.

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Biomass available from waste wood streams

Municipal waste streams offer potential for source separated fuels (wood fuels) that can be burned, and this can be economically attractive as waste handlers can avoid disposal costs by using waste wood as a heat source. The SEEPB study determined that East Sussex has the potential to contribute 7% (2.7MW installed capacity, 20.5 GWh) to the South East’s total energy from waste wood stream. Translating resource potential to Lewes District’s waste stream is difficult with limited LPA scale information but based on population of Lewes District in relation to East Sussex, approximately 0.5 MW of installed capacity, or 3.8 GWH of biomass might be secured and supplied from waste streams within Lewes District into bio-energy schemes, contributing 1.3% to the regional total. However, some of the wood waste resource may be collected in the future and utilised at the Newhaven Energy from Waste Plant. Wood waste is probably more efficiently collected and processed through county-wide coordination.

Potential and constraints for biomass for anaerobic digestion

There are a variety of waste streams available which could be utilised for energy production using Anaerobic Digestion (AD). AD refers to the decomposition of putrescible waste such as food waste, animal slurries and potentially a proportion of garden waste in anaerobic (oxygenless) conditions. AD produces a biogas made up of around 60% methane and 40% carbon dioxide (CO₂). This can be burned to generate heat or electricity. The biogas produced by the AD process can be used to generate electricity in a gas engine. Note that the AD process itself has an electricity requirement of between 10 - 20% of the power generated.

Anaerobic digesters also produce valuable fertilizer as a by-product which can be recycled back onto the land aiding agricultural productivity. In addition to all of that, biogas is in many ways a good alternative transport fuel – particularly for buses and heavy vehicles - that could provide a measure of resilience against peak oil.

As a transport fuel, the potential of biogas has already been demonstrated in Europe. In the city of Lille in northern France, 120 of the city’s 400 buses run on biogas made from locally sourced food waste, with one new gas-power bus commissioned every week. By 2012 all buses will run on a mix of one-third natural gas, two-thirds biogas. The biogas is produced by an anaerobic digester at the bus terminus, which fuels not only the buses but also the lorries that collect the waste. This means there is a high degree of insulation to short term interruptions in the oil supply. In Switzerland there are 3500 vehicles running on biogas, and there are also major programmes in Sweden and Germany.

Some British local authorities (Norfolk, South Staffordshire) have commissioned anaerobic digesters as part of their waste strategy, but none has yet exploited the full transport potential of biogas – which is considerable. According to a report by Environmental Protection (formerly the National Society for Clean Air), Britain produces some 30 million dry tonnes of food waste and agricultural manure per year, and this could produce over 6 million tonnes of oil equivalent in biomethane. That equates to about 16% of total transport fuel demand, while public transport consumes less than 5%. In other words, Britain could fuel a public transport network three times bigger than today’s on food and agricultural waste alone.

Potential for utilisation of household putrescible waste

The South East Renewables Review suggests that as the ‘biomass portion of Municipal Solid Waste’ is deemed by the Renewable Obligation Order 2009 to be 50%, 2,260,000t of the 4,520,000 tonnes of MSW produced in the South East would count as biomass resource. The SEEPB study determined that East Sussex could produce 9% of the region’s total installed capacity of energy from household putrescible waste (2,429 MW installed capacity, or 4,948 GWh).

31 The Oil Depletion Analysis Centre and the Post Carbon Institute (2009) “Preparing for Peak Oil – Local Authorities and the Energy Crisis” ODAC
Using an understanding of the average household waste per person produced in the Authority, as recorded in the Best Value Performance Indicator, along with the population data for 2008, it is possible to estimate the suitable waste arising in the study area.

**Table 16: Waste Arisings from Waste Best Value Performance Indicators**

<table>
<thead>
<tr>
<th></th>
<th>Annual household waste per person (kg)</th>
<th>Total population waste (t)</th>
<th>Biomass available (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lewes District</strong></td>
<td>509.2 48.47</td>
<td>2</td>
<td>24,236</td>
</tr>
</tbody>
</table>

While composting rates are currently at approximately 10.5%, and there is potential for biomass resource generated from household waste, only 2.1% have been used to recover heat, power and other energy sources. With the proposed energy from waste plant being built in Newhaven predicted to generate 19MW of electricity, these numbers could improve for Lewes District and surrounding area.

Efforts to reduce waste arising and increase recycling and composting (bearing in mind that composting and AD are not mutually exclusive) can have an impact on the viability of energy from waste installations, as it can reduce the calorific composition of the waste stream.

**Potential for utilisation of agricultural waste**

While energy generated from agricultural waste is low carbon, the generation capacity available from ‘farm animal by products (cattle, pigs and poultry)’ in Lewes District is relatively minimal. The table below outlines the number of livestock in Lewes District.

**Table 17: Livestock in Lewes District**

<table>
<thead>
<tr>
<th>Livestock</th>
<th>Number of Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>12,119</td>
</tr>
<tr>
<td>Pigs</td>
<td>1,321</td>
</tr>
<tr>
<td>Sheep</td>
<td>36,165</td>
</tr>
<tr>
<td>Poultry</td>
<td>N/A</td>
</tr>
</tbody>
</table>

In total, some 150 million wet tonnes (cattle, sheep and pigs) of excreta are produced in the UK, of which approximately 105 million tonnes are returned to the land by grazing. A further 3.5 million tonnes of used poultry litter and excreta (1.8 million dry tonnes) are produced (DEFRA, 2005). Of the farm feed-stocks available, slurry is more suitable for anaerobic digestion than farmyard manure and poultry litter. The data for Lewes District suggest that the anaerobic digestion of animal manures and slurries from cattle and pigs might generate 938,000 m^3^ of biogas per annum (most digesters in the UK are based on pig and dairy farms and used for on farm heating). With respect to the animal waste, the SEEPB study only looked at poultry. It determined that East Sussex 0.03 MW installed capacity, or 0.2 GWh, which is less than 1% of the total for the region.

**Potential for utilisation of water industry sludge**

The water industry produces both wet and dry sludge in large quantities which can be diverted for energy recovery. The majority of biomass electricity projects in the UK are sewage gas projects that are less than 2.2 MW in electrical capacity.

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33 Based on calculator available at: [www.anaerobic-digestion.com](http://www.anaerobic-digestion.com) based on DEFRA guidance.
The SEEPB study has suggested that Lewes District has the potential to contribute approximately 84.1 MW (456.5 GWh), 18% to East Sussex's sewage gas energy resource potential. Anaerobic digestion produces a sewage gas which contains methane and can be used to fuel gas CHP. The Peacock Wastewater Treatment Plant currently being constructed at Lower Horden Farm will treat wastewater generated from Peacehaven, Telscombe Cliffs, Ovingdean, Rottingdean, Woodingdean, Saltdean, and Brighton and Hove. The sludge will be recycled and the treated water will be released 2.5 km offshore. However, energy from sewage is likely to be delivered at a county level and cannot be led directly by the LPA.

**Delivery opportunities and constraints**

The conversion of potential to delivery requires consideration of a number of factors including:

- **Establishment of a supply chain** – While there is already a biomass resource available, there is no supply chain set up to collect, process and distribute that fuel. The LPA should work to enable the set up of a local supply chain.

- **Management of local forests** – Ownership and status of local forests varies. A management plan and coordinated programme will need to be in place in partnership with the Forestry Commission and key stakeholders to ensure forests are appropriately managed and the biomass yield is captured for local use. This initially might be best undertaken on a county scale. The Woodland Enterprise Centre in Flimwell, East Sussex helps timber growers and wood users be more sustainable and could provide a catalyst in helping to organise a forest management plan.

- **Management of environmental effects** – The South East Renewables Review reported that 'most of the wood fuel projects coming forward are of a relatively modest scale and have so far not given rise to severe difficulties through the planning system in the region. Impacts that are of concern relate to: emissions, stack size/height, extra transport movements, access issues, smell and potential fire hazards from stored fuel'.

- **Management of South Downs National Park** – Specifically related to biomass, the former South Downs Joint Committee’s planning guidelines state that “The Joint Committee…..supports the principle of biomass thermal energy production.” Therefore, it can be assumed that the National Park would be a willing partner in growing bio-fuel crops, in appropriate locations, and managing woodland within the park in a sustainable manner.

- **Organic waste supply chain** – Delivery of an organic waste supply chain would ideally be considered at the county level. However, the LPA should look for opportunities to support the development of such supply chains and proposals for anaerobic digestion (AD) in the area, and work with local industries and agriculture stakeholders to pool biomass resources for use in central AD plants.

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34 East of England Biomass Foundation Study report, Renewables East, November 2005
Possible carbon reduction over core strategy period

Biomass production does produce carbon emissions; however, because during the growth and production of organic matter, CO₂ is also absorbed from the atmosphere, it is considered a low carbon source of energy. From the previous analysis, bio-fuel crops, such as short rotation coppice and miscanthus provide the largest potential for carbon savings. Carbon savings from these sources are detailed in the table below:

Table 18: Carbon Savings Potential from Bio-fuels

<table>
<thead>
<tr>
<th>Fuel</th>
<th>5% of Grade 3 and 4 land</th>
<th>Carbon savings after one year</th>
<th>Carbon savings over five years</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRC (e.g. miscanthus, willow)</td>
<td>1,239 ha</td>
<td>458 tonnes carbon equivalents</td>
<td>2,824 tonnes carbon equivalents</td>
</tr>
</tbody>
</table>

Carbon savings are equivalent to 458 tonnes after one year and 2,824 over five years, representing an exponential saving over the longer time period. This saving is based on a study by the Institute of Biology, Environment and Rural Sciences at Aberystwyth University completed for the National Assembly of Wales, which determined 370 kg (0.37 tonnes) of carbon saved per hectare of land over one year, and 2,279 kg (2.3 tonnes) per hectare over a five-year period.

Influence of planning

The LPA should work to ensure safe and effective biomass growth and development in the district. This includes zoning regulations for refinery plants, taking into account surrounding land uses and prevailing winds, minimising impacts on air quality. Other negative impacts from delivery trucks on traffic and air quality should also be considered.

With respect to agricultural land, the use of land graded 3 and 4 should be encouraged, by both the South Downs National Park and the District Council, to be used for the growing of bio fuels. Grades 1 and 2 land should be used solely for growing food crops. However, this is unlikely to be done through the influence or control of planning as what is grown on land is unlikely to trigger a planning application. Despite this, the Council can work with the joint committee to develop a response to biomass. The joint committee has stated they:

> will normally support proposals for small-medium scale biomass thermal plants within or adjacent to the South Downs that are well related to the source of fuel and/or the settlements or facilities they are to serve provided that the proposed installation would not, individually or in conjunction with other installations, be to the detriment of the natural beauty, character and amenity of the South Downs through visual intrusion, noise, activity, odour, associated traffic movements or associated infrastructure such as overhead lines.

This is an opportunity to satisfy South Down’s goal of supporting renewable energy while simultaneously helping Lewes District satisfy its renewable energy goals.

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4.9 COMBINED HEAT AND POWER

Physical potential and constraints

Combined Heat and Power provides a much more efficient way of generating and distributing energy as it makes use of the heat usually wasted in energy production and because it is located close to the development the losses in transmission are reduced. Typically, a standard CHP achieves a 35% reduction in primary energy usage compared with conventional power stations and heat only boilers. However, CHP can also be run using biomass/biogas to provide a low carbon solution, with reductions in emission nearing 100%. The figure below shows the CHP arrangement compared with traditional energy generation.

Figure 33: CHP comparison

Scale of potential

A heat network could either be connected to a district heating system or a combined heat and power system (which distributes waste heat from the electricity generation process). These systems could utilise gas or biomass as a supply fuel, and the distribution of heat in such a fashion brings great efficiencies as heat demands are balanced across an...
area. It should be noted that while the introduction of CHP is strongly encouraged at a European and National level, and local authorities play a key role in delivery, CHP will only count towards renewable energy targets where it is fuelled by a renewable or low carbon source such as biomass or biogas. Technology surrounding biomass powered CHP is still developing in the UK but is expected to be perfected over the coming years. Hence, depending on delivery conditions it may be more suitable to implement gas-fired CHP in the interim and convert the fuel source to biomass or biogas as the technology and supply chain develops. However, the introduction of gas as CHP is still beneficial as it contributes directly to CO₂ reduction targets through efficient supply of electricity and heat.

Figure 34 highlights areas which have a heat demand intensity of greater than 3MW/km² (or 26MWh/km²). These areas are expected to be commercially viable for the installation of a district heating or combined heat and power system based on professional experience. Financial viability will be affected by a number of site factors, including: ownership, layout, density of development, delivery mechanism, and opportunity for change. The figure that follows shows that there is good potential for sites located in Lewes Town to be serviced by district heating networks. Along the southern coast of Lewes District – in Peacehaven, Newhaven and Seaford – there is also an opportunity for a linear network to be established.

In looking at new development, it is important to consider the site’s ability to support district heating. As can be seen from figure 35 below, when compared against the sites that are being assessed through the Strategic Housing Land Availability Assessment (SHLAA), some sites stand out as preferable for development in the Lewes Town area as well as the Peacehaven and Newhaven region. Housing built on these sites would be able to connect to a district heating network, thereby contributing to, and benefitting from energy efficiency.
Figure 34: Current distribution of heat density
Figure 35: SHLAA in relation to current distribution of heat density
CHP linked to a neighbourhood via a district heating arrangement could meet the home’s annual heating, hot water and most, if not all, of their electrical requirements. Higher density housing, typically at least 50 dwellings per hectare, tends to be more commercially viable to reduce district heating infrastructure costs. This is because costs are related to the length of the pipe, although CHP is technically viable at most densities. CHP also works best in mixed use developments as they operate most efficiently when they can operate constantly, and so can serve a diverse load. As different users have different energy use patterns (residential more in the morning and evening whilst offices through the middle of the day) mixed use development allows energy requirements to be balanced. With the support of the Carbon Trust, Mountfield Road in Lewes Town has commissioned a district heating feasibility study. This study will provide insight into many location-specific factors that influence the potential for CHP, including:

- Heat – whether the heat load is high and consistent enough to make CHP viable
- Running time – ideally, the plant will run for a minimum of 4,500 hours/year
- Total capital costs - £500,000 for a large scale 1GWe generator
- Cost of electricity – normally cheaper for CHP than conventional energy sources
- Fuel Price – relative price of the CHP fuel to the price of heat and electricity from other sources
- Future demand – The level of confidence in the demand for heat and power over the next 10-15 years

The size of the facility will be somewhat dependent on the number of homes it is to serve. For a facility to serve 1500 homes, you would probably require a facility of 500m² footprint. For biomass powered you would need a fuel storage area as well. The majority of the building could be 4m high, but a section rising to 7-9m would also be needed to house the heat store and there would also be a flue which will need to be a few metres higher than surrounding development.

As CHP works best in higher density areas, siting facilities can become a challenge. With sensitive and creative urban design, there is however, limited reason as to why they could not be able to be integrated into a townscape. The Town of Lewes might face some difficulties in integrating CHP in highly sensitive and protected land and townscape. The figure below highlights some potential options for urban design of CHP.

![Design options for siting CHP](Image)

**Figure 36: Design options for siting CHP**

CHP facilities may be designed to a specification where it is necessary to dispose of waste heat in summer. Suitable locations and methods should be considered in design to ensure this does not have significant environmental effects.

**Delivery opportunities and constraints**

Successfully delivering CHP requires the consideration of a number of factors including:

- **Anchor loads** – The location of such facilities is key, as district heating schemes often need an ‘anchor load’ or consistent energy user to operate efficiently. Therefore, areas around these anchor loads are priorities for development. For example, as the figure below suggests, residential development in the Mountfield Road area of Lewes town would offer the opportunity of delivering a district heating scheme. This is because Priory School and the Leisure Centre represent two key anchor loads located in close proximity to each other.

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Figure 37: Key anchor loads in Lewes Town in relation to current distribution of heat density
Heat Generators – In Lewes District the proposed Wastewater Treatment plant in Peacehaven plans to capture its own heat and use it to supply 25% of its energy requirements. The waste to energy plant in Newhaven currently under construction has the potential to capture and reuse its heat, which would be a key anchor load if it did. These two sites have the potential to start the first phase of a district heating network in the southwest of Lewes District (see figure below).
Figure 38: Key anchor loads in and around the coastal settlements in relation to current distribution of heat density
• **Council property** – Retrofitting private properties can be a slow and time intensive process before the required critical mass for a district heating network is achieved. Therefore, an opportunity exists for council-owned property to retrofit their properties first. This would eliminate issues related to piecemeal retrofitting, and provide the leadership and critical mass for an effective district heating network.

• **New developments** – New developments of a large scale (300+ homes) or with a substantial mix of uses that will create a strong heat demand density may drive their own site-wide CHP and district heating systems. However, new developments are often built in phases. Each phase on its own is often small and makes district heating on a larger scale difficult. Where possible, new developments should be built in conjunction with large anchor loads, such as hospitals, schools, or community facilities that would make a larger CHP network feasible.

### Possible carbon reduction over core strategy period

The table below shows the expected energy generation and CO2 savings associated with installation of gas-fired CHP in 15% of viable areas in the LPA (5% uptake each phase, beginning phase 2). The figures of 5% per phase are used as an illustrative example that is also realistic and deliverable. CO2 reductions could be further increased through a larger take up of heat networks, or through the use of biomass fuel in the place of gas.

**Table 19: Effect of introduction of gas CHP into 15% of viable existing areas**

<table>
<thead>
<tr>
<th>LPA Area</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lewes District</td>
<td>0</td>
<td>30,476,202</td>
<td>40,95</td>
<td>2,404</td>
</tr>
<tr>
<td>Heat from CHP introduction in existing areas (kWh/year)</td>
<td>0</td>
<td>46,176,063</td>
<td>92,352,127</td>
<td>138,528,190</td>
</tr>
<tr>
<td>Total CO2 saving over conventional supply (tonnes/year)</td>
<td>0</td>
<td>3,293,6586</td>
<td>9,878</td>
<td></td>
</tr>
</tbody>
</table>
Case study
Since 1990, Woking Borough Council has undertaken a series of sustainable energy projects, and become a pioneer in the process. Between 1991 and 2001, the council reduced its energy consumption by 40%. It established the UK’s first local sustainable community energy system and the first public/private joint venture Energy Services Company (ESCO). This has resulted in £4.9 million in savings for the council, as well as other savings for local households and businesses. Woking is recognized as the UK’s most energy efficient local authority, and is the only local authority to ever be awarded the Queen’s Award for Enterprise for its work in sustainable development. In 2002, Woking’s energy efficiency policy was replaced with a more comprehensive Climate Change Strategy for the Borough as a whole, shifting its focus from savings in kWh to savings in tonnes of CO₂.

<table>
<thead>
<tr>
<th>Category</th>
<th>Savings over 11 years - Woking</th>
<th>Potential savings over 11 years – if applied across the South East</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy consumption savings</td>
<td>170,170,665 KW h (43.8% saving compared to conventional energy supply))</td>
<td>14,413.5 GWh</td>
</tr>
<tr>
<td>Carbon dioxide emissions savings</td>
<td>95,588 tonnes (71.5%)</td>
<td>8,181,000 tonnes</td>
</tr>
<tr>
<td>Nitrogen oxides emissions savings</td>
<td>319.1 tonnes (68%)</td>
<td>27,000 tonnes</td>
</tr>
<tr>
<td>Sulphur dioxide emissions savings</td>
<td>976.6 tonnes (73.4%)</td>
<td>82,700 tonnes</td>
</tr>
<tr>
<td>Water consumption savings</td>
<td>340,011,000 litres (43.8%)</td>
<td>28,799,000,000 litres</td>
</tr>
<tr>
<td>Savings in energy and water budgets</td>
<td>£4,889,501 (34.3%)</td>
<td>£414,141,000</td>
</tr>
</tbody>
</table>


4.10 MICRO-GENERATION
The term micro-generation is used to describe small scale technologies (typically less than 50 kW electric and 100 kW thermal). These technologies are usually based in a building or on a small site, providing energy to one or more buildings. Micro-generation technologies include:

- Heat pumps
- Wood-burning stoves
- Micro CHP
- Photovoltaics (PV)
- Solar thermal
- Small and micro wind

The installation of micro-renewables in existing and new buildings will count towards national and regional targets, and therefore it is important to recognise how much of a contribution micro-generation could make.
Physical potential and constraints

Generally, some types of micro-generation technologies are suitable for installation in every type of existing building and the challenges are delivery related, rather than issues of technical feasibility. Activity in Lewes District, driven by the Council and OVESCO, has resulted in the delivery of a relatively large number of micro-generation installations in existing buildings. Delivery of wood burning stoves and solar thermal systems has been particularly successful in the area.

Spatially, across the UK the relative benefit of the use of solar technologies varies. Compared with the rest of the UK, the solar potential across Lewes District is good. However, on a global scale, solar technologies do not perform at high efficiencies in the UK as compared to say Colorado. Nonetheless, parts of the South East receive as much, or more solar irradiation as Germany, which has a large installed capacity of solar panels. The figure below shows the relative solar exposure of Lewes District compared with the rest of the UK. Solar technologies are widely available and will have a role to play in renewable energy generation, especially on low density development with a substantial amount of exposed roof space. To ensure that solar technologies are effective, south facing roof space should be favoured in building design and masterplanning (through street orientation).
Figure 39: Potential for solar energy in Lewes District
There are two main types of solar technology that are generally delivered alongside built development. Photovoltaic panels produce renewable electricity and can be mounted on structures or used in stand-alone installations. Solar thermal panels are commonly used to directly heat water in homes, but can also be used to assist heating. Photovoltaics are currently expensive in comparison to other renewable energy options, but they are one of the few options available for renewable electricity production and are often one of the only on-site options to assist in CO₂ reduction associated with electricity use. Solar thermal panels are more space and cost effective and are well utilised technology for heating hot water.

**Delivery opportunities and constraints**

**Delivery Momentum**

There is significant opportunity to build on the existing success of integrating micro-generation into existing homes, by keeping up momentum, ensuring grant funding is supported and supporting the activities of OVESCO and the Council. Independent uptake of electricity generating, micro-renewables will also be encouraged further on a national scale through the introduction of the feed-in tariff (now operational from April 2010). The Government has published planned feed-in tariffs for the generation and export of renewable electricity for a range of micro generation renewables including, PV, as well as Anaerobic Digestion, biomass, small hydro and wind. The table below provides an indicative annual income for a range of renewable energy technologies, assumed to have been installed in April 2011. The table below provides further information on incentive schemes proposed for small scale renewables.

**Table 20: Tariff payments for renewable energy systems installed in 2011**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Applicable tariff system</th>
<th>Generation tariff (p/kWh)</th>
<th>Export tariff (p/kWh)</th>
<th>Value of energy saved (p/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV (&lt;4kW new build or retrofit)</td>
<td>FIT</td>
<td>41.3</td>
<td>3.0</td>
<td>12.9</td>
</tr>
<tr>
<td>PV (&gt;4-10 kW)</td>
<td>FIT</td>
<td>36.1</td>
<td>3.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Hydro (&lt; 15kW)</td>
<td>FIT</td>
<td>19.9</td>
<td>3.0</td>
<td>12.9</td>
</tr>
<tr>
<td>MicroCHP (&lt;2kW)</td>
<td>FIT</td>
<td>10.0</td>
<td>3.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Wind turbine (&lt;1.5kW)</td>
<td>FIT</td>
<td>34.5</td>
<td>3.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Wind turbine (&lt;1.5-15kW)</td>
<td>FIT</td>
<td>26.7</td>
<td>3.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Small scale solid biomass (e.g. wood burning stove)</td>
<td>RHI</td>
<td>9.0</td>
<td>n/a</td>
<td>3.7</td>
</tr>
<tr>
<td>Small scale bioliquids</td>
<td>RHI</td>
<td>6.5</td>
<td>n/a</td>
<td>3.7</td>
</tr>
<tr>
<td>Biogas on-site consumption (e.g. small scale anaerobic digestion)</td>
<td>RHI</td>
<td>5.5</td>
<td>n/a</td>
<td>3.7</td>
</tr>
<tr>
<td>Ground source heat pumps</td>
<td>RHI</td>
<td>7.0</td>
<td>n/a</td>
<td>3.7</td>
</tr>
<tr>
<td>Air source heat pumps</td>
<td>RHI</td>
<td>7.5</td>
<td>n/a</td>
<td>3.7</td>
</tr>
<tr>
<td>Solar thermal/solar water heating</td>
<td>RHI</td>
<td>18.0</td>
<td>n/a</td>
<td>3.7</td>
</tr>
</tbody>
</table>
Feed-in Tariffs (Renewable electricity)

Feed-in Tariffs were introduced in April 2010 to replace the support provided by the Low Carbon Buildings Programme and stimulate increased vigour in the take-up of installation of small-medium scale renewable electricity generation.

The scheme will include:

- Fixed payment from the electricity supplier for every kWh generated (the “generation tariff”).
- A guaranteed minimum payment additional to the generation tariff for every kWh exported to the wider electricity market (the “export tariff”).
- Generators receiving FITs will also be eligible for on-site use: where they use the electricity they generate on-site, they will be able to offset this against electricity they would otherwise have had to buy.
- Technologies included: wind, solar PV, hydro, anaerobic digestion and non-renewable micro CHP.
- Tariffs will be paid for 20 years for new projects.
- The tariff levels proposed have been calculated to ensure that the total benefits an investor can be expected to achieve (from the generation tariff, the export tariff and/or the offsetting benefit) should compensate the investor for the costs of the installation as well as provide such a rate of return.
- The government intends to set tariffs at a level to encourage investment in small scale low carbon generation. The rate of return will be established between 5% and 8%.
- The proposed tariff levels for new projects will decrease by predetermined rates each year (“degression”). [The tariff rate agreed at the project outset will be maintained for the 20 year period – this therefore incentivises early take-up for maximum revenue return]

Renewable Heat Incentive

The Government is currently consulting on introducing a renewable heat incentive in April 2011. Renewable heat producers of all sizes will receive payments for generation of heat. The payments are intended to give a 12% rate of return and will be ‘deemed’ rather than metered. There is no upper limit to the size of heat equipment eligible under the Renewable Heat Incentive and anyone who installs a renewable energy system producing heat after July 15th 2009 is eligible. The following technologies are included in the scheme.

- Technologies included: air and ground source heat pumps, anaerobic digestion to produce biogas for heat production, biomass heat generation and CHP, liquid biofuels (but only when replacing oil-fired heating systems), solar thermal heat and hot water and biogas injection into the grid
- Unlike FITs, tariffs will be paid not on the basis of a metered number of kWh generated, but instead on a “deemed” number of kWh, namely the reasonable heat requirement (or heat load) that the installation is intended to serve.
- Tariff levels will be calculated to bridge the financial gap between the cost of conventional and renewable heat systems at all scales, with additional compensation for certain technologies for an element of the non-financial cost and a rate of return of 12% on the additional cost of renewables, with 6% for solar thermal.

Delivery in Conservation Areas

In terms of constraints, the delivery of micro-generation on existing buildings in and adjacent to Conservation Areas has been raised as a key issue for Lewes District, and one where the guidance is seen to be unclear.

In England, changes to permitted development rights for renewable technologies introduced on 6th April 2008, have lifted the requirements for planning permission for most domestic micro-generation technologies. The General Permitted Development Order (GPDO) grants rights to carry out certain limited forms of development on the home, without the need to apply for planning permission. The scope of the GPDO in England now extends to the following technologies (for domestic properties only):

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- Roof-mounted solar PV and solar thermal (permitted unless more than 200mm when installed)
- Stand-alone solar PV and solar thermal (permitted unless more than 4 metres in height; installed less than 5 metres away from any boundary; above a maximum area of array of 9m²; situated on a wall within any part of the curtilage of the dwelling house and would be visible from a highway in Conservation Areas and World Heritage Sites.
- Wood burning boilers and stoves, and CHP (permitted unless flue exceeds 1m above the roof height (excluding the chimney); installed on the principal elevation and visible from a road in building in Conservation Areas and World Heritage Sites).
- Ground source heat pumps.
- Water source heat pumps.

Installation of micro and small wind is currently not permitted development due to legal technicalities with the current statutory instrument, though this should soon be resolved (revisions are currently in consultation). Air source heat pumps are in a similar situation to micro-wind, and are expected to become permitted development once legal issues are resolved.

Draft legislation was released for consultation in November 2009 on ‘Permitted development rights for small scale renewable and low carbon energy technologies, and electric vehicle charging infrastructure’ (consultation closed in February 2010). This document proposed conditions of permitted development for small wind turbines and air source heat pumps. Air source heat pumps are proposed as a permitted activity in a conservation area, while wind turbines in conservation areas will require planning permission where the wind turbine would be visible from any highway which bounds the curtilage of the property.

The consultation document also proposes new policies on permitted development for non-domestic buildings. As proposed, all types of micro-generation except ground and water source heat pumps would require planning permission for inclusion on non-domestic properties in a conservation area.

The consultation document provides an indication of the possible direction of future policy. Regarding locational context, the document states:

‘The impacts of renewable and low carbon energy technologies will vary on a case by case basis according to the type of the development, its location and setting. Development that is appropriate in one place may not be acceptable somewhere else and permitted development rights need to reflect this. This consultation therefore proposes that limits to what would be permitted would vary according to their site and location. For instance, in reflecting the impacts of the various technologies, the consultation proposes different limits for detached and non-detached properties, for residential and industrial areas, for conservation areas and national parks etc.’

Further to this, the document states that

More restrictive limits are proposed for sensitive areas where the Government considers they would be warranted:

- Wind turbines, air source heat pumps and solar panels within World Heritage Sites would not be granted permitted development rights if they are visible from a highway adjoining the site. The same protection would be accorded to conservation areas, although there may be many such areas where they would be acceptable and could contribute to a low carbon footprint. The Government will be interested in views on how far this might be the case.

In conservation areas, visually obtrusive technologies may be unsuitable, but the scale and positioning of renewables should be considered in context to determine feasibility. Roof mounted technologies are likely to be the most concerning from a conservation perspective, though it should be noted that other roof-mounted objects such as TV
aerials are allowable in conservation areas. Roof-mounted micro-generation technologies that may be of concern include photovoltaics (PV), solar thermal, flues associated with wood-burning stoves/boilers and CHP and micro-wind turbines. Notably the installation of roof-mounted (but not stand-alone) PV and solar thermal is currently permitted activity in conservation areas unless specific local guidance or policy is in place.

The district of Lewes contains 35 conservation areas, and hence conservation is a key issue for the delivery of micro-generation in the area. For example, a large portion of central Lewes Town is a conservation area, and is of significant conservation value as a town entity. Lewes Town is notable for its location on a steep, east and south-facing slope of the South Downs, leading down to the flat River Ouse valley, and rising again towards Mount Caburn. In micro-generation terms, the south-facing perspective of the town is ideal for the use of solar-technologies placed on south-facing roof tops. However, placement of a large coverage of solar technologies may fundamentally change the visual appearance of the area. This does not necessarily mean that solar technologies cannot be delivered in the Lewes conservation area, but planning should ensure that the volume of delivery and the positioning of technologies do not adversely affect the value of the conservation area as a whole. In most instances roof mounted technologies should be placed so that they are not visible from the public realm, although this will need to be considered on a case-by-case basis. As an alternative to roof-mounted technologies, solar panels and wind turbines can be installed in private gardens out of view of the public realm.

Similar issues are likely to be encountered in the case of listed buildings, and appropriate design measures will need to be taken to mitigate visual or structural impacts.

Possible carbon reduction over core strategy period

The DECC methodology for renewable capacity assessment sets out a methodology to estimate the potential for solar technologies and ground source heat pumps which will be estimated for Lewes District. This, however, will not provide a full overview of all micro-generation technologies, nor will it estimate the scale of potential that could be driven depending on delivery impetus. As delivery impetus is high in Lewes District, the following sections consider the level of impact on carbon reduction that focussed delivery of micro-generation could have.

A study for BERR40 (now DECC) modelled the UK market for micro-generation technologies out to 2050, by simulating the UK consumer base and technologies for both the residential and non residential sectors. A number of assumptions are made based on regional surveys of consumer attitudes to technologies and costs, and their likelihood of purchasing a technology depending on their current house/building type, the current energy price environment, and their “willingness to pay”. Two scenarios are considered in the tables below (using uptakes modelled in the BERR study):

- ‘Medium uptake scenario’: This scenario entails a substantial change in the uptake of micro-generation. The level of electricity generation shown in the table below is equivalent to every third home in Lewes District installing 2m² of photovoltaic panels.
- ‘High uptake scenario’: This scenario assumes that the feed-in tariff is widely exploited in the District, and the current activities are continued along with focussed promotion and support.

Both scenarios are based on installation in domestic properties, assuming there are currently approximately 42,97941 homes in the Lewes District.

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41 East Sussex in Figures, 2009 estimate
Table 21: Effect of introduction of ‘medium level’ micro-generation in buildings

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro-generation Electricity Production (kWh)</td>
<td>159,983</td>
<td>159,983</td>
<td>1,436,720</td>
<td>3,980,534</td>
</tr>
<tr>
<td>Micro-generation Heat Production (kWh)</td>
<td>326,809</td>
<td>806,813</td>
<td>2,706,739</td>
<td>7,835,226</td>
</tr>
<tr>
<td>CO₂ Reduction due to Micro-generation (tonnes)</td>
<td>40</td>
<td>100</td>
<td>383</td>
<td>1,249</td>
</tr>
</tbody>
</table>

Table 22: Effect of introduction of ‘high level’ micro-generation in buildings

<table>
<thead>
<tr>
<th></th>
<th>2006-2011</th>
<th>2011-2016</th>
<th>2016-2021</th>
<th>2021-2026</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro-generation Electricity Production (kWh)</td>
<td>938,475</td>
<td>2,440,101</td>
<td>6,588,945</td>
<td>12,316,231</td>
</tr>
<tr>
<td>Micro-generation Heat Production (kWh)</td>
<td>5,053,604</td>
<td>12,476,148</td>
<td>29,624,208</td>
<td>47,771,302</td>
</tr>
<tr>
<td>CO₂ Reduction due to Micro-generation (tonnes)</td>
<td>618</td>
<td>1,535</td>
<td>3,904</td>
<td>7,296</td>
</tr>
</tbody>
</table>

Influence of planning

As discussed above, delivery of micro-generation in conservation areas is seen as a key delivery issue, and one which could be aided by strong planning guidance. The case study example below demonstrates that guidance can be developed which will allow planning to influence the types and design of renewables delivered in conservation areas.

Outside of conservation areas, planning has little direct influence over existing buildings. However, the wider role of the Council can seek to encourage and support delivery of micro-generation by providing guidance, implementing funding schemes and working with communities. This work is already active in the Lewes District and should be ongoing.

There is the potential for Lewes Council to incentivise swifter uptake of micro-generation in the District through a business information awareness campaign and through working with other partners to identify commercial/industrial businesses with larger areas of south-facing roof who might either be interested in investing in solar technologies or who would be interested in linking up with an investment body. Planning can take the opportunity to encourage the installation of micro-generation (along with other energy improvement measures) when a conversion or extension to an existing building is proposed.

Planning has more control over the introduction of on-site renewables on new development sites, though these are expected to lessen due to the proposals to tighten building regulations. The role of planning in new development carbon reductions, and the expected level of renewable delivered in Lewes District through new development is discussed further in the next chapter.
Case Study: Haringey Guidance on Renewable Energy in Conservation Areas

The London Borough of Haringey has developed guidance on renewable energy installations in conservation areas. The guidance discusses a range of technologies and diagrammatically demonstrates what areas and roof-tops are can support renewable energy installations without impacting on conservation value.

Guidance extract from Haringey Council’s guidance on renewables for conservation areas

4.11 CONSIDERING LPA AREA-WIDE RENEWABLE ENERGY TARGETS

Through the analysis above, it is clear that there is substantial renewable and low carbon resource across Lewes District, though the scale and type of solution varies across the LPA. The LPA shows significant potential for the delivery of renewable and low carbon heat supplied, due to the existence of many opportunities for the integration of district heating networks (both existing and new development) and an abundant local biomass supply. Onshore wind in the northern part of the District and at Newhaven Port also has the potential to contribute to meeting low carbon targets. Discussions with the South Downs National Park Authority to investigate which forms of renewable energy they would be amenable to – especially wind and biomass – should be pursued.

The potential to integrate renewable technologies to supply electricity, however, varies for each form of renewable energy.

- **Wind** – To the east of the district, there is a large area of land that is viable for large-scale wind development. In the north, there is also potential, but any possible interference with Gatwick airport represents the biggest hurdle and will need to be addressed before pursuing wind power in the area. The proposed installation of an 850 kW turbine at Glyndebourne is reason enough to investigate the option of installing large wind turbines in the National Park with the South Downs National Park Authority. Newhaven Port also represents an opportunity to install a large turbine, consistent with Newhaven Port’s desire to transform into a wind turbine technology transportation hub.

- **Biomass** – Biomass suitable for combustion in boilers or CHP represents the biggest opportunity for the District. With an abundance of grade 3 and 4 land, which is generally unsuitable for agriculture, transforming 5% of this land into fuel crops could provide electricity for over 6,500 homes while heating over 8,400 homes. If used as part of a district heating network, it could heat over 17,700 homes. Implementing a regional/sub-regional biomass supply chain could increase the potential for biomass energy in the area.

- **Microgeneration and hydro** – Both of these forms of electricity generation are not likely to be a large part of the renewable energy mix in Lewes District. They do, however, represent an opportunity to continue building community support for renewables in the area. There is potential for household retrofitting and buy-in to flow from this momentum.

The renewable potential of the District is shown visually in the ‘Energy Opportunity Map’ in the next section.

Lewes District has a large capacity to develop renewable heating options, most specifically from biomass energy and micro-generation. Consequently, we recommend the delivery of its proportion of renewable heat based on the national target (around 12% of heat by 2020) should be adhered to. Renewable heat is a similar delivery challenge for most areas across the UK, and hence Lewes District should be able to meet its proportional contribution. This might be delivered utilising district heating systems or on a building by building basis.

In terms of electricity generation, targets should be challenging, but deliverable, based on the opportunities and constraints in the District. National targets are aiming towards 30% of our electricity on a UK wide basis being supplied by renewables. Some of this target will be met by nationally-driven projects for off-shore wind, wind-farms, and tidal energy. The (now revoked) South East Regional Plan set a target of 10% renewable electricity by 2020 (and 16% by 2026) based on previous estimates of the scale of potential in the South East as a whole. It is however recognised that potential was on the whole underestimated, and this has been recently revisited in the SEEPB study. The SEEPB study does not set new regional targets due to the redundancy of the regional framework. This evidence base has shown that Lewes District has considerable potential for the generation of renewable electricity from wind, hydro, biomass CHP and micro-generation, and a renewable electricity target would help to ensure the delivery of these opportunities. An energy from waste plant is also planned at Newhaven which will deliver a large amount of low carbon electricity. A target of 30% of electricity from renewable sources by 2020 is therefore recommended to drive delivery of local opportunities.

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Two scenarios have been tested to illustrate indicative options to meet or exceed targets for heat and electricity by 2020:

**Scenario A: Resource and building focussed delivery:** This scenario focuses on utilising the potential of local renewable resources and building-focused technologies, with minimal input from community heating schemes and combined heat and power (CHP).

**Scenario B: Community system focussed delivery** – This scenario focused on the potential contribution from installing Biomass CHP within a portion of the viable areas around existing high density development and waste heat sources. A biomass CHP network could be introduced through a Council or community led scheme or an ESCo.

The tables below show possible combinations of initiatives under each scenario and the resulting percentage of electricity and heat provided through low carbon generation.

### Scenario A: Resource and Building Focussed Delivery

<table>
<thead>
<tr>
<th>Renewable Resource</th>
<th>GWh Electricity</th>
<th>GWh Heat</th>
<th>Corresponding Delivery Intervention Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy from Waste at Newhaven</td>
<td>64.0</td>
<td>0.0</td>
<td>Assumed electricity generation from proposed energy from waste plant at Newhaven (equivalent to powering 16,000 homes). It is assumed no renewable heat is captured for distribution, though this could be possible through delivery of a district heating system that captures waste heat.</td>
</tr>
<tr>
<td>Large wind power</td>
<td>62.6</td>
<td>0.0</td>
<td>Assuming 10 large scale (2.75MW) wind turbines are delivered in a combination of sites. Could include viable rural areas and Newhaven Port, and perhaps acceptable areas in the National Park.</td>
</tr>
<tr>
<td>Medium wind power</td>
<td>0.8</td>
<td>0.0</td>
<td>100 small scale (6kW) wind turbines are delivered. This could be in both rural and urban areas but is probably most feasible in rural areas due to less interrupted wind paths.</td>
</tr>
<tr>
<td>Biomass Heating</td>
<td>0.0</td>
<td>52.4</td>
<td>Biomass heating is heavily installed in buildings (on a building by building basis), utilising 100% of waste forestry arisings in Lewes District, and using 1% of grade 3 and 4 land to grow short rotation crops.</td>
</tr>
<tr>
<td>Biomass CHP</td>
<td>0.0</td>
<td>0.0</td>
<td>No CHP or district heating contribution.</td>
</tr>
<tr>
<td>Hydro-power</td>
<td>1.8</td>
<td>0.0</td>
<td>Based on all hydro sites being delivered.</td>
</tr>
<tr>
<td>Micro-generation on Existing Buildings</td>
<td>6.6</td>
<td>29.6</td>
<td>'High' up-take case for addition of micro-generation technologies for existing homes based on BRE projections (see micro-generation section).</td>
</tr>
<tr>
<td>Renewables included with New Development (on-site)</td>
<td>0.9</td>
<td>1.2</td>
<td>Expected renewable energy to be included with new development (on-site) following changes to Building Regulations.</td>
</tr>
<tr>
<td>Total</td>
<td>136.7</td>
<td>83.2</td>
<td></td>
</tr>
</tbody>
</table>

| % of Lewes District Consumption | 36% | 13% |

*This scenario utilises stand alone renewables and microgeneration in existing buildings to achieve the recommended electricity and heat targets.*
### Scenario B: Community System Focussed Delivery

<table>
<thead>
<tr>
<th>Renewable Resource</th>
<th>GWh Electricity</th>
<th>GWh Heat</th>
<th>Corresponding Delivery Intervention Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy from Waste at Newhaven</td>
<td>64 0.0</td>
<td></td>
<td>Assumed electricity generation from proposed energy from waste plant at Newhaven (equivalent to powering 16,000 homes). It is assumed no renewable heat is captured for distribution, though this could be possible through delivery of a district heating system that captures waste heat.</td>
</tr>
<tr>
<td>Large wind power</td>
<td>0.0 0.0</td>
<td></td>
<td>No wind contribution</td>
</tr>
<tr>
<td>Medium wind power</td>
<td>0.0 0.0</td>
<td></td>
<td>No wind contribution</td>
</tr>
<tr>
<td>Biomass Heating</td>
<td>0.0 0.0</td>
<td></td>
<td>No biomass heating in individual buildings</td>
</tr>
<tr>
<td>Biomass CHP</td>
<td>60.9 92.3</td>
<td></td>
<td>Biomass CHP used to supply 10% of the 'viable' areas identified in the heat map through community district heating systems.</td>
</tr>
<tr>
<td>Hydro-power</td>
<td>0.0 0.0</td>
<td></td>
<td>No hydro delivered</td>
</tr>
<tr>
<td>Micro-generation on Existing Buildings</td>
<td>1.4 2.7</td>
<td></td>
<td>'Medium' up-take case for addition of micro-generation technologies for existing homes, based on BRE projections (see microgeneration section).</td>
</tr>
<tr>
<td>Renewables included with New Development (on-site)</td>
<td>0.9 1.2</td>
<td></td>
<td>Expected renewable energy to be included with new development (on-site) following changes to Building Regulations.</td>
</tr>
<tr>
<td>Total</td>
<td>127.2 96.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Lewes District Consumption</td>
<td>33% 15%</td>
<td></td>
<td>This scenario utilises biomass CHP in urban areas to deliver low carbon heat and electricity along with some microgeneration and the expected contribution from energy from waste. The recommended targets are also met in this scenario.</td>
</tr>
</tbody>
</table>

The scenarios demonstrated above show that both targets are achievable by delivering a substantial yet reasonable level of renewable energy in the district. We recommend targets of 30% renewable electricity and 12% renewable heat in Lewes District by 2020 to encourage the delivery of the various renewable opportunities. The table above demonstrates that the targets are achievable if a range of renewable energy opportunities are driven forward. Delivery mechanisms should be put in place to meet these goals.
4.12 ENERGY OPPORTUNITIES MAP

The analysis of renewable and low carbon energy opportunities discussed above, have been compiled to form an ‘Energy Opportunities Map’ (EOM) for the area (see next page). EOMs can be used as a resource in policy and planning to guide key opportunities for consideration. This spatial map will allow Lewes District to identify delivery opportunities both now, and as new development opportunities come forward.

The map should also be used to inform policy making in the Sustainable Community Strategy and other corporate strategies, and investment decisions taken by the LPA and Local Strategic Partnerships. The EOM could be incorporated into some form of a planning guidance document and/or corporate strategies so that it can be readily updated to reflect new opportunities and changes in feasibility and viability.

The EOM 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 is likely to be viable due to the existing intensity of heat demand.
- The identification of urban areas where micro-generation technologies should be a focus for integration.
- The location of ‘anchor loads’ or large, consistent energy users which could form an anchor for district heating or CHP schemes.
Figure 40: Energy Opportunities Map for Lewes District
4.13 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

The sections above have considered the resource potential of Lewes District. Key considerations emerging from this chapter are:

- There are considerable renewable and low carbon resource opportunities across the District, with high carbon reduction opportunities linked to biomass, wind, CHP, hydro and micro-generation;
- The scale of potential and types of technologies that are likely to be viable varies across the District.
- Lewes Town and the coastal urban areas have good opportunities to generate and supply renewable and low carbon heat utilising district heating networks, and these opportunities should be supported through planning;
- Biomass is a strong resource for the area, but a biomass supply chain needs to be put in place to gather, process and supply biomass locally;
- The rural areas to the north and east of the district provide the most potential for medium scale wind energy, with some unconstrained areas available for large scale wind development;
- The National Park area is most technically favourable for the development of large-scale wind, but the impact of turbines on the landscape value would need to be strongly considered;
- All opportunities are delivery dependent – resource potential in itself does not contribute to targets, therefore focus should be on enabling delivery;
- The extent of potential in Lewes District provides an evidence base to support the application of targets of 30% electricity and 12% heat from renewables by 2020; and
- An Energy Opportunity Map has been produced as a planning resource which will allow assessment and prioritisation of delivery opportunities.
5. Physical Context: Climate change in Lewes District and potential adaptation measures

The impacts of climate change will be felt across the United Kingdom. While mitigation is a necessary component of any strategy looking to address the impact of climate change, because of the nature of carbon, historic emissions have already determined a significant portion of the climate change over the next three to four decades. In fact, UK-wide temperatures, on average, are already increasing and will continue to rise, regardless of any mitigating actions taken today. For this reason, the Government drafted a new planning policy statement (PPS), specifically stressing the importance for local planning authorities to address adaptation to climate change. The emerging PPS includes the need for local authorities to:

- Outline how new developments are to avoid vulnerabilities arising from climate change;
- Address how risks can be managed through suitable adaptive and resilient measures;
- Implement adaptation options for existing developments in "areas with significant vulnerability" to climate change;
- Incorporate green infrastructure into new developments to maximise its many great benefits.

This chapter aims to provide insight into the most recent climate projections for Lewes District, and South East of England. The first section looks at anticipated temperature and precipitation over the next century. The impacts this changing climate is forecasted to have on flooding, water quantity and quality, urban temperatures, biodiversity, and agriculture follows. Finally, the concluding section of this chapter discusses ways Lewes District can adapt to the inevitable changes in a manner that mitigates financial, social and environmental costs. The ways in which planning policy can encourage and facilitate adaptation measures in Lewes District are discussed in the policy recommendation chapter.

5.1 CLIMATE CHANGE PROJECTIONS FOR SOUTH EAST ENGLAND

Introduction

The UK Government predicts that South East England will face considerable impacts from a changing climate. Projections indicate that average temperatures will increase throughout the year and that precipitation patterns will change, resulting in wetter winters and longer dry spells in summer.46

The consequences of climate change will be felt across the region, with different landscapes facing their own unique sets of impacts. The most significant vulnerabilities identified include:

- An increased probability of severe flooding in winter due to prolonged periods of rainfall;
- Greater pressure on water resources, caused by reduced summer rainfall coupled with increasing water demands from development and agriculture;
- Heightened risk of coastal inundation due to rising sea levels and tidal surges;
- Inner cities becoming vulnerable to problems associated with urban heat islands in summer;
- Severe weather events, including flash floods.

South East England is already subject to occasional severe weather events. Climate change will exacerbate these underlying challenges, with both the frequency and severity increasing over time.

The UK Climate Projections (UKCP09) is the primary source of information on the climatic changes that can be expected in the UK.47 UKCP09 reports long term climatic variations in probabilistic terms, qualifying the projections based on the relative strength of the supporting evidence. The structure of the information available is shown in the figure below.

Figure 41: A summary of the information available from UKCP09

UKCP09 describes key climate change variables for South East England set against the underlying regional climate (based on 1961-1990), identifying changes in patterns as well as annual means. UKCP09 provides both temperature and precipitation data along with a wider range of more technical variables. Changes in wind speeds were included in the 2002 edition of the UK Climate Impacts Programme. They were assigned a very low level of confidence and are no longer reported.

Each set of probabilistic projections is reported according to a range of future emissions scenarios. The three scenarios – high, medium and low – reflect the uncertainty regarding the global emissions trajectory towards a future low carbon society.

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47 Defra (2009) ibid
UKCP09 allows us to understand the likelihood of projected changes over three time slices (where 2020s is 2010-2039, 2050s is 2040-2069 and 2080s is 2070-2099) at particular locations for a given emissions scenario. The figures below are summaries of the projected changes for South East England. The results presented are from the medium emissions scenario, with the central probability estimates placed in the context of the confidence interval, with the variable ‘very likely’ to be within this range. Mean daily maximum temperature is the average of the daily maximum temperature over the temporal averaging period e.g. a season, whilst mean annual temperatures are the average change in temperature over a year.

**Expected Changes in Temperature**

Summer temperatures are expected to increase over the coming decades, with mean increases of 2.8°C likely in 2050. The average daily maximum temperature in summer gives an indication of the severity of future heat waves. Temperatures on the hottest day are likely to be 3-7°C higher and not more than 6.6°C more in 2050.

Table 23: Summer mean temperatures in the medium emissions scenario

<table>
<thead>
<tr>
<th>Year</th>
<th>Lower Estimate</th>
<th>Central Estimate</th>
<th>Higher Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>0.6°C</td>
<td>1.6°C</td>
<td>2.2°C</td>
</tr>
<tr>
<td>2050</td>
<td>1.3°C</td>
<td>2.8°C</td>
<td>4.6°C</td>
</tr>
<tr>
<td>2080</td>
<td>2.0°C</td>
<td>3.9°C</td>
<td>6.5°C</td>
</tr>
</tbody>
</table>

Change in annual mean temperature (°C) Medium emissions

![Change in annual mean temperature](image)

Figure 42: Predicted (50% probability) change in annual mean temperature in South East England (UKCP09)
Expected Changes in Precipitation

Mean annual rainfall is expected to remain within the range of natural variation. However, changes in temperature feed through to the hydrological cycle, changing the distribution of rainfall over the year. Summer rainfall is expected to decrease. The central estimate points towards a 23% reduction in mean precipitation during the summer months in the 2080’s. The central estimate for winter precipitation is a 22% increase.

Table 24: Summer mean rainfall in the medium emissions scenario

<table>
<thead>
<tr>
<th>Year</th>
<th>Lower Estimate</th>
<th>Central Estimate</th>
<th>Higher Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>-26%</td>
<td>-8%</td>
<td>14%</td>
</tr>
<tr>
<td>2050</td>
<td>-41%</td>
<td>-19%</td>
<td>7%</td>
</tr>
<tr>
<td>2080</td>
<td>-48%</td>
<td>-23%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Change in summer precipitation (%) Medium emissions

Figure 43: Predicted (50% probability) change in summer precipitation in South East England (UKCP09)
**Table 25: Winter mean rainfall in the medium emissions scenario**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lower Estimate</th>
<th>Central Estimate</th>
<th>Higher Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>-4%</td>
<td>6%</td>
<td>19%</td>
</tr>
<tr>
<td>2050</td>
<td>2%</td>
<td>16%</td>
<td>36%</td>
</tr>
<tr>
<td>2080</td>
<td>4%</td>
<td>22%</td>
<td>51%</td>
</tr>
</tbody>
</table>

**Change in winter precipitation (%) Medium emissions**

**Figure 44: Predicted (50% probability) change in winter precipitation in South East England (UKCP09)**

**Rising sea levels**

Under a high emissions scenario, sea levels may rise as much as 86cm by 2080 in the South East. In order to understand the potential implications this change may have, sea level rises must be placed in the context of extreme weather events, when they will be most keenly felt. These sea level rises increase the likelihood of inundation during storm and tidal surges.

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5.2 IMPACTS OF CLIMATE CHANGE IN LEWES DISTRICT

The UKCP09 project that changes to South East England climate will result in greater vulnerability to a number of existing threats. Some themes will be common to the whole region with some sub-regions expected to suffer disproportionately, due to their specific characteristics. Increases in temperature, flooding during winter months along with reduced water availability in the summer will increase the risks to infrastructure, health, agriculture and biodiversity. Key impacts are described in some detail below. The severity of the consequences will differ greatly by location, being dependent upon the predominant land use and urban form or natural context.

Increased flooding

Between 1998 and 2008, flooding was the most common extreme weather event to occur in East Sussex. Lewes Town was hit particularly hard in October 2000 when flooding of the River Ouse damaged 613 residential and 233 other properties. Flooding has since become one of the most pressing vulnerabilities for the region and Lewes District is no exception to this. It is a major economic and social issue in vulnerable areas, particularly in low-lying areas along the River Ouse, including Malling Brooks, Cliffe, and Town Centre West. In urban areas, where impermeable surfaces pre-dominate, heay downpours have the potential to cause flash flooding, and the likelihood of this may increase. Local Climate Impact Profile (LC IIP) reports for East Sussex show that the summer flash floods of 2005 were particularly severe, with flash flooding so extensive in Brighton it required East Sussex Fire and Rescue Services based in Barcombe, Newhaven, and Lewes Town. Increased winter rainfall will add to the problem by increasing the number of vulnerable settlements and making flood events more frequent and severe. To address this issue, Lewes District Council, East Sussex County Council, and Environment Agency created a Lewes Flood Plan, and East Sussex drafted a LC IIP report within the region.

Coastal settlements in the UK are often situated on low-lying flood plains, and therefore, are also subject to high risk of coastal flooding. The coastline is protected from inundation by extensive coastal defences; however, without further improvements to these defences, flooding is expected to cause an average of £1.4 billion of damage per year in the country. Chan ges in wave direction, changing patterns of erosion and deposition also complicate the risk of inundation. The combined effects could increase flooding risks by between four and ten times. In Lewes District, Newhaven and Seaford are at particular risk from coastal inundation, and sections of the cliffs at Pea cehaven and Telscombe are at risk from coastal erosion. The extent of vulnerability to flooding in coastal areas will not only increase due to rising sea levels but also from increased fluvial flooding. Rivers draining towards the coast interact with tidal flooding, increasing the likelihood of tide locking, reducing discharge rates of floodwaters to the sea. This is already a known problem in the Cliffe area of Lewes. The recent completion of the Lewes Cliffe flood defence should mitigate some of these risks.

Flooding in Lewes District is also a result of coastal inundation travelling up the River Ouse, extending upstream from Newhaven to the mouth of Barcombe Mills. The frequency of severe weather events, including the risk of rapid inundation, will increase as the climate becomes more capricious. As can be seen in the figure below, much of Lewes Town and some of Newhaven is already considered to be situated in a high risk flood zone (flood zone 3) and climate change is likely to extend the risk further into surrounding areas. As can be seen below, some of the sites submitted for the Strategic Housing Land Availability Assessment can be found in high flood risk zones. This information will be taken into account when assessing the suitability of a site for housing development.

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52 Lewes District Climate Impact Profile, as Part of East Sussex County Council. Local Climate Impact Profile Summary Report
54 Defra (2004)
Figure 45: Flood risk area and SHLAA identified sites comparison
The vulnerability infrastructure map indicates that the majority of the infrastructure is concentrated in areas of the District where the social vulnerability index indicates it is most needed. Some of the infrastructure in place, however, is currently located in areas at risk of flooding. It should be noted that some of the agricultural land that is suitable for growing biomass (grades 3 and 4) are located in flood zones; however, it is assumed that this land could be used for short-term biomass growth. In addition, the towns of Newhaven and Lewes both have services, including a fire station, leisure centres, secondary schools, and primary schools that fluvial flooding might impact upon.
Figure 46: Vulnerability of Infrastructure in relation to flood risk zones
The Adaptive Strategies for Climate Change in Urban Environment (ASCCUE) undertook a study to determine the District’s climate change flood risk over the next 100 years. They concluded that at sea level rise was predicted to preclude traditional options, such as raising defences. Therefore, the study suggested that engineering an off-stream flood water storage area on the floodplain below Lewes Town would be needed to mitigate the 2080 predicted sea level rise. Such a scheme is being examined by the Environment Agency. Until the outcomes of this work are established the suitability of the flood water storage area cannot be determined.

Reduced water availability and quality

Around three quarters of the public water supply in the South East is sourced from aquifers with the remaining proportion from rivers and reservoirs. The region is one of the driest and most water stressed in the UK while demand for water resources is increasing. Currently, more than 50% of catchments in the region are over-abstracted or over licensed at low flows. A direct result of over-abstraction has placed fifteen designated nature conservation sites at risk.

Reductions in summer rainfall will increase the likelihood of over abstraction from existing water resources and add to the region’s severe water stress. This could lead to reduced rivers flows and the depletion of aquifers. In fact, by 2050 there is the potential for water demand to increase by an additional 500 million litres per day in the South East River Basin. In lowering the water table, coastal aquifers become susceptible to salt water intrusion— the addition of salt water into freshwater aquifers — further heightening risks to coastal habitats and communities. Increased winter precipitation will potentially increase replenishment rates but the scale of this effect is not clear at present as some models predict climate change bringing the possibility of water resources decreasing by 10-15% and river flows by 50-80% in the worst case scenario.

As periods of drought become more common, constraints will be placed on the level of development which can be sustained. Water consumption has already been recognised as one of East Sussex’s most pressing issues, and water for new housing and commercial developments will continue to become scarcer. Water pollution in the South East is declining, but reduced water availability coupled with an increased likelihood of flooding threatens to reverse the trend.

Surface water sources are susceptible to water pollution. Low summer flows reduce a river’s ability to dilute effluent from industry and agriculture. As a result, existing pollutant levels will be concentrated, reducing water quality and increasing the risk of eutrophication and associated algal blooms.

Winter flooding increases the risk of contamination to surface water resources. Flooding events can cause sewage from combined sewers and from treatment plants to overflow and combine with the surface water resource.

The urban heat island effect

The region has suffered a few adverse effects from heat waves in the past; however, the heat waves of 2003, 2005 and 2006 were found to have significant impacts, including higher than average mortality amongst vulnerable groups. The population of Lewes District is expected to grow by 19% between now and 2033, and most of this growth is likely to take place in urban areas, where a disproportionately high amount of people already live, thus contributing to vulnerabilities associated with the urban heat island (UHI) effect.

66 East Sussex County Council. Local Climate Impact Profile Summary Report
This is the phenomenon whereby an urban area experiences significantly warmer temperatures than its surrounding countryside. Solar radiation is absorbed by dense materials like concrete and asphalt in the built environment during the day and this is re-radiated at night, causing an increase in temperature. The UHI effect is exacerbated by the typology and character of the urban environment, with dense cities and tall buildings having high impact. However, smaller towns may also experience an effect, although to a lesser extent, if they have a preponderance of sealed surfaces in their centres. Breezes from the ocean may slightly mitigate UHI effects in coastal cities and towns.

Especially in larger cities, the urban heat island effect can cause overheating in buildings and on transport networks, with implications for human comfort. A common response is to increase levels of mechanical cooling, but the waste heat only adds to the local warming effect. This is known as a maladaptation, as it reduces the problem for the immediate user but does not consider the wider picture. It also contributes to a rise in carbon emissions.

In extreme circumstances, abnormally high local temperatures have increased mortality rates. The August 2003 heat wave caused an estimated 18% increase in mortality in the South East. Nationally, it accounted for an estimated 2,000 premature deaths in the UK and increased emergency hospital admission rates by 6%. In London, urban areas were 9°C hotter than the adjacent countryside. As the figure below suggests, these kinds of drastic consequences are less likely to occur in a less densely populated area such as Lewes District – or even Lewes Town.

Higher summer temperatures will also bring benefits to the region. Outdoor recreation can be expected to become more popular and the impacts of severe cold spells will be reduced. While these are tangible benefits, they must remain in the context of the expected impacts.

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68 East Sussex County Council. *Local Climate Impact Profile Summary Report*


Figure 47: Urban heat island effect in Lewes District
The above figure maps how urban heat island effect will be felt within the different areas of Lewes District. Because the South East gets more sunshine than any other region of the UK, Lewes District is likely to feel the effects somewhat more dramatically than many other areas in the UK. This is especially true for the more populated areas such as Lewes Town and the coastal settlements that include Peacehaven, Newhaven, and Seaford. Lewes District, however, is not as urbanised as metropolitan regions, such as London; therefore, it will not feel urban heat island to the same extent. Maintaining and improving green infrastructure is the best way to mitigate excess heat resulting from UHI.

The Adaptive Strategies for Climate Change in an Urban Environment (ASCCUE) completed a study on comfort in outdoor spaces, focusing on Lewes District as one of its two cases studies. The authors concluded that the results reported “seem some what worrying for the ability of UK’s subjects to cope with the challenges of climate change.” They emphasise the problem is both physical and educational, noting that, where possible altering streets to manipulate microclimates is important for adapting to climate change.

Storms and high winds

East Sussex regularly experiences incidents of extreme wind. In the last decade, the county experienced a reported 24 incidents, causing trees to be felled and interfere with road conditions. One notable case in January 2008 resulted in high winds toppling a tree, killing a female e-motorist in Robertsbridge. UKCP09 does not describe the probabilities of increased incidents of storms and high winds due to the difficulty in predicting them accurately.

A greater understanding of the potential impacts of increased storm intensity in the South East should be pursued, including a regional wind study and its interaction with other impacts and vulnerabilities.

Reduced biodiversity

The range and number of species has been declining in South East England. Biodiversity is under pressure from loss of habitat caused by changes in farming, urban and infrastructure development and pollution. The impacts of climate change will exacerbate these pressures, potentially increasing the rate of species decline. Biodiversity is a priority for protection, in recognition of its importance to the ecosystem. With 483 protected species, and 2016 rare species in Lewes District, every effort should be made to protect and enhance biodiversity in the region.

The geographic distribution of many species is defined by climate. As average temperatures increase, birds, insects and mammals (where they are able to) will move northwards or to higher altitudes. Observed changes have resulted in a gradual migration with animals moving north by 31-60km over the last 25 years. The ability of species to migrate is hampered by fragmentation of habitat and human induced pressures. Species with small existing distributions and specific habitat requirements are therefore at greater risk.

Increases in temperature have caused changes to the timing of seasonal events, with spring beginning earlier and autumnal events occurring both earlier and later. The trends and the effects of these changes are poorly understood at present; however, the risk is that species which commonly interact at these times become mismatched. With further climate changes in future, the changes to seasonal timings will increase and will alter how some species interact.
Challenges and opportunities for agriculture and landscapes

Lewes District is home to many important landscape assets, including parts of the South Downs National Park (covers 55% of the District) and the Low Weald, as well as many areas of Ancient Woodland (approximately one third of the district lies within 500 metres of Ancient Woodland)\(^78\). Predicted reductions in summer rainfall could lead to these areas appearance altering during certain times of the year, with a more arid appearance more likely during the summer months. The agricultural sector will also face challenging conditions as a result of climatic change. Climate change threatens soil quality, increased water stress and a reduction in arable land area. The combined effects threaten the viability of traditional crop types.

As outlined in *Strategy for Changing Climate: Climate Change Guide for Lewes District*, summer droughts will increase the likelihood of damage to certain soil types. This might be offset by increased autumn and winter rainfall, but only if rainwater can be captured. Soil quality is already reliant on irrigation, which is required to maintain fertility. Rising summer temperatures will cause an increase in the land area that requires irrigation. Warmer temperatures might also mean new livestock and crop pests, and traditional crops replaced with warm-climate crops, such as maize and soy. However, soil erosion, pollution, and degraded water quality will likely impact potential yields\(^79\). With this in mind, and considering the quality of land is not as fertile as other regions of the country, it may be more beneficial to use this land for growing biomass crops. Lewes District has a relatively low proportion of high quality agricultural land, but wider impacts on agriculture in the South East will have indirect effects on the District due to changes in local food and material availability and cascading economic effects.


5.3 UNDERSTANDING ADAPTATION NEEDS IN LEWES DISTRICT

The following sections discuss the various aspects that should be considered when determining adaptation needs and opportunities in Lewes District.

Understanding Social Vulnerability

There is an emerging body of evidence that demonstrates that certain communities are more vulnerable to the predicted impacts of climate change than others. An extensive UK study\(^{80}\) has defined social vulnerability as relating to three aspects:

1. **Place**: people living in areas at risk
2. **Deprivation**: people who are already deprived by health, level of income, quality of their homes and mobility
3. **Disempowerment**: people who lack awareness of the risks of climate change, the capacity to adapt and who are less well supported by family, friends and agencies

![Figure 48: Social Vulnerability Chart](image)

The figure below shows the socially vulnerable areas within Lewes District. The factors taken into account were those over the age of 65 and under the age of 5, those in poor health, and those living on lower incomes. These bespoke statistics were then compared against national averages to determine the level of vulnerability. The coastal towns, as well as part of Lewes Town in the Landport area, are socially the most at risk; however, neighbourhoods surrounding the central core are less vulnerable. More vulnerable areas will either have a higher elderly or youth population, or have a higher concentration of those living on low incomes or are in poor health. The figure below shows an index of social vulnerability based on health, deprivation, and age.

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When compared against the urban heat island map, social vulnerability areas needing retrofits and would benefit most from improved green infrastructure become more salient. Lewes Town and the coastal towns appear to be the high priority areas where improved green infrastructure would have the greatest impact.

Figure 49: Social vulnerability based on three key indicators
Using Green Infrastructure for Adaptation

With world populations continuing to migrate into urban areas, the process of urbanisation has a number of effects on the natural environment. For example, concrete and other impermeable surfaces impede stormwater runoff's natural filtration process; greenfields are developed upon to provide more homes, car parks, and office buildings; and trees are felled for the threat they pose to highways and buildings. In an increasingly urbanised environment, green infrastructure plays a vital role in the health of an ecosystem.

Green infrastructure is considered as being a network of multi-functional green space, which supports natural ecosystems, and is essential to the quality of life within a community. In a world where climate change is likely to make extreme weather conditions more common, green infrastructure can help to improve human comfort levels, especially in outdoor spaces, and ensure that water resources are not wasted.

The influence increased greenspace can have on increased temperature is significant. One model concluded that adding 10% greenspace in high density residential areas kept surface temperatures at or below baseline temperatures from 1961-1990, for all projected future temperatures, except the 2080 worst case scenario. To maintain comfortable temperatures, therefore, it is important to increase, or at least maintain current greenspaces within cities. Where an urban area is already developed past the point of adding large swaths of greenery, adding as much as possible is important. This can be achieved through green roofs and walls, increased street trees, rain gardens, community gardens, and any other creative means of expanding an urban area’s vegetated cover.

As the UK Climate Impact Study has determined that all areas of the South East will experience drier summer months, growing and maintaining greenspace will be inhibited. To address this, it may be important to incorporate greenery more suited to more arid climates. Trees commonly found in Mediterranean countries are more drought resistant, yet still provide the desired shading and evapotranspiration to keep microclimates cool and comfortable.

The following table lists some species of timber that would benefit from increases in temperature in England, as well as species that are resistant to storm damage.

<table>
<thead>
<tr>
<th>Benefit from extra warmth</th>
<th>Resistant to storm damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer saccharum</td>
<td>Acer pseudoplatanus</td>
</tr>
<tr>
<td>Carya cordiformis</td>
<td>Bitter nut</td>
</tr>
<tr>
<td>Celastrus hasana</td>
<td>Yellow wood</td>
</tr>
<tr>
<td>Corylus colurna</td>
<td>Turkish hazel</td>
</tr>
<tr>
<td>Cupressus glabra</td>
<td>Smooth Arizona cypress</td>
</tr>
<tr>
<td>Cupressus sempervirens</td>
<td>Italian Cypress</td>
</tr>
<tr>
<td>Eucalyptus delegatiensis</td>
<td>Woollybutt</td>
</tr>
<tr>
<td>Fagus grandifolia</td>
<td>American beech</td>
</tr>
<tr>
<td>Juglans nigra</td>
<td>Black walnut</td>
</tr>
<tr>
<td>Liquastria lucidum</td>
<td>Tree privet</td>
</tr>
<tr>
<td>Lithodendron tulipfera</td>
<td>Tulip tree</td>
</tr>
<tr>
<td>Pinus montana</td>
<td>Foxglove tree</td>
</tr>
<tr>
<td>Platania acerifolia</td>
<td>London Plane</td>
</tr>
<tr>
<td>Pinus serotina</td>
<td>Black cherry</td>
</tr>
<tr>
<td>Prunus ptyera</td>
<td>Wild pear</td>
</tr>
</tbody>
</table>

Figure 50: Climate Resilient Species

The figure below maps the areas designated as environmentally or naturally significant. This map does not include all areas classified as green infrastructure because Lewes Council has yet to undertake an extensive audit of its green infrastructure. Lewes District does have a number of sites that have received environmental designations, such as Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs), National Nature Reserves (NNRs), or priority habitats identified in the Biodiversity Action Plan (BAP). Looking at some of the greenery within the housing areas and leisure management areas it does show that many small green spaces. However, the Lewes District Informal Recreation Space Study discusses that many major town centres in Lewes District have a higher demand for green space than is currently supplied, and that there is a need for more green space in the district’s population centres. When compared against the social vulnerability map, flood map, urban heat island map, the study’s conclusions agree with the notion that the population centres especially would benefit from an increase in green infrastructure.

While rainfall in the summer months in the UK is predicted to diminish, it is expected to surge in the winter months. This swing in precipitation to the extremes will require better management of the water supply. Sustainable Drainage Systems (SUDS) play a vital role in this strategy. A wide range of SUDS types including rain gardens, swales, wetlands, rainwater harvesting and green roofs are likely to be suitable in the District. SUDS should be retrofitted throughout the District and integrated with the green infrastructure strategy to achieve the best results.

Figure 51: Environmental Designations and Green Infrastructure
Designing and Retrofitting Buildings

Adapting to climate change means paying attention to the design of a new building, its surroundings, and how it is used and managed. Ideally, new buildings and developments should be planned outside both current and predicted flood plains; however, this is not always possible and adaptation is the next most logical step. Strategies for adapting buildings to climate change can be divided into three overarching categories: overheating, flooding and snow damage, and pressure on water resources.

Overheating

Building orientation is the first step to ensuring that climate is comfortable in new developments. Using landscape in order to benefit from shelter, provide adequate shade and catch breezes in the summer, orientation can balance minimising heat loss in the winter with the risk of solar gain during the summer. Solar shading can be incorporated into building design on sun facing windows by using a louvered design, which admits light, but minimises solar gain. This can be achieved similarly through the use of solar control glazing, which manages internal temperature and light levels by rejecting direct radiation and controlling glare. Other solar shading strategies include deciduous tree canopies, which provide shading during the summer months, and allow in light and heat when the leaves are shed in the winter; vertical planting on the south façade can filter stronger sunlight and provide additional shade; and balconies and overhangs can provide shading to the floors directly below.

Building ventilation is another key component to maintaining comfortable indoor conditions. Natural and passive ventilation and cooling approaches should be used, rather than mechanical ones, where possible. In its simplest form, this means designing windows so that building occupants can easily control them. This can facilitate cross ventilation, which is the most effective means of naturally ventilating a building. Another effective strategy is a “passive stack” whereby air is drawn into and up the centre of a building through a central atrium. Similarly, a “solar chimney” can allow moist, warm air to rise and escape from the top of the property, and in the process draw in fresh air from the bottom. Depending on the difference between outdoor air temperature and underground soil temperature, earth tubes, which draw air into the building through tubes buried in the ground, can also play a role in effective ventilation.

Sometimes, mechanical ventilation cannot be avoided. In these cases, it is important to incorporate low carbon designs where possible. Chilled beams are a water-based closed circuit that uses water as the transfer heat method, and require less fan power than conventional ventilation systems. Absorption chillers are ideal for large cooling loads as they use low grade waste heat as their power source rather than electricity, thereby substantially reducing operating costs and CO2 emissions.

Building materials can also play a significant role in the comfort level of a building. Thermal storage is the capacity for building materials to absorb, store and later release heat. Materials with high thermal storage can, for example, be used effectively in homes to absorb and store warmer daytime temperatures and release them over the course of the evening when the home would otherwise be uncomfortably cold. As the heat dissipates from the material over the evening, it will be cool the following day and act to passively air condition the home. Cool or reflective building materials can also insulate buildings effectively. White roofs made of light coloured materials can reflect sunlight and reduce solar gain. Green roofs and walls can play a similar role in insulating buildings, although they tend to be more expensive.

Flooding and Snow Damage

Raising floor levels, electrical fittings, and equipment at a sufficient height above predicted flood levels is particularly important for areas that are likely prone to flooding. Rainproofing overhangs to keep heavy rain away from doors and windows, as well as temporary free-standing barriers to prevent infiltration are other measures that can be taken. Using flood resilient materials such as vinyl and ceramic tiles, pressure treated timber, glass block, metal doors and cabinets are also useful. Finishing materials such as lime plaster and hydrated lime coatings dry quickly and are damaged less when exposed to flood water.
Improving the on-site drainage can help to prevent flooding in the first place. Simple solutions, such as installing one way valves as a permanent device in drains and sewer pipes to prevent backflow onto a property, or creating drainage ditches can enhance the ecological value of the site and have the added benefit of being self-maintaining. Using SUDS, such as water-permeable surfaces, can also help maintain water quality and keep ground conditions stable.

Pressure on Water Resources
Installing water efficient fittings and devices is one of the easiest ways of reducing water consumption and cost. Low flush toilets, showers and taps; and motion sensor and ‘dry’ urinals are a few such devices. These accessories can also be fitted to monitor and record water use in order to influence occupants to use less water.

Water reuse systems are another effective way to reduce freshwater consumption. Rainwater collection and storage can significantly reduce or eliminate the amount of water used for irrigation and WC flushing. The added benefit of rainwater storage is the reduced risk of flooding during heavy rainfall. Greywater recycling refers to untreated waste water which has not come into contact with toilet waste. It includes water from baths, showers, bathroom wash basins and water from washing machines, but generally excludes water from kitchen sinks and dishwashers. Greywater isn’t climate-dependent so it is more reliable than rainwater collection systems, but as it requires treatment, it tends to be less cost effective.
How Have Planning Policies been used to Influence Climate Change Adaptation

As planning is the main tool cities and towns can use to develop in ways the community determines beneficial, it is important for planning authorities to develop climate change adaptation policies. The Greater London Authority is one city that has drafted a series of these policies and also has a Climate Change Adaptation Strategy. The London Plan (2004) includes a series of policies on climate change adaptation as shown below. It should be noted that while London is much different in character to Lewes District, it was chosen because it is one of the more progressive policies.

**Sample of London Climate Change Adaptation Policies (Draft)**

**Overheating and Cooling**

Major developments should use the following cooling hierarchy:

- Reduce internal heat generation through energy efficient design
- Decrease heat entering a building through solar shading, reflective surfaces, insulation and green roofs and walls
- Manage heat within buildings through exposed thermal mass and high ceilings
- Use passive ventilation
- Use mechanical ventilation
- Install low carbon active cooling systems

Developments should be required to demonstrate how their design, materials and construction will minimise overheating and cooling needs.

**Urban Greening**

Development proposals should incorporate green infrastructure, including tree planting, green roofs and walls, and soft landscaping. Major development proposal should also be designed to include as many of the following as possible:

- Adaptation to climate change
- Sustainable urban drainage
- Mitigation of climate change
- Enhancement of biodiversity
- Accessible roof space
- Improved appearance and resilience of the building
- Growing food

**Flood Risk Management**

Development proposals must comply with Planning Policy Statements related to flood risk assessment and management (PPS25) over the lifetime of the development and respect the measures proposed in TE2100 and Catchment Flood Management Plans. Developments that pass PPS25 Exceptions Test will need to address flood resilient design and emergency planning by demonstrating that:

- Development will be safe during a flood
- A strategy exists for safe evacuation or safely remaining in building during a flood
- Utilities will not be affected during a flood
- Buildings are designed for quick recovery from flooding

Development adjacent to flood defences will be required to protect them and, if possible set back from them.

**Sustainable Drainage**

Development should utilise SUDS when possible, and aim to achieve greenfield run-off rates. Runoff should be managed as close its source as possible in line with the following hierarchy:

- Store rainwater
- Use infiltration techniques (porous surfaces) when possible
- Attenuate rainwater in ponds for gradual release
- Attenuate rainwater by storing it in tanks for gradual release
- Discharge rainwater into existing waterway
- Discharge rainwater to a storm drain
- Discharge rainwater into sewer

**Water Use and Supplies**

Developments should minimise water treatment by:

- Incorporating water saving measures and equipment
- Meeting water efficiency targets of 105 litres per person per day in residential developments
- New development for sustainable water supply infrastructure will be supported

The Draft Replacement London Plan retains these policies, and adds additional targets to the urban greening policies, including a strategic move to increase the ‘greened areas’ in the central zone by 5% by 2030, and a requirement for major developments to include green roofs and walls where possible.

Lewes District has a number of challenges associated with climate change adaptation, and both policy and strategic planning will be able to drive adaptation initiatives. Appropriate policies are considered in the policy recommendations chapter.
5.4 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

- Planning has a key role to play in helping new and existing communities and environments adapt to climate change;
- Lewes District is at risk to a number of climate impacts, including significant flood risk, changes in microclimate, water supply impacts and effects on biodiversity and agriculture;
- Planning should consider which communities are likely to be most vulnerable to long-term effects caused by climate change;
- The integration of green infrastructure is an important strategy to control local climate effects;
- The Council should where possible encourage retrofitting of buildings in risk areas to increase climate resilience; and
- Planning should influence both the location and design of new development to minimise climate risk.
6. Delivery Context: Using Local Opportunities and Growth

6.1 INTRODUCTION TO THIS CHAPTER

This chapter considers the impact of unique local opportunities on delivery of carbon reductions. Lewes District has a number of factors that make it unique, including its landscape, its communities and its planning and development characteristics. The chapter considers the delivery context in Lewes District, exploring three key areas that are likely to shape the way opportunities are delivered and the prioritisation of those opportunities:

- Maximising Benefit from New Development and Growth
- Building on Local Resources and Enthusiasm
- Taking Advantage of Change

The first section examines three ‘typical’ (but fictitious) development options in Lewes District to demonstrate their ability to meet emerging carbon targets and the likely selection of low carbon technologies. It also considers strategic spatial planning decisions and how growth and regeneration plans can coincide with carbon reduction and climate change adaptation strategies. The second section considers local groups, companies and communities that make Lewes District unique and can assist in delivering opportunities for carbon reductions. The third considers expected change that is occurring in Lewes District and how carbon reduction and adaptation measures could be delivered in tandem.

6.2 MAXIMISING BENEFIT FROM NEW DEVELOPMENT AND GROWTH

New development is a direct opportunity where planning policy can take effect on build quality and require standards relating to carbon reduction and provision of renewable energy. The PPS1 supplement, and the emerging PPS also place emphasis on the role of spatial planning and the potential to locate and direct types of growth that will support low carbon communities.

6.2.1 SUSTAINABILITY STANDARDS AFFECTING TO NEW DEVELOPMENT

Planning can have a direct influence on carbon reductions and climate change resilience in new development through specific policies and targets. Historically, the enforcement of on-site renewable targets and carbon emission reduction targets has seen significant success. Recently, however, carbon reductions and renewable energy deployment in new development sites has become the focus of evolving building regulations, therefore lessening the need for local policies to be enforced through the planning process. Taking a wider approach to sustainable design and construction than just carbon and energy, Local Authorities can also utilise the Code for Sustainable Homes and BREEAM targets on either a district-wide or site specific basis to uphold a high standard of building in their area. The following sections discuss the proposed changes to Building Regulations, the application and cost implications of the Code for Sustainable Homes and BREEAM standards, and the current direction from Government on the need for local targets.
6.2.2 BUILDING REGULATIONS AND THE TRAJECTORY TO ZERO CARBON

The **Building Regulations** first started to turn their focus towards reducing CO₂ emissions in the 2002 revision to Part L (Conservation of Fuel and Power). Further revisions to Part L in 2006 brought the UK Building Regulations in line with the EU’s Energy Performance of Buildings Directive (EPBD), introducing amongst other things the requirement for Energy Performance Certificates (EPCs).

The current 2006 Building Regulations Part L requires that CO₂ emissions calculated for a new development should be equal to, or less than a Target Emission Rate. This is generally in the region of 20% lower than CO₂ emissions from a building which complies with the 2002 Building Regulations, depending on the specific building type.

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. In the Budget 2008, the Government also announced its ambition that all new non-residential buildings should be zero carbon from 2019 (with earlier targets for schools and other public buildings). The Government has also indicated that all new non-residential buildings will be required to be zero carbon by 2019, again implemented through the Building Regulations.

The **Definition of Zero Carbon Homes and Non-Residential Buildings** consultation in 2009 sought to clarify the definition of zero carbon that will be applied to new homes and buildings through proposed changes to the Building Regulations. A statement by John Healey, Minister for Housing and Planning, in July 2009 confirmed the policy to require all new homes to be zero carbon by 2016 and set out the proposals which will be taken forward to implement this policy. This addressed the concern that the original definition, which followed the definition of Code for Sustainable Homes Level 6, would not be feasible or viable on many sites.

Prior to the introduction of the zero carbon requirement, the following intermediary step changes are proposed to the requirements of Part L of the Building Regulations for dwellings:

- **2010:** 25% improvement in regulated emissions (relative to 2006 levels). This is expected to broadly correspond to the energy and CO₂ element (there are nine elements in total) of Level 3 of the Code for Sustainable Homes.
- **2013:** 44% improvement in regulated emissions (relative to 2006 levels), corresponding to Code Level 4
- **2016:** Zero carbon in terms of both regulated and unregulated emissions

The figure below illustrates the planned changes in the Building Regulations requirements for dwelling emission rates. One of the key points is that the requirements in 2010 and 2013 will only apply to the emissions that are currently regulated, which are associated with energy use for fixed building services (heating, ventilation, cooling and lighting) inside the dwelling. From 2016, the requirements will apply to all emissions associated with energy use in the dwelling, including cooking and other appliances.
The Government has published a hierarchy for how CO₂ emissions should be reduced to achieve the zero carbon emissions standard, as in the figure below.

Developments will not be required to achieve zero carbon emissions entirely within the site boundary. There will be a minimum requirement for emissions savings through energy efficient design of the building services and building fabric; the amount is to be determined by the Government in the near future. Further measures will be required to achieve “carbon compliance” on-site, bringing the regulated emissions savings on-site up to a 70% on TER (Total Emissions Rate). These can include building integrated renewable energy, additional energy efficiency features and connection to a heat network.
The residual CO₂ emissions beyond carbon compliance are to be dealt with through “allowable solutions”. Likely allowable solutions include:

- Further CO₂ reductions on site;
- Energy efficient appliances;
- Advanced forms of building control system which reduce the level of energy use in the home;
- Exports of low carbon or renewable heat from the development to other developments; or
- Investments in low and zero carbon community heat infrastructure.

Other allowable solutions remain under consideration and government decisions on allowable solutions will be reflected in the finalised version of the emerging PPS. Currently, it is undecided who will coordinate and deliver allowable solutions, though LPAs are expected to play a role and should account for the effect of allowable solutions in planning.

6.2.3 CODE FOR SUSTAINABLE HOMES

The Code for Sustainable Homes (CfSH, The Code), developed by BRE and supported by the Department of Communities and Local Government (DCLG), sets out a national rating system to assess the sustainability of new residential development, replacing the previous system ‘Ecohomes’. The CfSH 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.

Table 26: Performance required to meet Code levels.

<table>
<thead>
<tr>
<th>Code Levels</th>
<th>Minimum entry requirements</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Energy improvement over TER</td>
<td>Water litres/person/day</td>
<td>Total points score out of 100</td>
</tr>
<tr>
<td>Level 1 (★)</td>
<td>10%</td>
<td>120</td>
<td>36</td>
</tr>
<tr>
<td>Level 2 (★★)</td>
<td>18%</td>
<td>120</td>
<td>48</td>
</tr>
<tr>
<td>Level 3 (★★★)</td>
<td>25%</td>
<td>105</td>
<td>57</td>
</tr>
<tr>
<td>Level 4 (★★★★)</td>
<td>44%</td>
<td>105</td>
<td>68</td>
</tr>
<tr>
<td>Level 5 (★★★★★)</td>
<td>100%</td>
<td>80</td>
<td>84</td>
</tr>
<tr>
<td>Level 6 (★★★★★★)</td>
<td>Zero Carbon</td>
<td>80</td>
<td>90</td>
</tr>
</tbody>
</table>

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 is based on local circumstances. The use of the code is reinforced by the draft PPS.

Since May 2008 it has been compulsory for new homes to have a CfSH 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 requirements of the Code for Energy. 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 2011.
Cost Implications of the Code for Sustainable Homes

An industry report on the costs of building homes to full Code levels has been used to show the financial implications of achieving Code targets. The costs were predicted, and are not yet fully supported by the development industry. Only a handful of real Code assessments have been completed so there is not yet sufficient final cost data to establish robust cost benchmarks. These costs are national averages, and will vary somewhat for Lewes, depending on factors such as land values and construction costs.

Predicted costs show that costs associated with meeting advanced Code for Sustainable Homes 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. The percentage uplift in build costs arising from the additional Code requirements (i.e. all Code criteria excluding the energy and CO₂ requirement) is around 3% for flats and around 5% for houses for Code Level 4. This relates to achieving all additional Code credits; homes must actually achieve 57% of available credits to achieve Code Level 3 and 68% of available credits to achieve Code Level 4.

There is a significant jump in cost when moving from Code Level 4 to Code Level 5 due to the need for water re-use and recycling systems in order to meet the mandatory water requirements for Code Level 5 and above. The percentage uplift in build costs for Code Level 5 (excluding the mandatory energy criteria) is around 4.5% for flats and nearly 12% for houses.

The graphs below show the predicted cost to deliver Code targets 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.

![Percentage cost increase (over base construction cost) for Code credits (exc. ENE 1, 2 & 7) - Flat.](image)

Figure 54: Costs (over base construction cost) for delivering Code credits as required to levels 4, 5 & 6 for a flat

86 Cost analysis of the Code for Sustainable Homes (produced for department for Communities Local Government by Cyril Sweett, July 2008)
Homes must achieve 57% of available credits to achieve Code Level 3 and 68% of available credits to achieve Code Level 4 (Source: Cost Analysis of The Code for Sustainable Homes, Cyril Sweett, 2008).

Figure 55: Costs (over base construction cost) for delivering Code credits as required to levels 4, 5 & 6 for a house.

Figure 56: Cost of meeting all Code credits in each issue excluding the mandatory Energy for a detached house and a flat.
6.2.4 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.

Cost Implications of BREEAM Standards

The figure below shows the % increase on the base build cost to deliver Good, Very Good and Excellent ratings under BREEAM Offices (2004) and BREEAM Schools. Both costing exercises were led by the BRE Trust. They were supported by Cyril Sweett for the Office costing exercise (Putting a price on sustainability, BRE Trust and Cyril Sweett, 2005) and Faithful & Gould for the Schools work (Putting a price on sustainable schools, BRE Trust and Faithful & Gould, 2008). The costs shown in the figure below under ‘school’ are for a secondary school block of 3,116m².

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.

In order to help in the achievement of certain BREEAM standards, companies can claim both Enhanced Capital Allowances (ECA) and Carbon Trust grants to help them invest in Combined Heat and Power, renewables and other low and zero carbon technologies.
6.2.5 DELIVERING CARBON REDUCTIONS IN NEW DEVELOPMENT IN LEWES DISTRICT

Carbon efficient new development will be delivered through a combination of energy efficiency measures and low carbon energy infrastructure, in-line with the Government’s commitment to zero carbon development in 2016. This would require around a 70% reduction above the TER with the remaining emissions potentially picked up through a range of ‘allowable solutions’ to offset the remaining energy requirements. Consequently, new development will deliver a proportion of renewable and low carbon energy which can contribute to the local renewable energy targets.

The selection of technologies included in new development will depend on the level of CO₂ reduction which can be achieved through energy efficiency, and the most cost effective energy generating technologies available for inclusion on-site to reach the required CO₂ reduction. The general range of technologies available for use in new development and their constraints is shown in the figure below.
<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>DESCRIPTION</th>
<th>SOURCE</th>
<th>SCALE</th>
<th>LANDSCAPE IMPACT</th>
<th>ENERGY TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photovoltaics</td>
<td>Panels convert light energy to electricity. They can be positioned on a south-facing roof or as stand-alone installations.</td>
<td>Sun</td>
<td>Building integrated</td>
<td>Area on rooftop</td>
<td>Electric</td>
</tr>
<tr>
<td>Micro-wind</td>
<td>Small-scale wind turbines can supply electricity directly to homes or connect to the grid. Careful siting is needed to ensure turbulence from structures doesn’t affect efficiency.</td>
<td>Wind</td>
<td>Building integrated</td>
<td>Area in home</td>
<td>Electric</td>
</tr>
<tr>
<td>Ground source</td>
<td>Ground source heat pumps use the latent heat in the ground to increase the efficiency of electric heating. Pipework can be laid horizontally or vertically in the ground.</td>
<td>Ground</td>
<td>Building integrated</td>
<td>Area in home</td>
<td>Hot Water</td>
</tr>
<tr>
<td>Solar hot water</td>
<td>Solar thermal panels use heat from the sun to heat water for use inside the home. They should be placed on a south-facing roof and angled to harness the sun path.</td>
<td>Sun</td>
<td>Building integrated</td>
<td>Area on rooftop</td>
<td>Hot Water</td>
</tr>
<tr>
<td>Biomass heating</td>
<td>Biomass or organic material such as wood pellets can be utilised as a renewable resource to provide heating. Can be used in communal heating systems or individual building systems.</td>
<td>Wood</td>
<td>Building integrated</td>
<td>Area on rooftop</td>
<td>Hot Water</td>
</tr>
</tbody>
</table>

Figure 58a: Range of renewable and low carbon technologies available for use in new development
Figure 58b: Range of renewable and low carbon technologies available for use in new development
6.2.6 ANALYSIS OF LOCAL DEVELOPMENT TYPOLOGIES

The results of modelling for three development typologies, representative of those expected to be typical in Lewes District, are described in this section. A range of solutions has been presented to comply with expected changes in Building Regulations standards between 2010 and 2013, with the planned implementation of zero carbon homes in 2016. An analysis of the effect of feed in tariffs and other policy mechanisms is also provided. The following development typologies have been considered. All figures on technology costs, construction costs and CO2 savings are based on generalised benchmark figures and may differ from those provided by developers. All sites are fictitious, but are designed to be representative of possible future development situations in Lewes District (this does not mean that such development scenarios will be pursued in the LDF, nor does it mean that scenarios that are not identified below will not be pursued in the LDF). This will allow planners and stakeholders to understand the carbon reduction possibilities associated with different types and locations of development.

- **Site 1**: A large development (100+) within Lewes Town (in the National Park and therefore subject to designation constraints on suitable types of renewables).
- **Site 2**: A small rural development (less than 10) in the northern area
- **Site 3**: A medium size development in the coastal towns (infill)

### Table 27: Assumed housing mix for the development typologies considered in Lewes District

<table>
<thead>
<tr>
<th>Dwelling type</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Houses</td>
<td>400</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>Flats</td>
<td>100</td>
<td>3</td>
<td>30</td>
</tr>
</tbody>
</table>

### Table 28: Indicative baseline energy demand and CO2 emissions for the development typologies considered in Lewes District

<table>
<thead>
<tr>
<th>Development Name</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Heat (kWh)</td>
<td>3,398,410</td>
<td>65,89</td>
<td>298,353</td>
<td>3,762,657</td>
</tr>
<tr>
<td>Annual Electricity (kWh)</td>
<td>1,818,277</td>
<td>35,83</td>
<td>171,199</td>
<td>2,025,310</td>
</tr>
<tr>
<td>Regulated CO2 Emissions (kg)</td>
<td>832,413</td>
<td>16,16</td>
<td>73,533</td>
<td>922,109</td>
</tr>
<tr>
<td>Total CO2 Emissions (kg)</td>
<td>1,426,605</td>
<td>27,90</td>
<td>130,126</td>
<td>1,584,636</td>
</tr>
</tbody>
</table>

### Site 1: Large, residential development

This typical development has been assumed to have 500 dwellings, although the findings would be relevant to developments with at least 100 homes or large mixed use developments.

It has been assumed that at this development is located in the National Park and within sight of a conservation area, within Lewes Town. The more visible technologies (i.e. solar PV and wind turbines) are unlikely to be permissible in these areas and have therefore been omitted from the analysis for this development typology. Nevertheless, there are feasible options for installing low carbon and renewable energy technologies on a site with these characteristics. The scale of development and probable proximity to existing buildings and anchor loads in Lewes Town makes it potentially suitable for on-site CHP and communal heating, if the site were designed appropriately, including a density of over 55 dwellings per hectare.

Figure 59 below shows the low carbon solutions that could be applied to a new, large residential development to meet CO2 standards in the tightening Building Regulations. The figure shows that with today's grid mix, air source heat pumps (omitted from graph) and ground source heat pumps are the least cost-effective technology for reducing CO2 emissions. The most cost-effective solutions for delivering CO2 savings are energy efficiency measures. However,
these have limited potential for saving CO$_2$, up to 25%, and so would not be sufficient to meet the standards for Building Regulations after 2010.

Waste heat (for example, from industry) and CHP could meet the Building Regulations standards after 2013, when a 44% reduction in on-site CO$_2$ emissions is likely to be required. Waste heat, biomass heating and biomass CHP are comparable in terms of cost per tonne CO$_2$ saved, but only biomass CHP is likely to meet Building Regulations standards after 2016 when zero carbon policy is likely to become active.

**Figure 59: Cost of renewable energy technology per tonne CO$_2$ saved for a large residential development in Lewes Town to deliver CO$_2$ savings.**

In the above figure, gas CHP (Biomass) refers to installations where biomass boilers have been installed as a secondary/backup heating system. “Visible” technologies have been omitted from the analysis. Air source heating has been omitted from chart – this would cost a total of £323,798 per tonne CO$_2$ saved for the development, with potential CO$_2$ savings of 1%. Energy efficiency scenarios 1 and 2 show different approaches, where 2 has higher carbon savings but higher cost.

The green bars indicate the most cost-effective solutions, the grey dots show level of CO$_2$ savings. The solutions are listed in order of CO$_2$ savings, so that the first two solutions would be sufficient to meet 2006 Building Regulations, the 3rd and 4th solutions would be sufficient to meet 2010 Building Regulations (due to come into effect in October 2010) and the 5th, 6th and 7th solutions would be sufficient to meet the proposed 2013 Building Regulations. Only Biomass CHP would achieve the CO$_2$ standards required for the proposed 2016 Building Regulations. (Source: AECOM analysis).
Site 2: Small residential (10 dwellings)

The development has been assumed to be a small rural development of less than 10 dwellings, located for example in the northern part of Lewes District.

It has been considered unlikely to be able to take advantage of waste heat from other development and also not large enough to justify its own on-site CHP and communal heating system, due to the size of technology available and the overheads associated with operating communal plant. It has also been assumed to be located outside of the National Park and other conservation areas, therefore more visible technologies such as those using solar and wind energy have been considered acceptable.

![Cost of renewable energy technology per tonne CO2 saved for a small residential development in Lewes District to deliver CO2 savings.](image)

In the above figure, GSHP refers to ground source heat pump installations. Solutions requiring district heating or CHP have been omitted from the analysis. Air source heating has been omitted from chart for clarity – this would cost a total of £400,184 per tonne CO2 saved for the development, with potential CO2 savings of 1%.

The green bars indicate the most cost-effective solutions; the grey dots show level of CO2 savings. The solutions are listed in order of CO2 savings, so that the first 4 solutions would be sufficient to meet 2006 Building Regulations, the 5th and 6th solutions would be sufficient to meet 2010 Building Regulations (due to come into effect in October 2010) and all remaining solutions (except the first 6) would be sufficient to meet the proposed 2013 Building Regulations. Only biomass heating supplemented with a large PV array would achieve the CO2 standards required for the proposed 2016 Building Regulations.

(Source: AECOM analysis).

The figure above shows, with the exception of air source and ground source heat pumps, the CO2 saving solutions have comparable costs in terms of CO2 emissions saved. However, only biomass solutions are likely to deliver the savings required after 2016 when zero carbon policy comes into force. Most solutions can be supplemented with PV to meet required standards; however this will depend on the space available to effectively mount PV on site.
For areas suitable for wind development, as shown in the previous section, a small wind turbine (around 15kW) may be feasible, provided there is sufficient room on site to allow for a approximately 150m separation from the nearest residential properties and 20m from the nearest road or railway. Our calculations indicate that one small wind turbine could result in around 70% savings on regulated CO₂ emissions for a small residential development of 10 homes, at a cost of around £51,000 installed. Additional land and infrastructure costs would need to be factored in if the turbine were installed outside of the site boundary. Where feasible, this would be the cheapest option for reducing CO₂ emissions.

**Site 3: Medium size development**

This development has been assumed to be a medium size, 50 dwelling infill development on the coastal strip, with no major landscape or other environmental constraints on the suitable low carbon or renewable energy technologies.

The figure below shows that for areas suitable for wind development, as shown on the wind energy maps in this chapter, a large scale wind turbine is undoubtedly the most cost-effective solution for CO₂ reductions.

![Figure 61: Cost per tonne CO₂ saved of biomass-fuelled CHP with PV with a large scale wind turbine, for a medium sized, coastal development in Lewes District](Image)

Cost/tonne CO₂

- £12,000
- £10,000
- £8,000
- £6,000
- £4,000
- £2,000
- £0

Biomass CHP + PV (max)  Wind (Large Turbine)
Figure 62: Cost of renewable energy technology per tonne CO₂ saved for a medium sized development in Lewes District to deliver CO₂ savings.

In the above figure, GSHP refers to ground source heat pump installations. Air source heating has been omitted from chart for clarity – this would cost a total of £40,018 per tonne CO₂ saved for the development, with potential CO₂ savings of 1%. Large wind turbines have also been omitted for clarity – this would cost a total of £595 per tonne CO₂ saved for the development, with potential CO₂ savings of 3,654%. (Source: AECOM analysis).

6.2.7 USING THE INFLUENCE OF PLANNING ON NEW DEVELOPMENT IN LEWES DISTRICT

The Building Regulations are the primary drivers for higher energy performance standards and low carbon and renewable energy generation in new developments. Lewes District Council could however apply policies that act to facilitate, accelerate or increase the scope of targets, such as:

- District-wide carbon targets or sustainability targets;
- Site specific carbon targets or sustainability targets;
- Supporting and coordinating favourable carbon reduction measures; and
- Influencing the design process

**District-Wide Targets**

A range of district-wide targets are possible regarding renewable energy and CO₂ reduction, but only in the short-term. The emerging PPS¹ provides advice on setting district targets; it says:

¹The progressively demanding standards for CO₂ emissions set through Building Regulations, together with the assessment of local opportunities for renewable and low carbon energy, will help drive greater use of decentralised energy. Targets for application across a whole local authority area which are designed to secure a minimum level of

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decentralised energy use in new development will be unnecessary when the proposed 2013 revisions to Part L of the Building Regulations (for both domestic and non-domestic buildings) are implemented. As an interim measure until the coming into force of the 2013 revisions, the Secretary of State will support the application of authority-wide targets where these are included in the development plan. At the local level, any target should be in a DPD.’

‘Any local requirement for a building’s sustainability should be set out in a DPD and:

i. relate to a development area or specific sites and not be applicable across a whole local authority area unless the justification for the requirement can be clearly shown to apply across the whole area;

ii. not require local standards for a building’s performance on matters relating to construction techniques, building fabrics, products, fittings or finishes, or for measuring a building’s performance; and,

iii. be specified in terms of achievement of nationally described sustainable buildings standards. In the case of housing, this means a specific level of the Code for Sustainable Homes. Where local circumstances do not support specifying compliance with an entire Code level (because of the range of environmental categories covered) – or envisaged development could not attain the relevant Code level on all environmental categories – a local requirement can be stipulated solely in relation to the energy/CO2 emissions standard and/or water standard in an identified level of the Code.’

Accordingly, district-wide carbon reduction targets are discouraged by the latest PPS for consultation, as it is seen that Building Regulations will set minimum (and challenging) carbon reduction targets. However, setting planning policy targets for additional CO2 savings or a minimum contribution from renewable or low carbon technologies would add to the complexity of the planning and development control process, with potentially little impact on resultant CO2 emissions or generating capacity. Furthermore, planning policy targets of this nature would only have a short term impact, as they would effectively be superseded by the Building Regulations zero carbon requirement from 2016 onwards for homes and 2019 for other types of building.

The emerging PPS does allow the use of district-wide Code for Sustainable Homes or BREEAM targets where these can be shown to be viable for delivery across the district. As shown in the cost analysis above, Code Level 4 is generally achievable without significant cost, but Code Level 5 and 6 are more difficult due to the costs associated with meeting the water targets. A bespoke evidence base for the full range of sustainability aspects would have to be developed to support a district-wide Code or BREEAM target in Lewes, which is outside of the scope of this study.

Site-Specific Targets

The current Supplement to PPS1 on Climate Change encourages Local Authorities to set higher carbon reduction targets for strategic sites where there is a significant opportunity to achieve additional reductions:

‘...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’.

The emerging PPS reinforces this need stating that:

‘Local requirements for decentralised energy should be set out in a development plan document (DPD) and be derived from an assessment of local opportunities. Local requirements for decentralised energy should:

i. relate to identified development areas or specific sites;

ii. be consistent with giving priority to energy efficiency measures; and,

iii. focus on opportunities at a scale which developers would not be able to realise on their own in relation to specific developments.

Local requirements should be consistent with national policy on ‘allowable solutions’ set out in support of the zero carbon homes and buildings policy.'
If a local requirement is set out as a target for the use of decentralised energy in new development the target should be expressed as either:

- the percentage reduction in CO₂ emissions to be achieved. In doing so, local planning authorities should set out how the target relates to standards for CO₂ emissions set by Building Regulations; or,
- an amount of expected energy generation expressed in KWh.

Lewes District Council is not yet at a stage where specific development sites have been decided, and hence no strategic sites have been tested for their ability to exceed emissions targets associated with Building Regulations. The typologies in the previous section provide the Council with an indication as to what extent different development types can achieve carbon reductions and at what cost. The Council should use these typologies, along with the Energy Opportunities Map and delivery criteria described in Chapter 7 to identify sites where higher targets could be investigated.

Supporting and Facilitating Carbon Reduction Opportunities

Post 2016, allowable solutions will place emphasis on local authorities to identify and support delivery of community scale solutions. It may therefore be more productive for planning to begin to focus on identifying and delivering community scale energy opportunities which go beyond site boundaries, and obtaining an appropriate financial or delivery contribution from developers towards this. These opportunities do not need to be delivered in association with new development, although the two are not mutually exclusive. Large cost savings can often be made by planning in low carbon and renewable infrastructure at the start of the design process.

This approach could also reduce the burden on developers at a later date, when the zero carbon requirement is introduced, since coordination of community and large-scale renewable and low carbon energy opportunities would enable them to access a broader range of allowable solutions for Building Regulations compliance.

From our modelling of the likely selection of energy strategies by developers, we can expect the CO₂ reductions in Lewes District that will need to be met through allowable solutions to be equivalent to those shown in the table below. Potentially, allowable solutions or a local carbon buyout fund will be charged at £10/tonne, resulting in significant availability of funding. A recent speech by Rt Hon John Denham suggests that an annual pot of £1bn will result from the zero carbon homes policy by 2020.

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂ reduction portion from allowable solutions (tonnes)</td>
<td>0</td>
<td>0</td>
<td>456</td>
<td>1,896</td>
<td>3,225</td>
</tr>
<tr>
<td>Equivalent annual funding arising from allowable solutions (£)</td>
<td>0</td>
<td>0</td>
<td>45,600</td>
<td>189,600</td>
<td>322,500</td>
</tr>
</tbody>
</table>

District Heating Opportunity Areas

The PPS1 Supplement allows local authorities to “set specific requirements to facilitate connection” in order to secure energy from low carbon or renewable sources. The consultation on new PPS1 reinforces this, stating that local authorities should “set out any opportunities for district heating (to supply existing buildings and/or new development) identified through heat mapping will be supported.” District heating in Lewes District should

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88 Impact Assessment of the Zero Carbon Homes Consultation, CLG, December 2008
89 The Green Councils of the Future, 26th November 2009
be concentrated in areas where opportunities are the greatest, as identified on the Energy Opportunities Map and encouraged through policy in development plan documents for sites.

Should development come forward prior to a district heating network being in place, developers can be required to provide an energy centre to deliver temporary supply. Where appropriate, applicants can be required to provide land, buildings and/or equipment for an energy centre to serve proposed or multiple developments. 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 development. It is expected that requirements will be discussed in pre-application discussions and will be included as part of a planning condition. The common standards and requirements for future-proofing should form part of strategic heat planning guidance as set out in relevant AAPs and Development Briefs. In order to provide additional certainty to the installation of district heating networks it is recommended that Local Development Orders are defined for areas where district heating is applicable.

The advantage of this approach is that it provides a solution for CO₂ reductions for developments where local constraints make it difficult or financially unviable to achieve targets with on-site microgeneration technologies. It also secures the heat load for district heating systems and the guaranteed customer base can be used to underwrite project finance.

Policies relating to district heating will generally only be relevant to new development, although the Council can connect their own properties and give other developments the opportunity to connect. 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. District heating infrastructure also requires long-term investment to maintain the network over a period of at least 25 years. District heating networks of the scale identified in the Energy Opportunities Map, for example along the coastal strip, would not be deliverable through individual developments or planning applications. A strategic approach will be necessary to successfully manage and coordinate delivery, potentially requiring the involvement of many bodies and structures across both the new build and existing sectors. It is the role of the local authority to strategically drive for the delivery of schemes by providing the necessary support and coordination to the relevant parties.

Arrangements for connection to existing energy networks can be complex and involve a number of parties. This can result in delays to planning programmes and 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.

Wind Energy Opportunity Areas

Where it is feasible, wind energy can be an extremely cost-effective method of delivering carbon savings and therefore, every available opportunity for wind energy should be taken advantage of. However, the Energy Opportunities Map has shown that commercial opportunities for turbines are likely only to be limited. The Council could expect developers within these areas to consider wind energy as their first option for meeting CO₂ targets and be expected to demonstrate that they have fully considered the potential to deliver CO₂ reductions using on-site wind energy generation.

Influencing Site Design

Passive design is a simple, cost-effective and resource-minimal approach to energy saving, and should be supported and tested through the planning process. Passive approaches to sustainable design can include:

- Improvements to fabric (such as increased insulation) and improvement of air tightness.
- Building orientation - main orientation of the building should be within 30° of south.
- Window design - double or triple-glazed south-facing windows allow infrared radiation to pass through. Smaller north facing windows minimise heat loss.
- Shading devices (e.g. external louvres, shutters, or overshadowing from balconies).
- Green roofs and walls.
- Interior decoration - the use of pale colours on walls and ceilings can reduce the need for artificial lighting.
- Thermal mass – this can help control temperatures by acting as a buffer to the temperature variations through the day, by absorbing heat as temperatures rise and release heat as temperatures fall. The addition of phase change materials to walls and floors in both existing and new buildings can add thermal mass.
- Trombe walls – this is a natural design feature which moves air warmed by free solar heat into a space using convection
- Light tubes - channel sunlight from an outside roof or wall into a room during the day

Effective design can reduce overheating and provide beneficial solar gains during the winter months. Applying the principles of passive design need not add to the cost of development or running costs and can reduce energy use and CO₂ emissions, as well as having positive health and aesthetic benefits. Incorporation of some of these measures can also contribute towards credits in the Code or BREEAM.

Table 30: Possible energy savings from passive solar design

<table>
<thead>
<tr>
<th>Design feature</th>
<th>% energy saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Conventionally’ planned houses orientated north/south</td>
<td>1-3%</td>
</tr>
<tr>
<td>Estate layouts designed to minimise shading from obstructions to solar gain</td>
<td>2-4%</td>
</tr>
<tr>
<td>Glazing biased towards south (for the conventionally planned houses)</td>
<td>3-4%</td>
</tr>
<tr>
<td>Houses designed internally so that most principal rooms face south</td>
<td>1-2%</td>
</tr>
</tbody>
</table>

Figure 63: Brise soleil on Victoria Gate in Woking helps to prevent excess solar gain, and can reduce energy costs in office buildings by up to 10%.

6.3 BUILDING ON LOCAL RESOURCES AND ENTHUSIASM

Lewes represents a unique district with more community support and involvement than is found in most other areas in the UK. Transition Town Lewes is part of a larger community of transition towns, which aim to respond to climate change and peak oil challenges. TTL’s movement developing an action plan, Pathway to a Positive Future, to increase the community’s resilience in the face of rising oil prices. The organisation is always pushing for increased community participation.

One of the major contributions to the Lewes District's continued interest in sustainability was the creation of the Ouse Valley Energy Services Company (OVESCo). OVESCo is a not-for-profit company created for community benefit to: provide energy advice and grants for insulation and heating; grants for renewable heat and electricity in homes; provide a feed-in tariff, which is currently 41.3p per kWh; and seek out potential industrial scale alternative energy generation in the region.

There are a number of other organisations building on Lewes District's continued interest in sustainability. Some of these community groups include: Coastal Climates Communities Interest Company, Ringmer Community College, Plumpton Going Green, Rodmell Sustainability Group, Low Carbon Ringmer, Action in Rural Sussex, and Coastal Climates CIC. All of these organisations demonstrate local enthusiasm for renewable energy initiatives and support overall reduction in carbon emissions.

The community support has meant that many Council spawned renewable energy initiatives have been met with enthusiasm and resulted in synergistic relationships formed in the delivery of these programs. Corporate actions that have supported this process include: Environmental Management system, which was responsible for award winning projects. Some of these projects are: ‘Action in Renewables’ Sustainability Checklist, which encourages low carbon design and the District’s ongoing educational initiatives. The Council has also been implementing an ambitious program to reduce carbon emissions 10% in 2010 under the 10:10 global campaign. As a forward thinking green Council, Lewes has benefitted from its strong relationships with its many community partners.

6.4 TAKING ADVANTAGE OF CHANGE

While new development rates in Lewes District are expected to be relatively low, there are other changes expected due to new infrastructure or regeneration that could be taken advantage of.

6.4.1 NEW INFRASTRUCTURE

Lewes District is likely to accommodate some large pieces of new infrastructure in the coming years which could help deliver low carbon communities.

**Newhaven Energy from Waste Plant**

An Energy from Waste plant is currently under construction in Newhaven, and is likely to be delivered in 2011. The plant sources waste from the wider sub-region, including Brighton and Hove. It is understood that the plant will produce electricity from the biogas sourced from waste, but there are no plans to capture waste heat and distribute it for use locally. To enable the use of heat, a district heating system would have to be delivered in surrounding areas. While the opportunity has passed to influence the planning application directly, the Council should work with the owners of the plant, Veolia, to explore options to integrate the plant with wider energy systems.

**Peacehaven Wastewater Treatment Plant**

There is also a wastewater treatment plant currently being constructed at Peacehaven. The plant will produce small amounts of biogas from anaerobic digestion processes associated with sludge treatment, and it is understood that energy will be generated to offset a quarter of the plant’s energy demand using a Combined, Heat and Power (CHP) system. The Council should work with the plant owners and constructors to explore if there are any opportunities to increase the capacity of the CHP unit (supplementing fuel supply with natural gas) to generate larger amounts of decentralised energy and distribute heat to a district heating network in Peacehaven.

**Offshore Wind Infrastructure**

The proposed offshore wind farm off the coast of Newhaven (known as Hastings Bank) means that electricity distribution infrastructure on the mainland is likely to need upgrading. The upgraded infrastructure will be able to hold higher capacities and cope with the intermittent generation of wind energy. Building in this resilience to local infrastructure will ensure that other local large-scale renewable projects are likely to be feasible (whereas this cannot otherwise be a constraint). As identified in Chapter 4, there is an opportunity to integrate a large-scale wind turbine in
Newhaven port. The possibility of having the presence of industry and expertise in the Newhaven area to support the delivery of the offshore wind farm would be an excellent opportunity to use those resources to also deliver on-shore opportunities.

6.4.2 REGENERATION

The Council is currently developing a regeneration strategy for Newhaven. As part of the regeneration plans there are likely to be improvements to public realm, buildings and a maintained or increased use of the Port. There is also an emerging vision for a significant number of new homes and employment floorspace. Regeneration of the area provides a delivery opportunity to implement a number of actions to seek carbon reductions and respond to the challenges of climate change.

Firstly, renewable energy could be a key focus for regeneration and economic aims. There may be an opportunity to attract low carbon industries and create an economic hub in Newhaven, building on support services to the offshore wind farms. The installation of a large-scale wind turbine at the Port could be a unique opportunity to deliver large renewable electricity generation in a relatively unconstrained area of Lewes District. This would also create a local icon that makes a statement about the area’s commitment to tackling climate change. Experimental tidal energy installations could also be installed at Newhaven.

Changes to public realm and buildings in the area, along with new development also provide the opportunity to create low carbon systems and buildings and make the area more resilient to climate change. The introduction of adaptation features, including green infrastructure and sustainable drainage systems, should be supported. Building standards should also be advanced where viable. There may also be an opportunity to retrofit district heating infrastructure to the area during public realm improvements.

6.5 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

- Expected changes in Building Regulations will significantly decrease CO₂ emissions from new development, therefore removing some emphasis in this role from planning authorities;
- The changes to Building Regulations are likely to create demand for 'Allowable Solutions' which involve the development of solutions outside of the site boundary that can further reduce CO₂ emissions associated with new development. LPAs are likely to need to play a role in coordinating and delivering Allowable Solutions;
- The Code for Sustainable Homes and BREEAM are national and independent assessment tools which can be utilised to appraise sustainable design and construction in new development. The energy sections of these tools can be utilised as a policy tool. The Code and BREEAM also require other sustainability aspects to be addressed. The costs associated with other aspects are considered reasonable in relation to the overall build cost for levels up to and including Code for Sustainable Homes Level 4 and BREEAM 'Very Good'.
- Development scenarios have been developed that demonstrate the potential and cost of implementing carbon reduction opportunities in new development in Lewes District. These should be utilised to explore options and set higher targets, where possible, for strategic sites.
- Growth plans for the area should consider where new development can deliver the greatest carbon reduction opportunities, using the Energy Opportunity Map.
- Lewes District has a unique mix of community forums and local companies that can help push forward the climate change agenda. The Council can assist in coordinating and channelling enthusiasm and resources.
- The delivery of new infrastructure – the energy from waste, wastewater treatment plant and upgraded electricity distribution infrastructure provides an opportunity to drive wider decentralised energy systems.
- Regeneration in Newhaven is an excellent opportunity to implement carbon reduction and adaptation measures.
7. Delivery Context – Delivery Mechanisms and Partners

7.1 INTRODUCTION

Along with planning policy, targets provide a useful mechanism for articulating 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, key local delivery players including OVESCO and Transition Town Lewes, 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; and
- Recommended next steps.

This chapter describes the mechanisms available to Lewes District Council, to deliver the principal opportunities for decentralised renewable and low carbon energy opportunities identified on the energy opportunities map (EOM). These mechanisms should be considered in addition to the planning policy recommendations. It is not intended to be an exhaustive list, nor does it reach definitive conclusions about which mechanisms are most suited to Lewes District. 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 Lewes District will require a more detailed study involving discussions across the Council and with partners.

The figure below sets out some of the mechanisms and partners required to deliver change in Lewes District. Both refer to the three types of energy opportunity identified in this study: existing development; new development; and strategic community-wide interventions. Each uses the EOM 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. Substantial funding contributions 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 Lewes District to act on the recommendations set out in this section and to roll out area based programmes. AECOM is an accredited consultant and is able to explore this process further with Lewes District Council and Partners.

The figure below gives an overview of the range of delivery mechanisms and the key delivery partners in Lewes District.
7.2 EXISTING DEVELOPMENT

Delivering Energy Efficiency in Existing Buildings

Our estimations of the likely change in performance of existing buildings in chapter 3 show the differences between a ‘business as usual’ scenario, where energy efficiency measures continue to be encouraged on a national scale with existing local authority initiatives, and a ‘higher reduction’ situation where further steps are taken to maximise energy efficiency. The CO₂ savings that can be achieved through improvements to existing buildings are substantial and this should be a priority across Lewes District. However, a concentrated funding and improvement programme would have to be introduced to trigger the completion of higher cost elements of retrofit. The Council could also play a strong role in working with partner organisations to conduct wider retrofit works on existing buildings by distributing and focusing funding.

This study shows certain areas in the District as having higher heating demand per home than others, particularly in the more rural areas, 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. Home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement should be heavily promoted across the District. In rural areas that are reliant on other fuels such as oil burners, there is an opportunity to promote the use of low carbon fuels such as biomass.
Delivering On-Site Renewable and Low Carbon Energy Technologies

Delivery of low carbon and renewable technologies within existing buildings and communities cannot easily be required by planning, but can be encouraged by the Council. Lewes District Council, partnered with OVESCO, have already seen substantial success in retrofitting existing homes with micro-generation technologies. To carry on this success, the Council should seek to engage communities and highlight the cost-saving benefits of the introduction of micro-generation, especially with the introduction of the feed-in-tariff93. There are also other funding sources available to homeowners and businesses to assist with the capital cost of installation.

The Council and partners have also set an example by supporting the installation of example micro-generation technologies in schools and community buildings. Further initiatives could be taken through pro-active community education and leadership of the Council by installing significant installations on their own buildings. Lewes District Council owns and manages a high proportion of buildings and facilities in Lewes District, and therefore there is good potential to lead by example.

The presence of the South Downs National Park and Conservation Areas in the District means that the Council could play a strong role in guiding appropriate types and location of micro-generation in the area. A guidance document should be produced that indicates what types of micro-generation are favoured in Conservation Areas (such as less visible elements like heat pumps, biomass boilers) and how technologies should be designed in without adversely affecting the character of the area.

Delivering Adaptation Measures for Existing Buildings

Similar to integration of low carbon infrastructure, the Council can play a supportive (but indirect) role in improving existing buildings to make them more resilient to the effects of climate change. A Supplementary Planning Document (SPD), or an advice leaflet/document on locally appropriate and necessary adaptation measures in buildings, could be developed to make communities aware of the needs and opportunities to retrofit their homes. Flood resilience is a particular issue for the area, and the Council should work with community groups and consider forming a focus group that will raise awareness and implement a climate change adaptation strategy. Funding options for adaptation measures are less prevalent at the moment, but are expected to come forward as soon as the focus on resilience increases.

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.

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 on Target (CERT), the Big Lottery Fund, the Energy Saving Trust and Low Carbon Communities Challenge. Further details are contained in Appendix A.

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 and energy efficiency improvements. The initiative could be financed using a combination of SALIX and Community Energy Savings Programme (CESP) and could be co-ordinated through the Council and/or OVESCO, 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 to be sold on at a discount to households and businesses.

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93 Active from 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).
- **Householder or business hire purchase** — appropriate technologies could be leased to households 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.

### Table 31: Delivery options for existing development

<table>
<thead>
<tr>
<th>Options</th>
<th>Potential Partners</th>
<th>Potential Delivery Mechanisms</th>
</tr>
</thead>
</table>
| Increased energy efficiency | - Lewes District Council  
- OVESCO  
- Energy companies  
- Community groups  
- Private installation companies | - 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  
- Sali x Finance  
- Warm Front  
- Carbon Emissions Reduction Target  
- Big Lottery Fund  
- Energy Saving Trust  
- Low Carbon Communities Challenge |
| Increased microgeneration |                                                                                  |                                                                                                 |
| Adaptation measures      |                                                                                  |                                                                                                 |

### 7.3 NEW DEVELOPMENT

**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 Lewes District Council is therefore limited beyond specifying more stringent policy or targets to achieve this.

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 is a further option.

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 a Community Infrastructure Levy (CIL) or similar. The CIL was enacted in April 2010. Since then, a new Government has come into power and have indicated that they intend to take forward a similar system, possibly in the form of a tariff. Unlike Section 106 contributions, money raised through the CIL can be used to support the development of an area rather than to support the specific development for which planning permission is sought. Therefore, contributions collected through CIL from development in one part of the charging authority can be spent anywhere in that authority area. This flexibility will enable the Council, as the ‘charging’ authority, to fund energy infrastructure identified in the energy opportunities map.

It is our understanding that currently 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’ (see below). Although CIL is an optional charge for local authorities we would recommend adopting it in Lewes District 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.

**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 expected from Government, but previous 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 is likely to be of most interest to Lewes District, since it has some 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 developments around Lewes Town or along the south coast could potentially be anchor developments for a district heating solution linking new development to existing residential and commercial heat users. In selecting development sites and options for growth, the Council should consider the potential for new development to achieve both on-site and off-site carbon reductions through development of district heating networks. This is discussed further below; however, 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. The EOM at figure 8.3.2 shows the location of the SHLAA sites identified in relation to feasible district heating area and should be used to assist the Council in identifying the location and phasing of district heating.

Similarly, there are some (though limited) wind and micro-hydro opportunities that exist and can be related to new development. In locations not prioritised by the Council for district heating, developers could be required to pay for or contribute (through allowable solutions or a CIL/tariff) towards a large or small wind turbine or a micro-hydro scheme off-site in one of the opportunity areas. Further work will need to be undertaken to establish the extent of the opportunity for both wind and micro-hydro projects, considering issues such as land ownership. Alternatively, if no tariff or carbon reduction fund is in place, a Merchant Wind arrangement could be entered into between the developer and energy company.

Modelling in Chapter 6 showed that there could be around £300,000 of funding arising from ‘allowable solutions’ by 2026. It should be noted that at this scale of contribution will only offset CO2 increases from new development. The Council will need to consider these opportunities alongside those for the existing stock and strategic community-wide interventions. Lewes District Council should develop a plan to deliver allowable solutions in the Council area, to ensure funding available from new development is directed towards the best solutions in a coordinated manner.
Requirements for Resilient Development

In flood risk areas and areas prone to the urban heat island effect, adaptation measures should be encouraged and required where possible through planning. Integration of SUDS into new development is likely to be required by 2011 under the Flood and Water Management Bill, and this should be complemented by encouragement of flood resilient buildings and sensible location of development following the Sequential Test set out in PPS25. New development should be utilised where possible to drive the introduction of green infrastructure networks and projects, tying in with a wider green infrastructure strategy for the area.

Application of higher energy or sustainability targets

Planning policy can enforce higher carbon reduction targets than building regulations on either a district-wide level or a site-by-site basis. Currently, the changes to building regulations are expected to come into force, meaning that accelerated targets are most useful prior to 2016. The emerging PPS on low carbon planning suggests that district-wide carbon reduction targets in excess of building regulations can be set for the interim before 2016 where viable. It also encourages the setting of site-specific targets where there is significant potential for a site to exceed building regulation requirements.

A ‘carbon buyout fund’ (operated through CIL or other tariff mechanism) offers a useful way of providing continuity in delivery mechanisms between proposed planning policies requiring energy performance standards a head of Building Regulations prior to 2016 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 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.

Table 32: Delivery options for new development

<table>
<thead>
<tr>
<th>Options</th>
<th>Potential Partners</th>
<th>Potential Delivery Mechanisms</th>
</tr>
</thead>
</table>
| Higher energy and sustainability standards | • Lewes District Council  
• OVESCO  
• Energy companies  
• Community groups  
• Private installation companies  
• Homes and Communities Agency | • Conditions attached to local authority owned land sales  
• Community Infrastructure Levy or local carbon buyout fund  
• ‘Allowable solutions’ or off-site opportunities  
• Local delivery vehicle (company, partnership or joint venture)  
• Salix Finance  
• Low Carbon Communities Challenge  
• Merchant wind  
• Green Infrastructure Projects |
| Wind energy                     | • Lewes District Council                                |                                                            |
| Micro-hydro energy              | • OVESCO                                                |                                                            |
| District heating networks       | • Lewes District Council                                |                                                            |
| Adaptation Measures             | • OVESCO                                                |                                                            |
7.4 STRATEGIC COMMUNITY-WIDE INTERVENTIONS

The principle stand alone renewable and low carbon infrastructure opportunities in Lewes District come from large and medium scale wind turbines, micro-hydro and district heating networks to provide community heat from biomass or gas (preferably with CHP to provide electricity as well). 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 CO$_2$ 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 infrastructure. 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 energy and low carbon, where it does not 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; and
- Providing policies designed to support delivery mechanisms, such as a requirement for new development to connect to a district heating network.

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:

- Development of stand-alone wind power is a possibility in some areas of Lewes District, including Newhaven Port and some rural areas (with preference to those outside the National Park). The Council should seek to positively support development of wind energy. However, as a broad rule of thumb commercial wind developers are interested in opportunities of above 5MW. Since most of Lewes District's opportunities will be for smaller scale or individual turbines, they are unlikely to be attractive to commercial developers. The Council or community groups will therefore have an important role to play in bringing sites forward, potentially through a Merchant Wind arrangement, where power is sold on a short-term contract basis.

- As with new development, the zero carbon building policy’s proposed allowable solutions will place emphasis on the Council to identify and support delivery of strategic and community scale solutions. There is potentially, therefore, an opportunity to use delivery of energy opportunities across Lewes District 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 brake on development.
Table 33: Delivery options for strategic community-wide market interventions

<table>
<thead>
<tr>
<th>Options</th>
<th>Potential Partners</th>
<th>Potential Delivery Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind energy</td>
<td>• Lewes District Council</td>
<td>• Community Infrastructure Levy or local carbon buyout fund</td>
</tr>
<tr>
<td></td>
<td>• OVESCo</td>
<td>• ‘Allowable solutions’ or off-site opportunities</td>
</tr>
<tr>
<td></td>
<td>• Regional and sub-regional bodies</td>
<td>• Local delivery vehicle (company, partnership or joint venture)</td>
</tr>
<tr>
<td></td>
<td>• Energy companies</td>
<td>• Merchant wind</td>
</tr>
<tr>
<td></td>
<td>• Homes and Communities Agency</td>
<td>• Region-wide development and coordination of biomass supply chains</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Renewable Obligation Certificates and feed-in-tariff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New housing or domestic development</td>
</tr>
<tr>
<td>Micro-hydro energy</td>
<td>• Lewes District Council</td>
<td>• Community Infrastructure Levy or local carbon buyout fund</td>
</tr>
<tr>
<td></td>
<td>• OVESCo</td>
<td>• ‘Allowable solutions’ or off-site opportunities</td>
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<td></td>
<td>• Energy companies</td>
<td>• Merchant wind</td>
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<tr>
<td></td>
<td>• Homes and Communities Agency</td>
<td>• Region-wide development and coordination of biomass supply chains</td>
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<td></td>
<td>• Renewable Obligation Certificates and feed-in-tariff</td>
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<td></td>
<td></td>
<td>• New housing or domestic development</td>
</tr>
<tr>
<td>Biomass supply chain</td>
<td>• Lewes District Council</td>
<td>• Community Infrastructure Levy or local carbon buyout fund</td>
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<td></td>
<td>• OVESCo</td>
<td>• ‘Allowable solutions’ or off-site opportunities</td>
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<tr>
<td></td>
<td></td>
<td>• Renewable Obligation Certificates and feed-in-tariff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New housing or domestic development</td>
</tr>
</tbody>
</table>

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 large developments, 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 developments, areas of multiple land ownership and other infrastructure such as roads, rivers or rail lines 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 meaning that 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. The same is the case for micro-hydro schemes, where large market developers are unlikely to be interested.

Where market delivery isn’t forthcoming Lewes District Council can lead delivery of energy infrastructure, potentially with support from OVESCo or other ESCOs, the 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 nature of the District’s communities. The Transition Town movement in Lewes Town has attracted a lot of community involvement, and that forum could be utilised to form active community groups that could deliver opportunities.

Medium and large scale wind

Few wind opportunity areas identified in the EOM are likely to be attractive to commercial developers. Project finance options include the issuing of bonds to residents and businesses. Returns on investments would be based on energy sales, ROCs and the feed-in-tariff. Further community incentives could include discounts on Council tax. These kinds of delivery approaches will be challenging. Therefore, to ensure sufficient expertise and resource is devoted to making local authority-led delivery initiative a success it is recommended that a local authority-led delivery vehicle, such as an ESCo, partnership or joint venture, be considered. The types of ESCo are discussed in more detail below. Lewes District is fortunate to have a local and very active ESCo in place, OVESCo, who have been working with the Council
on micro-generation projects over the last few years. However, OVESCO is currently a relatively small company and are likely to need additional support to deliver a large-scale project.

Some existing primary and secondary schools sit within or close to wind opportunity areas. Where this is the case, new school buildings and refurbishments to those existing provide an opportunity to take advantage of this resource. Where school focused communities are identified, through further work, community-led delivery could provide an alternative to local authority-led delivery.

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 raising a awareness of the potential for community ownership. Community ownership or investment could bring particular benefits for delivering more controversial schemes; large wind being an obvious example in such a heavily constrained district.

For all potential wind sites the Council and its partners should identify delivery opportunities, considering available financial mechanisms, publicly owned land, community involvement and ownership and the role of schools.

Micro-Hydro Schemes

As identified in the previous chapters, Lewes District has a number of possible micro-hydro sites. There are also a number of existing mills which could incorporate hydro-schemes. OVESCO has actively identified mill sites and is working with mill owners. Micro-hydro is an energy opportunity which is particularly suitable for delivery through OVESCO or community groups.

District heating with CHP

There are major opportunities in Lewes town and the urban areas along the south coast for the introduction of heating networks. 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** – 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. It is unknown whether this will be taken forward by the new government but 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. An initial district heating network could be installed...**
to connect existing council facilities, where new and existing development later connects. This model has been used successfully implemented by the Council in Working. Council-owned properties have been identified in the heat maps of Lewes Town and the southern coast in Chapter 4.

- **Planning** - the PPS1 Supplement presents opportunities at the local level in the form of a Local Development Order (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.

- **Phasing** – installing a district heating network is a major capital investment. The cost depends on the number of buildings to be connected, how close they are and how much heat they require. In order to minimise risk, a general strategy for developing a scheme would be to secure a large anchor load within close proximity to the generating plant. Existing anchor loads are identified on the energy opportunities map. Further work will need to prioritise sites based on the following suggested considerations:
  
  o Opportunities for incremental delivery, such as by requiring pipes to be installed when roads are being dug up. Newhaven is an area with high heat density and plans for regeneration in the town. Where regeneration plans involve redevelopment or public realm improvements it would make sense to designate such areas as a district heating priority area.
  
  o There are no major road redevelopment proposals, but there are strategic road corridors that run through Lewes town and also along the coastal towns which would be key corridors for heat mains. These are likely to require strategic interventions to ensure opportunities are not lost.
  
  o Phasing of and opportunities from major new development sites. Sites that include new anchor loads as part of the development will make ideal candidates to drive district heating network delivery.
  
  o Opportunities for connecting existing anchor loads. For example, the existing hospital, and clusters of heat users such as the already recognised proximity of a school and leisure centre at Mountfield Road.
  
  o Opportunities for connecting heat generators and energy infrastructure. The proposed wastewater treatment plant at Peacehaven and the energy from waste plant at Newhaven both propose to use energy generation infrastructure (CHP and electricity generation respectively). These could be connected into a wider heat network to capture waste process heat.
  
  o Areas of homes and other buildings that are difficult to treat, such as those with solid walls (a significant proportion) or conservation areas.

- **Type of development** – the following criteria should be applied to detailed assessments:
  
  o Large scale mixed use development (at least 500 homes and 10,000m² non-domestic) to enable a good anchor load.
  
  o Proximity to high heat density areas with gas grid to enable extension into existing development.
  
  o Proximity to existing fuel sources (e.g. waste heat, managed woodland, waste treatment site) to enable easy access to renewable fuel sources.
  
  o Proximity to good transport links to enable solid fuel delivery.
  
  o Proximity to sources of waste heat (e.g. industrial processes) to enable zero carbon energy sources.
Creating a biomass supply chain

There are opportunities to establish a biomass supply chain, coordinating both for forestry and agricultural waste and growth of bio-crops locally. The limited supply of biomass within Lewes District means that the Council will need to explore sub-region or region-wide opportunities with partners in neighbouring rural authorities. Biomass sources will need to be identified and coordinated, so that biomass can be transported to a local processing site which could also act as a supply outlet to provide biomass fuel to local residents and businesses. The evidence base has established that it is likely that there is a substantial biomass potential from management of local forests and trees, along with good conditions to grow local bio-crops. The market is unlikely to develop a supply chain alone, and hence there is an opportunity for the Council, community groups or a local ESCo to take a leading role. Possible partners include the Forestry Commission and the local Woodland Enterprise Centre.

Delivering Wider Adaptation Measures

The Council has an opportunity to implement climate change adaptation measures on a district-wide scale. We recommend that these measures are developed and prioritised through a Climate Change Adaptation Strategy. This should be strongly linked with a green infrastructure and flood management strategy but also seek to understand local vulnerability issues associated with communities and infrastructure. The evidence base in this report has begun to identify issues and opportunities but this need to be taken forward into a full strategy where delivery partners are identified. Studies of Lewes District have identified the need for a flood storage area to the south of Lewes Town. This could be delivered as a key green infrastructure project, partnering with local environmental bodies such as Natural England and Defra.

*Table 34: Delivery options for strategic community-wide interventions*

<table>
<thead>
<tr>
<th>Options</th>
<th>Potential Partners</th>
<th>Potential Delivery Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind energy</td>
<td>• Lewes District Council • OVESCO • Transition Town Lewes • Regional and sub-regional bodies • Energy companies • Homes and Communities Agency • Partnerships for Renewables • NHS • Developers • Community groups • Forestry Commission • Woodland Enterprise Centre • Natural England • Defra</td>
<td>• Community Infrastructure Levy or local carbon buyout 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 • Climate Change Adaptation Strategy • Green Infrastructure Strategies • Flood Management Strategies</td>
</tr>
</tbody>
</table>
7.5 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.

In addition to the Lewes District Sustainable Community Strategy, the emerging Local Development Framework (LDF) for Lewes District will be of high importance for setting out the requirements for coordinated delivery of low carbon and renewable energy projects at the local level.

There is a lot of knowledge and enthusiasm in the District already to build on, particularly found around the Transition Town Lewes movement and the activities of OVESCo. The Council can take a key role in allocating priorities and working with other groups to deliver projects. The Council itself should consider options for setting up a local authority delivery vehicle. The skills needed to do 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. A partnership with OVESCo is a particular opportunity, building from the current arrangement for coordination of funding for micro-generation in homes, to explore wider energy opportunities.

<table>
<thead>
<tr>
<th>Table 35: Advantages and disadvantages of ESCo/delivery vehicle models</th>
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</thead>
<tbody>
<tr>
<td><strong>Private Sector Led ESCo</strong></td>
</tr>
<tr>
<td><strong>Advantages</strong></td>
</tr>
<tr>
<td>- Private sector capital</td>
</tr>
<tr>
<td>- Transfer of risk</td>
</tr>
<tr>
<td>- Commercial and technical expertise</td>
</tr>
<tr>
<td>- Lower interest rates on available capital can be secured through Prudential Borrowing</td>
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<tr>
<td>- Transfer of risk on a District heating network through construction contracts</td>
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<tr>
<td>- More control over strategic direction</td>
</tr>
<tr>
<td>- No profit needed</td>
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<tr>
<td>- Incremental expansion more likely</td>
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<tr>
<td>- High set-up costs</td>
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<tr>
<td><strong>Disadvantages</strong></td>
</tr>
<tr>
<td>- Loss of control</td>
</tr>
<tr>
<td>- Most profit retained by private sector</td>
</tr>
<tr>
<td>- Incremental expansion more difficult</td>
</tr>
<tr>
<td>- High set-up costs</td>
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7.6 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. Alongside the opportunities for a local delivery vehicle are shorter-term Local Area Agreements (LAA) and National Indicators.

The Renewable Energy Strategy (Department of Energy & Climate Change) 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.
- **NI 188** – Climate change adaptation – measuring the council’s progress towards realising local vulnerabilities and developing an action plan.
7.7 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 Lewes District and a mix is likely to 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 Lewes Council explores further the potential for using the Carbon Trust - Low Carbon Building Strategic Design Advice money to undertake the following next steps:

**Leadership and skills**

- The Council must take strategic leadership role and work with local community groups and OVESC o to ensure the necessary political and stakeholder buy-in.

- 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 on key development sites, council and public sector property and assets. Oversize energy generation should be considered on new development sites and in public sector and council owned schemes to supply excess heat/energy to surrounding areas.

- The Council should work with the other parties in the sub-region to develop opportunities for hydropower, larger wind energy and biomass energy.

- Initiatives in energy efficiency priority areas should focus on home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement. In rural areas (off the gas grid), a fuel switch to biomass should be promoted and facilitated.

- The Council should work with OVESCo and other partners to continue a micro-generation retrofit strategy. The Council should develop guidance on appropriate design strategies for conservation areas.

- A set of priority district heating 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, phasing and type of development. Options for designation as a district heating priority area include:
  - Lewes Town Centre, perhaps beginning with the Mountfield Road scheme;
  - The South Coast Urban area is as, perhaps beginning with a heat network around the proposed energy from waste scheme (capturing waste heat), and focusing on Newhaven and Peacehaven where heat demands are higher (than Seaford). Regeneration of Newhaven may also provide an opportunity to retrofit a district heating scheme.

- Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of establishing a LDO in order to add certainty to the development process and potentially speed up delivery.

- For all potential wind sites the Council and its partners should identify delivery opportunities, considering available financial mechanisms, publicly owned land, community involvement and ownership and the role of schools. Newhaven port is a particular opportunity which should be explored in tandem with regeneration plans.

- Opportunities for biomass, biofuels and biogas should be explored with partners in neighbouring authorities and local woodland stakeholders. The Council should facilitate the development of a biomass supply chain with other partners.

- Projects and delivery partners need to be identified for climate change adaptation measures through a Climate Change Adaptation Strategy. The council should take this forward to drive retrofit opportunities and new green infrastructure and flood resilience projects in both buildings and public realm.

- 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 Lewes District, but it will need to consider OVESCO, 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 fund coordination body that can coordinate large-scale projects, using possible contributions from CIL, allowable solutions or other funding grants. The body could take forward wind, hydro and district heating projects. A plan should be developed to ensure funding is directed towards the best solutions in a coordinated way.

- Communities are likely to play a crucial role in the delivery of energy infrastructure. Community projects could be coordinated using existing forums such as Transition Town Lewes.
8. Policy Options

The previous chapters have developed an evidence base for policy development, based on the policy, energy use and environmental context, the resource potential and delivery considerations. The section below outlines the possible policy options open to Lewes District Council to implement carbon reductions and build climate change resilience in the District. These policy options are based on the analysis within this report and the best information available at the time of writing. These policies should be developed in conjunction with the other policies that make up the Local Development Framework (LDF) and other Council policies and strategies and consider the effect of policies on the local development context to ensure that they are fit for purpose, viable and achievable.

A full suite of policy options have been set out. These can be reviewed by the Council and combined and refined as necessary. The structure of the chapter follows that of the previous; considering policies applicable to existing buildings, new development and strategic community-wide interventions. The policy options do not propose exact policy wording, as this should be developed and tested by the Council.

The diagram below outlines the relationship with the three tiers of opportunity for energy efficiency through existing, new and strategic community-wide interventions, providing a list of policy options that could be provided in relation to these opportunities.

Figure 66: Policy options for the three energy opportunities
The Energy Opportunities Map (EOM) and delivery opportunities and mechanisms set out in Chapters 6 and 7 have informed the policy proposals in this chapter. We propose that the three elements be treated together, as follows:

- The EOM is either adopted as policy and used to justify planning and other policies and actions, or included as part of a Supplementary Planning Document (SPD); and
- The recommendations form the basis of council-wide discussions on delivery.

A Climate Change SPD would give people making planning applications additional information on the measures that they can include in new development to reduce energy use and adapt to climate change.

The policy options proposed here will need to be reviewed if and when the approach to local authority delivery is agreed by the LPA and their partners. The review will need to consider:

- The nature of the local authority delivery mechanism and the role of planning policy in supporting this; and
- The extent to which existence of this mechanism influences the viability and feasibility of the policies set, and discussion around the need for more explicit criteria.

8.1 EXISTING DEVELOPMENT

The scope for planning policies to directly influence existing development is fairly limited. Therefore, it is important that the delivery opportunities identified in Chapter 7 are developed further in order to improve the energy performance and resilience of the existing building stock.

In the Lewes District context, the existing stock makes up a very significant portion of energy demand (and thus energy-related carbon emissions) over the Core Strategy period (till 2026) and some buildings are in relatively poor condition and in need of regeneration and renewal. As growth rates are low, it is less about the building of new developments and more about working with the existing stock and improvements to this stock. Section 3 gives an overview of current stock and possible improvement scenarios for the future.

Therefore, in policy terms, there is a need to give emphasis to measures that can be taken through planning to improve existing stock.

8.1.1 POLICY OPTIONS: CONSEQUENTIAL IMPROVEMENTS TO EXISTING HOMES

Policy Options Development Context

The purpose of these recommendations is to reduce CO₂ emissions from existing housing, create more resilient homes and offset any increased heated volume of a dwelling caused by extensions. The approach aims to make the most of any straightforward opportunities for improvement that exist in existing buildings. These include loft and cavity wall insulation, draught-proofing, flood-proofing, natural cooling, improved heating controls and replacement boilers.

It is inappropriate to set direct requirements to improve existing buildings when a planning application is triggered through a proposal for an extension; however, it is an opportune time to encourage building owners to think about opportunities for improvement. We recommend that policy mechanisms and planning processes are put in place to ensure these opportunities are promoted and that information is available to building owners that outlines the possibilities and associated costs. Information could be set out in an SPD or targeted brochure.

Precedent examples exist for these types of policies and supporting guidance for existing development within the Uttlesford District Council Energy Efficiency and Renewable Energy SPD (2007). This SPD includes details of policies relating to extensions and replacement dwellings. These precedent policies are listed below;
Uttlesford Guidance 2 - In relation to extensions, where a property is proposed to be extended the Council will expect cost effective energy efficiency measures to be carried out on the existing house. Applicants are asked to complete and submit a home energy assessment form and are notified of energy savings measures that the Council will require as part of the conditions of granting planning permission for the extension.

Uttlesford Guidance 3 - In the case of replacement dwellings if the replacement is bigger than the existing house then the Council will seek an "as built" dwelling emission rate 10% lower than the target emissions rate calculated to comply with Part L1A of the Building Regulations.

Uttlesford District Council has been successfully implementing these adopted policies for three years, and they have been well received by householders. Around 1,400 extensions have been affected by the policy so far, and the total projected savings from measures required as a result are £72,600 and 398,000kg of CO₂ per year. However, it should be noted that this policy has never been challenged and tested.

The Council can also ensure that micro-generation is delivered throughout Lewes District, including conservation areas, by providing design guidance as to how technologies should be incorporated on buildings/within sites in conservation areas. The guidance can demonstrate which technologies are most suitable for designated areas.

Planning Recommendation:
We recommend that the Council develop supporting policies and guidance in an SPD, or targeted brochure, that encourage improvement of existing buildings, and apply these where the planning process is triggered in extension or conversion applications. Currently, requiring improvements through policy is seen to be in conflict with national planning policy and is yet to be tested. However, the Council, especially Development Management, can play an active role by working with building owners and developers to prompt the opportunity to retrofit carbon reduction and adaptation measures. Guidance could be outlined in an SPD or guidance document.

The installation of micro-generation technologies in conservation areas should also be supported by guidance that shows how selection and placement of micro-generation technologies should be undertaken to ensure conservation priorities are not harmed.

8.2 NEW DEVELOPMENT

A range of planning policy approaches can be directed at new development. The starting point has been to propose policies that meet the following criteria: readily understandable and implementable by the Council’s Development Management teams and applicants; do not have an adverse impact on scheme viability; and maximise CO₂ reduction and decentralised renewable and low carbon energy installations.

It is important that new buildings are designed for energy efficiency and where possible should include some form of renewable energy and combined heat and power generation. This should be on site where possible, however off site solutions could be considered if benefits can be evidenced, for example, where a critical mass can be established for the needs of more than one development to be met. Often the most cost-effective options for carbon reduction can be realised when a development is considered in its wider context, and hence it is in the interest of developers and the Council to deliver wider opportunities. These are discussed further in section 7.3.

Lewes District has relatively low planned growth, and hence the scope of influence must be compared to the level of policy development and development management required when devising policy options. Lewes District Council is still in the early stages of developing its options for the Core Strategy of the LDF. Hence, there is still opportunity to influence where growth is located and to identify possible strategic sites where specific climate change policies should apply.
8.2.1 POLICY OPTIONS: ACHIEVING A REDUCTION IN CO2 EMISSIONS THROUGH NEW DEVELOPMENT

Policy Options Development Context

There is a framework through national and regional policy for the inclusion in planning policy of CO2 emissions targets and higher energy and carbon performance standards than those found in the Building Regulations. Changes to the Building Regulations for residential buildings, in 2010 and expected in 2013 and 2016, will bring in tighter standards for CO2 emissions. From 2016 it will be necessary for all new residential buildings to be built to zero carbon standards, with the equivalent standard for non-residential buildings due to be introduced in 2019.

Policy can be used to accelerate the move towards zero carbon by applying an additional carbon reduction, but we do not recommend this on a district-wide basis for Lewes District for four reasons:

- the level of new development in Lewes District is expected to be relatively low;
- the emerging PPS advises that additional targets should only be used in the interim before 2013 when increased Building Regulations come into place;
- the Core Strategy is unlikely to come into application for two years; and
- Viability testing should be applied to test local delivery of additional targets.

Considering the above factors, policy development alone is seen to be unproductive.

However, planning can encourage the location, type and phasing of new development. Lewes District Council is in a key stage of developing their LDF, and has an opportunity to ensure that plans for growth support and drive low carbon opportunities. Using the Energy Opportunity Map and other analysis conducted in this report, low carbon opportunities should be a key criterion used in the option development process for growth, as well as assessing options for growth in the Sustainability Appraisal process. This report has identified opportunities for decentralised energy systems and district heating in Lewes Town and the urban centres along the coast in particular.

Precedent examples exist for these types of policies for new development within the draft Manchester City Council Core Strategy. The Core Strategy includes details of a policy relating to reducing CO2 emissions through new development. This precedent policy is listed below;

Policy Approach En1 – Achieving a Reduction in CO2 Emissions through New Development

The City Council will seek to decouple growth in the economy and growth in CO2 emissions, through the following actions;

- All development must follow the principle of the Energy Hierarchy
- Wherever possible new development must be located and designed in a manner that allows advantage to be taken of opportunities for decentralised, low and zero carbon energy.
- Where possible new development will be used as a mechanism to help improve energy efficiency and increase decentralised, low carbon energy supplies to existing buildings.
- Where appropriate new development will be required to connect to existing or planned/potential decentralised heat and/or power schemes.

Planning Recommendation:

Through a spatial planning process, opportunities for growth and development should be prioritised where they are likely to drive low carbon solutions; by being in an opportunity area near a viable district heating network, where development sites are of a size to drive their own decentralised systems, or where clear opportunities exist to implement wind energy or support hydro developments.

Policy Option:

Efficient Design and Integration of New Development

All new development should, where possible, be located and designed in a way in which advantage can be taken of opportunities for decentralised, low and zero carbon energy.
All new development should catalyse improvements for energy efficiency and increase supplies of decentralised, low-carbon energy in existing buildings.

All new development should, where appropriate, be required to connect to existing or planned decentralised heat and/or power schemes.

**Design, Layout and Location**

Development proposals should respond to opportunities identified in the Energy Opportunities Map.

All new developments should ensure buildings are designed to be warmed by the sun, orientating buildings to maximise sunlight and daylight and using natural lighting and ventilation to reduce carbon emissions.

The council should support the design or location of buildings to enable people to get access to amenities with fewer or shorter car journeys. In addition, the council should support development which makes efficient use of land with good access to public transport to reduce travel and therefore carbon emissions.

**Approach to Policy Implementation**

Developments that have an opportunity to install or connect to decentralised energy should be identified using the Energy Opportunities Map (EOM) and the development typology analysis contained in this report. On larger sites, an energy strategy should be required outlining the ways in which development will achieve carbon reductions and investigation of a range of opportunities.

In encouraging energy efficient buildings that use the minimum amount of energy but still meet the needs of the people who are using them, wherever possible, the context of the site and its surroundings buildings should be positioned to make sure that the principal rooms face south to benefit from solar gain.

The way the buildings are laid out on the site should also take account of the wind direction. Tree and shrub planting schemes can act as windbreaks, which will ensure wind chill factor is reduced. These goals will help to ensure policy options can be met.

In addition, Lewes District Council should consider the orientation of new residential developments, to ensure energy efficiency is achieved. For example, the use of the cul-de-sac in building design is inefficient as the heating circuit is incomplete. Arranging the location of buildings in block form allows heat to flow constantly around the system. Mixed use buildings also offer good opportunities for energy efficiency as a range of uses provides a variety of heat loads.

Policy implementation can also be achieved by considering how existing areas that are to be redeveloped or enhanced can assist in meeting energy efficiency goals. Regeneration and redevelopment is proposed in Newhaven, which offers an opportunity to locate the necessary infrastructure for district heating in this location, as part of this construction, to ensure it can connect into a district heating system either immediately or in the future.

**8.2.2 POLICY OPTIONS: WIDER SUSTAINABLE CONSTRUCTION TARGETS FOR NEW DEVELOPMENT**

**Policy Options Development Context**

The PPS1 Supplement allows local authorities to require levels of building sustainability in advance of those set nationally where local circumstances warrant them. The South East area and Lewes District in particular, will be affected by climate change, with frequent winter flooding, possible heat waves, changes in the landscape as well as changes in habitats and species composition, habitat fragmentation and changes in soils, recreation and tourism and cultural heritage. This means that actions must not only be taken to reduce the impacts of climate change by reducing CO₂ emissions, but also to adapt proposed development to the effects of climate change and other environmental damage. The Code for Sustainable Homes is the voluntary Government-backed building assessment tool that covers a full range of sustainability issues including, but not restricted to, energy and CO₂ emissions.
This report includes an evidence base for the need for carbon reduction in Lewes District. The Code for Sustainable Homes requires mandatory credits for energy and water, and hence, these are the most inflexible items that are directly tied to the Code Level specified. There is flexibility in the other aspects covered by the code, and each of these depends on site-specific conditions as to whether the credits can be achieved. This study has provided indicative costs of the application of various levels of the code, but this should be supported by a wider evidence base that details the local need for resource efficiency, especially regarding water, to support a district-wide application of Code for Sustainable Homes and BREEAM levels. Overall viability and cost related to all aspects of the Code for Sustainable Homes and BREEAM is given in Section 2 of this report. Individual applications should assess the viability of meeting the standards proposed on a site-by-site basis.

The changes to Building Regulations on the pathway to zero carbon are currently proposed, but may change in response to the new government, or for other reasons. Application of the Code for Sustainable Homes/BREEAM targets would ensure all new development has a ‘backstop’ requirement for carbon reductions in the absence of Building Regulation changes.

Dover District Council has adopted Core Strategy policies that require delivery of district-wide Code and BREEAM levels. These policies are supported by a sustainable construction evidence base that shows that the Dover area is very resource constrained and is likely to be seriously affected by climate change. Dover District Council’s policies include a provision to fund off-site reductions in carbon or water use where targets cannot be met on-site. The Dover policies are as follows:

‘New residential development permitted after the adoption of the Strategy should meet Code for Sustainable Homes level 3 (or any future national equivalent), at least Code level 4 from 1 April 2013 and at least Code level 5 from 1 April 2016.

New non-residential development over 1,000 square metres gross floorspace permitted after adoption of the Strategy should meet BREEAM very good standard (or any future national equivalent).

Where it can be demonstrated that a development is unable to meet these standards, permission will only be granted if the applicant makes provision for compensatory energy and water savings elsewhere in the District.’

Climate change adaptation needs particular consideration in Lewes District due to the serious flood risk and heat wave risks associated with the area. A policy option has been included that requires new development applications to demonstrate how they have created resilient places and buildings. Flood resilience will be particularly important in current and future flood risk areas. Precedent for climate change adaptation policies exists in the London Plan (as detailed in Chapter 5). The draft Manchester City Council Core Strategy includes a policy on climate change adaptation as follows (it includes a separate policy on managing flood risk):

‘All new development will be expected to be adaptable to climate change in terms of the design and layout of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following, although this is not an exhaustive list:

- Appropriate treatment of all surface areas to ensure rainwater permeability
- Measures to reduce the urban heat island effect
- Increase in tree cover
- Building orientation to reduce solar heat gain
- Incorporation of green roofs where appropriate’
Policy Options:

Sustainable Design and Construction

Note: This policy should only be applied once a full evidence base against all sustainability aspects has been developed

New residential developments in Lewes District are required to meet full 'Code for Sustainable Homes' standards or equivalent. These requirements will not come into effect until successive updates to Part L of the Building Regulations become mandatory:

- Code level 3 or above, will be required for all new homes once updates to Part L come into effect from 1 October 2010.
- Code level 4 or above, will be required for all new homes once updates to Part L come into effect (currently scheduled for 2013).

All new non-residential developments in Lewes District over 1000m² gross floor area should aim to achieve the BREEAM "Very Good" standard or equivalent, with immediate effect (relevant versions of BREEAM are available covering offices, retail, industrial, education and healthcare).

If this policy option is to be applied it should require submission of final Code certificates and post-construction BREEAM certificates, as appropriate.

Climate Change Adaptation

All new development will be expected to be adaptable to climate change in terms of the design and layout of both buildings and associated external spaces. In achieving developments which are adaptable to climate change, developers should have regard to the following:

- How their design, orientation, materials and construction will minimise overheating and cooling needs.
- How development will incorporate green infrastructure, including tree planting, green roofs and walls, and soft landscaping, where possible.
- How Sustainable Urban Drainage Systems (SUDS) can be implemented when possible, aiming to achieve greenfield run-off rates. Runoff should be managed as close to its source as possible in line with the following hierarchy:
  - Store rainwater
  - Use infiltration techniques (porous surfaces) when possible
  - Attenuate rainwater in ponds for gradual release
  - Attenuate rainwater by storing it in tanks for gradual release
  - Discharge rainwater into existing waterway.

Further Analysis of the Policy Option

This study does not include an evidence base for all aspects of Sustainable Design and Construction aspects. However, the Council should consider the local context and potential need for wider targets (which also include energy standards). Under the Code for Sustainable Homes, energy and water have mandatory credits, while other aspects of sustainable design have flexible credits that can be mixed-and-matched to some degree.

The policy does not require residential building to meet standards beyond Code Level 4. At levels 5 and 6 the current mandatory criteria for water use create strong drivers for greywater recycling or rainwater collection systems. In our judgement, it is not clear that the installation of rainwater and greywater systems in new homes is a cost-effective or appropriate to the water demand and supply balance in Lewes District, as the evidence hasn’t been scoped as part of this study. The proposed policy Code targets could be reviewed in response to any future changes in Code water criteria for Code Levels 5/6.

Approach to Policy Implementation

A Code for Sustainable Homes and/or BREEAM pre-assessment should accompany a planning application to provide assurance that at the design stage the required rating will be achieved. 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. Where cost associated with a pre-assessment is considered unreasonable due to the size and/or type of development, negotiations should be made with the planning authority to ascertain supply of details of how the policy can be met.

8.2.3 POLICY OPTIONS: STRATEGIC SITES

Policy Options Development Context

The PPS1 Supplement encourages setting specific policy and targets for strategic sites where greater opportunities exist to reduce CO₂. No determined uses for strategic sites have yet to be identified but Lewes Council should also seek opportunities to set higher targets on sites that come forward where significant potential is present.

Policy Option:

Strategic Sites

Where suitable strategic sites come forward, we recommend the Council require the following:

That an energy strategy, including phasing requirements, should be developed for the entire site and surrounding area. This will guide the development of low carbon infrastructure in a coordinated way, and ensure that individual developments on the site can be taken forward in a carbon and cost-efficient manner. All energy strategies for sites in or near feasible district heating areas, as identified in the Energy Opportunities Map, should include feasibility assessment for district heating and CHP.

Based on feasibility study results, carbon reduction targets relative to Building Regulation standards or the Code for Sustainable Homes/BREEAM targets should be set for strategic sites to drive additional carbon reductions. Calculations showing the achievement of the required carbon reduction should be provided to the Council using the standard methods outlined in Building Regulations.

Approach to Policy Implementation

Reductions in carbon emissions should be supplied using the standard measurements from Building Regulations. Development typologies have been developed as part of this study to demonstrate possible carbon savings, and these can be used as a resource. The assumptions used in the typologies may not reflect the eventual proposals on the sites, and hence the energy strategies submitted for each site should scope the particular potential of proposals and outline how the carbon reduction target can be met (or where it cannot, how carbon reduction can be increased as far as feasible).

8.3 STRATEGIC COMMUNITY-WIDE INTERVENTIONS

The third policy area addresses strategic, stand-alone energy opportunities and those that are not necessarily related to specific development proposals.

8.3.1 POLICY OPTIONS: RENEWABLE ENERGY

Policy Options Development Context

The binding national renewable energy target of 15% of total energy to be generated from renewable sources by 2020 can be delivered through a combination of renewable electricity, heat and transport fuel. The Government’s July 2009 Renewable Energy Strategy indicates that this is likely to comprise: 30% of total electricity from renewables; 12% of total heat; and 10% of total transport fuel. Planning has a key role to play across all three but the focus of this study is on electricity and heat, therefore, the targets relate to these elements only.
The 30% target for electricity will be met in part through contributions on a national scale, through off-shore wind installations and other major projects; however a substantial proportion still needs to be delivered on land and across the country, following where opportunities exist.

The South East had set an overall target of 10% of electricity from renewables by 2020 but subsequent studies were engaged to review that target upwards. Based on resources identified in this study, we believe achievement of a higher target of 30% is possible and should be set as an aspiration. The 12% heat target on a national scale will be delivered and supplied primarily in conjunction with the built environment, and therefore, Lewes District should contribute the portion of that target where significant opportunities exist to generate renewable heat. Lewes town and the coastal settlements demonstrate significant potential for inclusion of renewable heat in the form of a district heating system utilising biomass, and therefore the national target is recommended for policy. Chapter 4 has demonstrated a range of resource options available to meet both electricity and heat targets.

Delivery of the targets will depend to some extent on emerging policy for the South Downs National Park, of which part lies within Lewes District. The Council should work with the National Park Authority to determine suitable policy for the Park area and whether there is a differentiation in policy according to the type or location of renewable energy development. Wind energy development may be suitable in some areas where it has limited landscape impact. The growth of bio-crops in the National Park area should also be considered.

Planning Recommendation:
The Council should engage with the South Downs National Park Authority to develop a clear policy on wind development and bio-crop growth within the National Park. We recommend that policy for wind energy be tied to a flexible visual impact assessment process, rather than a blanket restriction.

Policy Option:
Renewable Energy
Lewes District demonstrates significant potential for inclusion of district heating and micro-generation and should aim to meet at least the national heat target of 12% or above.

Lewes District should assist in the delivery of its portion of the 30% electricity from renewables by 2020 using its potential for combined heat and power, energy from waste, wind energy, hydro energy and micro-renewables.

Applications for low carbon and renewable energy installations should generally be supported in the area, except where adverse effects would be seen. The area is seeking new renewable energy generation capacity to deliver an appropriate contribution towards the UK Government’s binding renewable energy target.

Approach to Policy Implementation
The Council may wish to support the policy option and targets by setting criteria by which decisions will be taken. In the context of national policy in PPS22 and the PPS1 Supplement, (including the consultation draft of the PPS on Planning for a Low Carbon Future in a Changing Climate), these would need to cover all or some of the following: local amenity; ecology; landscape and visual impact; cultural heritage; the technologies; weighing up impacts and benefits; and community involvement and ownership.

Monitoring of the targets included in the proposed policy can be calculated from the expected energy demand baseline derived in Chapter 3. The nature of the renewable energy resource in Lewes District means that much of this is likely to be delivered through decentralised heat and/or power schemes and wind energy; however, hydro power, solar photovoltaics and other technologies will also play an important role. The role of the local authority and communities as delivery agents will be important and is explored in more detail in Chapter 7.
8.3.2 POLICY OPTION: DELIVERING THE ENERGY OPPORTUNITIES MAP

Figure 67: The Energy Opportunities Map
Policy Option Development Context

The various key decentralised renewable and low carbon energy opportunities across the District have been used to create an Energy Opportunities Map (EOM). The EOM acts as the key spatial map for energy projects in Lewes District. It underpins the policies, targets and delivery mechanisms described here and can set out where money raised through allowable solutions or other funds can be spent. The EOM should also be used to inform policy making in the Sustainable Community Strategy and other corporate strategies, and investment decisions taken by the District Council and the Local Strategic Partnership.

Policy Option

Delivering the Energy Opportunities Map

Decentralised, low carbon and renewable energy is a priority for the Council. Planning applications for new development in Lewes District will need to demonstrate how they contribute to delivery of the ‘Energy Opportunities Map’.

Approach to Policy Implementation

The EOM should be incorporated into SPDs or development plan documents and corporate strategies and should regularly be updated to reflect new opportunities and changes in feasibility and viability. The EOM should be used as a tool to inform applications and assessment, though it should not be used to restrict scope or locations of proposals, where they are shown to be viable.

8.3.3 POLICY OPTION: PRIORITY AREAS

Policy Option Development Context

The planning policy approach represents the application of national policy to the specific Lewes District context. The PPS1 Supplement on Planning and Climate Change and PPS22 (Renewable Energy) are both supportive of wind power. Specifically in relation to District solutions, the Supplement requires the following:

Along with criteria based policies, identify suitable sites for decentralised and renewable or low carbon (DRLC) energy and supporting infrastructure.

Expect a proportion of energy supply for new development to be secured from DRLC energy. This can involve utilising existing and fostering new opportunities to supply development. For example, co-locating potential heat customers and suppliers, requiring development to connect to an identified system or to be able to in the future, setting out how proposed development should contribute to securing the DRLC energy system from which it would benefit, and facilitate connection.

Precedent policy exists for these types of strategic areas within the draft Manchester City Council Core Strategy and Bristol Core Strategy. The Manchester City Core Strategy includes details of a policy relating to areas for low carbon, decentralised and renewable energy development. This precedent policy is listed below;

Policy Approach En 2 – Within Manchester it is considered that the following strategic areas will have a major role to play in achieving an increase in the level of decentralised, low carbon and renewable energy available:

- Regional Centre, which also includes the Oxford Corridor and Sport city
- District Centres
- Inner Areas
- Strategic Housing sites
- Strategic employment sites
The City council will work with all relevant stakeholders, which may include residents, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward more detailed proposals for decentralised low and zero carbon energy infrastructure in these areas.

Where investment or development is being undertaken into or adjacent to a public building, full consideration shall be given to the potential role that the public building can have in providing an anchor load with a decentralised energy network.

Bristol Core Strategy has taken a similar approach, encouraging renewable development where appropriate to the landscape and prioritising CHP and district heating in key urban areas:

‘Proposals for the utilisation, distribution and development of renewable and low carbon sources of energy, including large-scale freestanding installations, will be encouraged. In assessing such proposals the environmental and economic benefits of the proposed development will be afforded significant weight, alongside considerations of public health and safety and impacts on biodiversity, landscape character, the historic environment or the residential amenity of the surrounding area.

The use of combined heat and power (CHP), combined cooling, heat and power (CCHP) and district heating will be encouraged. Development will be expected to incorporate, where feasible, low-carbon energy generation and distribution by these means. Within Heat Priority Areas, development will be expected to incorporate infrastructure for district heating, and will be expected to connect to existing systems where available.’

The priority areas listed in the policy option below have been identified based on the analysis carried out in Chapters 4, 6 and 7. The purpose of the policy is to prioritise district heating and community wind in areas where opportunities are the greatest.

**Policy Options**

**Priority areas**

The Council will favourably consider applications for development which will support the following energy priority areas:

**DISTRICT HEATING PRIORITY AREAS**

The Energy Opportunities Map (EOM) highlights the favourable areas for district heating networks. These areas should be considered by the delivery body as priority areas for installing district heating systems.

The Council will support the delivery of district heating in these areas and will work with all relevant stakeholders, which may include residents, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward more detailed proposals for district heating in these areas.

Development within the priority area should install the secondary elements of a district heating network (i.e. from the wider network to properties), unless it can be shown not to be viable or feasible, and work closely with the E SCo to ensure compatibility of systems. Should development come forward prior to a district heating network being in place, developers should provide a containerised energy centre to provide temporary supply. Where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre to serve proposed or multiple developments.

New residential and commercial development should be designed to maximise the opportunities to accommodate a district heating solution where feasible, considering: density; mix of use; layout; and phasing.

**WIND POWER PRIORITY AREAS**

The Energy Opportunities Map (EOM) highlights potential favourable locations for wind turbines.

The Council will look favourably on the addition of new wind turbines at the medium or large scale as part of any redevelopment of industrial parks, commercial areas or public realm located a suitable distance from residential areas. The location of wind turbines in these areas should not be to the detriment of local wildlife. Applications would be encouraged from community groups and individuals in priority areas.

Sites within the South Downs National Park are subject to (evolving) policy from the National Park Authority.
Approach to Policy Implementation

Developments (possibly excluding developments below 10 dwellings) within or near the district heating priority areas should investigate the feasibility of the opportunity within the site (and surrounding the site as far as possible). A planning application should provide details of how the opportunities will be implemented to allow the LPA to coordinate delivery of potential across the priority areas. Where installation of infrastructure is not possible, details of the viability assessment should be given with the application.

In order to provide additional certainty to the installation of district heating networks it is recommended that a Local Development Order (LDO) is designated, either for district heating networks across the council areas or specifically in priority areas. Introduced in the 2004 Planning and Compulsory Purchase Act and amended by the 2008 Planning Act, LDOs grant permission for types of development specified in the Order and by doing so, removes the need for a planning application to be made by the developer.

The PPS1 Supplement supports their use in bringing energy projects forward. A pilot is underway for the Barking Power Station strategic heat main promoted by the London Development Agency. Barking and Dagenham have recently received funding for a pilot project using a LDO for implementing a district heating system.

Applications should be encouraged for wind energy developments directly related to new domestic and non-domestic developments, particularly in areas identified in the Energy Opportunities Map.

Due to the nature and size of the strategic sites identified, they should complete an energy strategy to ensure that the best options are identified, taking into account the whole site and its surroundings. The energy strategy should outline the proposed options and how these will be delivered in coordination with District-wide initiatives.

8.3.4 POLICY OPTION: STRATEGIC CLIMATE CHANGE ADAPTATION

Policy Option Development Context

Lewes District faces some serious challenges associated with predicted climate change, as demonstrated in Chapter 5. There are strategic interventions that could be applied to lessen risks to vulnerable communities and infrastructure. This study has identified some key opportunities including improvement of buildings, green infrastructure integration (especially in urban areas), retrofitting of SUDS into existing areas, and a flood storage area south of Lewes Town. The Council should develop a Climate Change Adaptation Strategy that identifies and prioritises initiatives and delivery plans for adaptation measures across the district. This strategy should link with a local green infrastructure strategy and flood management plans.

Planning Recommendation:

The Council should develop a clear Climate Change Adaptation Strategy to fully understand local vulnerabilities and structure the response to climate change risk. This should be taken forward as a collaborative approach between planning and wider council services, and should link to requirements under National Indicator 188 (if in operation).

Policy Options:

The Council will support and encourage the integration of climate change adaptation strategies in the district, including the provision of green infrastructure, SUDS and flood risk management features.

The development of a flood storage area to the south of Lewes Town will be supported. Design of the area should support local biodiversity and amenity aims as far as possible.

Approach to Policy Implementation

Adaptation measures should be further investigated and prioritised. There is a clear opportunity to support general adaptation measures throughout the district, along with specific features such as the flood storage areas. Design guidance could be developed to ensure adaptation measures are in keeping with the needs of designated areas such as conservation areas and the National Park, and that they deliver local architectural, biodiversity and amenity priorities.
Appendix A: Funding mechanisms for Renewable and Low Carbon technologies

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 2015/16. 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.

<table>
<thead>
<tr>
<th>Technology</th>
<th>ROCs/MWh</th>
<th>Technology</th>
<th>ROCs/MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>1</td>
<td>Energy from Waste with CHP</td>
<td>1</td>
</tr>
<tr>
<td>Onshore wind</td>
<td>1</td>
<td>Gasification/Pyrolysis</td>
<td>2</td>
</tr>
<tr>
<td>Offshore wind</td>
<td>1.5</td>
<td>Anaerobic Digestion</td>
<td>2</td>
</tr>
<tr>
<td>Wave</td>
<td>2</td>
<td>Co-firing of Biomass</td>
<td>0.5</td>
</tr>
<tr>
<td>Tidal Stream</td>
<td>2</td>
<td>Co-firing of Energy crops</td>
<td>1</td>
</tr>
<tr>
<td>Tidal Barrage</td>
<td>2</td>
<td>Co-firing of Biomass with CHP</td>
<td>1</td>
</tr>
<tr>
<td>Tidal Lagoon</td>
<td>2</td>
<td>Co-firing of Energy crop with CHP</td>
<td>1.5</td>
</tr>
<tr>
<td>Solar PV</td>
<td>2</td>
<td>Dedicated Biomass</td>
<td>1.5</td>
</tr>
<tr>
<td>Geothermal</td>
<td>2</td>
<td>Dedicated energy crops</td>
<td>2</td>
</tr>
<tr>
<td>Geopressure</td>
<td>1</td>
<td>Dedicated Biomass with CHP</td>
<td>2</td>
</tr>
<tr>
<td>Landfill Gas</td>
<td>0.25</td>
<td>Dedicated Energy Crops with CHP</td>
<td>2</td>
</tr>
<tr>
<td>Sewage Gas</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FEED-IN-TARIFFS

These came 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
- 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 / TARRIF

The CIL was enacted in April 2010 but is currently being considered by government. The new government have indicated that they will retain a similar concept to CIL, but may make it a Tariff. Unlike Section 106 contributions, a CIL 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.

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 £350 million 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 the UK is the RDAs, 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. These investments may take the form of equity, loans and/or guarantees and will be delivered to projects via Urban Development Funds (UDFs) and, if required, Holding Funds (HF). The fund will recycle monies over time and series of projects.

GREEN RENEWABLE ENERGY FUND

A 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 energies 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.
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.