In Association with

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Low Carbon & Renewable Potential Study

January 2010

Prepared for

Rother District Council

Revision Schedule

Low Carbon & Renewable Potential Study
January 2010

Rev	Date	Details	Prepared by	Reviewed by	Approved by
03	21/01/10	FINAL	**Karl Walker** Principal Sustainability Consultant **James Eland** Senior Energy Consultant **Sean Rendall** Head of Policy & Strategy, Thameswey	**Martin Birt** Technical Director	**Andrew McNab** Director of Sustainable Development

Scott Wilson
6-8 Greencoat Place
London
SW1P 1PL

Tel: 020 7798 5000
Fax: 020 7798 5001

www.scottwilson.com

Table of Contents

List of Tables

List of Figures

List of Boxes

Executive Summary

Introduction

Scott Wilson, in conjunction with its project partners Thameswey Energy and Drivers Jonas, was commissioned by Rother District Council to develop an evidence base for low carbon and renewable technology policy in the Core Strategy as part of the Local Development Framework process.

The provision of decentralised and renewable or low carbon energy generation will be central to sustainable economic growth and development in Rother District. It is vital that such development be coordinated through the spatial planning system incorporating technical input from the renewable energy and low carbon sectors. The Climate Change Supplement to Planning Policy Statement 1 (PPS1) is a key driver for this study, along with the need to address ambitious regional targets that are both deliverable and viable in accordance with Rother District Council wider objectives such as affordable housing.

Key drivers of the study:

- Response to PPS 1 Supplement, PPS 22 & Climate Change Act 2008.
- Achieving deliverable national and regional targets for renewable energy and greenhouse gas emissions.
- Reduce the District's energy consumption through existing stock.
- Need to ensure viable local policies and targets, taking into account housing costs, affordable housing shortages, rural nature and landscape characteristics.
- Corporate policies including National Indicator 186.
- Meet the Local Strategic Partnership objectives of East Sussex Sustainable Community Strategy – Pride of Place.

The key objectives of the study are as follows:

- Provide a baseline assessment of carbon emissions arising from current and anticipated developments.
- Develop an evidence based assessment of opportunities and constraints, and therefore the potential for low carbon and renewable energy technologies within Rother.
- Identify robust policies for delivery, suitable technologies and targets, and evaluate the potential of strategic sites.
- Include key stakeholders in the study to ensure sign-up to delivery.

Carbon Footprint

The carbon footprint analysis of Rother District confirmed **623** thousand tonnes carbon dioxide per annum which can be compared to **432,727** thousand tonnes for the UK, or 0.14%. Based on an evaluation of this carbon footprint against the LDF energy policy options presented in the Core

Strategy, *Consultation on Strategy Directions*, the figures for domestic and commercial emissions projections identify there is only a limited level of impact on overall building stock emissions that new-build policy can make. If the overall goal of policy design and implementation is to reduce global carbon emissions, then this analysis strongly points towards the need for policy measures that target the emissions of existing buildings as well as new construction.

Summary of Constraints and Opportunities

The District has good opportunities for low carbon and renewable technologies, particularly wind and biomass as outlined in Chapter 4. It is forecast that in the year 2021 there will be an annual production of around a million tonnes of biomass potentially available as wood fuel in the South East. In terms of wind potential, wind speeds around Rother are favourable for energy generation, particularly around the Bexhill and Rye area. There are, however, a number of potential impacts and constraints which would need to be addressed by any future wind developments such as protected areas, public rights of way and scattered settlements. The most appropriate wind energy developments may be single turbine or small clusters of up to 3 turbines, probably of 1.5-2MW capacity. Other technologies such as solar technologies and ground source heating are also suitable but will need to be subject to more detailed analysis on a site by site basis.

Strategic Sites

In addition to evaluating the potential across the borough, specific site testing of standards in advance of Government targets was carried out on sites agreed with Rother District Council. These included the following strategic sites in the LDF: North East Bexhill, North Bexhill and West Bexhill. Specific local constraints and opportunities for low carbon and renewable technology were explored in further detail for both locations. Different energy strategies were explored and modelled, giving consideration to cost of technology and uplift of Code levels to ascertain the appropriate energy standards that would both enable the strategic sites within the District to address higher standards of sustainable design and at the same time maintain development viability. Proposed policies for the strategic sites are summarised in the next section.

Summary of Policy Recommendations

District Wide

CC Policy 1

Residential

a. **New developments will meet Code for Sustainable Homes level 3 and at least Code level 4 from 1 April 2013 and Code level 6 from 1 April 2016.**
b. **New developments of 10 or more dwellings should secure at least 10% of their total energy (regulated and non-regulated, but excluding transport-related fuel consumption) 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.**

c. **A comprehensive energy strategy is to be submitted to the Council as part of any planning application of more than 10 proposed dwellings.**
d. **Any application greater than 100 dwellings or 50 apartments must provide a comprehensive study of the potential for district heating and Combined Heat and Power (CHP).**
e. **Proposals for more than 10 dwellings or apartments within 200m of an existing District heat network should consider connection to that network.**

Non-residential development

f. **New non-residential buildings over 1,000m2 gross floorspace should meet BREEAM 'Very Good' standard. All new non-residential developments should also achieve an Energy Performance Certificate (EPC) rating of at least 50.**
g. **New developments 1,000m2 or more of non-residential floorspace should secure at least 10% of their total energy (regulated and non-regulated, but excluding transport-related fuel consumption) 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.**
h. **A comprehensive energy strategy is to be submitted to the Council as part of any planning application of 1000m2 or more of non-residential floorspace.**

CC Policy 2

There will be a presumption in favour of proposals for standalone renewables and low carbon technologies, such as wind farms and biomass generators, which have given due regard to the following considerations:

- **visual impact;**
- **noise;**
- **impact on other local amenities;**
- **traffic generation; and**
- **designated areas such as AONB and SSSIs.**

Strategic Sites

North East Bexhill

CC Policy 3 - North East Bexhill

a. **New residential development, including minor and individual applications, should meet: as a minimum Code for Sustainable Homes level 4 with immediate effect; as a minimum Code Level 5 from 1 April 2013; and Code Level 6 from 1 April 2016.**
b. **For all non-residential applications over 1,000m2 a minimum of BREEAM 'Excellent' will be required, including an Energy Performance Certificate (EPC) of 40.**
c. **Should the provision of a freestanding wind turbine in the order of 2mW be feasible, then new residential development within North East Bexhill should achieve Code level 5 with immediate effect.**

North & West Bexhill

CC Policy 4 - North and West Bexhill

New residential development, including minor and individual applications, should meet: as a minimum Code for Sustainable Homes level 4 with immediate effect; as a minimum Code Level 5 from 1 April 2013; and Code Level 6 from 1 April 2016.

Existing Stock

CC Policy 5 – Extensions and conversions

Residential and non-residential extensions and conversions should incorporate energy efficiency measures that are designed to achieve no net increase in energy demand from the whole building.

Further policy considerations are outlined in **Section 6.3.5**

1 Introduction & Policy Context

1.1 Background

Scott Wilson, in conjunction with its project partners Thameswey Energy and Drivers Jonas, was commissioned by Rother District Council to develop an evidence base for low carbon and renewable technology policy in the Core Strategy as part of the Local Development Framework process.

The provision of decentralised and renewable or low carbon energy generation will be central to sustainable economic growth and development in Rother District. It is vital that such development be coordinated through the spatial planning system incorporating technical input from the renewable energy and low carbon sectors. The Climate Change Supplement to Planning Policy Statement 1 (PPS1) is a key driver for this study, along with the need to address ambitious regional targets that are both deliverable and viable in accordance with Rother District Council wider objectives such as affordable housing.

1.1.1 Key drivers of the study:

- Response to PPS 1 Supplement, PPS 22 & Climate Change Act 2008.
- Achieving deliverable national and regional targets for renewable energy and greenhouse gas emissions.
- Reduce the District's energy consumption through existing stock.
- Need to ensure viable local policies and targets, taking into account housing costs, affordable housing shortages, rural nature and landscape characteristics.
- Corporate policies including National Indicator 186.
- Meet the Local Strategic Partnership objectives of East Sussex Sustainable Community Strategy – Pride of Place.

1.1.2 The key objectives of the study are as follows:

- Provide a baseline assessment of carbon emissions arising from current and anticipated developments.
- Develop an evidence based assessment of opportunities and constraints, and therefore the potential for low carbon and renewable energy technologies within Rother.
- Identify robust policies for delivery, suitable technologies and targets, and evaluate the potential of strategic sites.
- Include key stakeholders in the study to ensure sign-up to delivery.

1.1.3 Structure of this Report:

Chapter 1 provides an overview of Rother District Council and reviews international, European, national, regional and local policy relevant to this study.

Chapter 2 reviews UK Government standards and targets on energy use and development, including the Code for Sustainable Homes and the Building Research Establishment Environmental Assessment Method (BREEAM), and explains the financial implications of meeting the above standards and providing a step change to zero carbon.

Chapter 3 presents findings from an evaluation of the baseline District energy demand & an emissions projection.

Chapter 4 reviews the constraints and opportunities for low carbon and renewable energy in Rother District.

Chapter 5 evaluates the policy options specific to the Rother context and considers their application within the District, with specific focus on the strategic sites such as North East Bexhill. This chapter also reviews development viability of the strategic sites for meeting specific levels of the Code for Sustainable Homes.

Chapter 6 provides policy recommendations for low carbon and renewable technology in the District and provides justification for options proposed for informing the Core Strategy.

Chapter 7 provides conclusions and presents the main findings of this study and makes recommendations, including an outline of implications for the Council and its strategic partners.

1.2 Overview of Rother District

Rother District is located in the easternmost part of East Sussex. It envelops Hastings, with Eastbourne to the west and the boundary with Kent to the north and east. The District derives its name from the River Rother, which traverses the northern part of the area to reach the English Channel at Rye. It covers some 200 square miles and has a population of 88,813 inhabitants (2008).

Bexhill is the principal town and administrative centre and has a population of 42,280 inhabitants (2008). The smaller, historic towns of Battle and Rye also lie within this mainly rural District.

The majority of the countryside located in the District falls within the High Weald Area of Outstanding Natural Beauty. Landscape beauty, heritage and the coast combine to provide the underlying high quality physical environment that attracts both visitors and residents.

However, there are economic and social, as well as infrastructure, issues. The existing road and railway infrastructure is in need of significant upgrading. Poor accessibility, combined with limited local job opportunities and low wages, has created economic problems for both Rother District and the adjoining Borough of Hastings. There are also issues of the decline of traditional rural employment and loss of services. Across the District, the combination of low wages and high house prices creates real affordability difficulties.

1.3 Physical Context

Rother Districts aspires to balance its objectives of improving the quality of residential developments with the provision of local employment in line with addressing its wider objectives and local challenges as outlined in Section 1.2 above. Rother, as with other Districts in the South

East region, is being driven to address its current status and its potential to deliver sustainable development. In addition to policy as outlined previously, the State of the Environment Report (Environment Agency, 2007) and Reducing the South East's Ecological Footprint and Carbon Emissions (SEERA, August 2008) both refer to the need to significantly reduce carbon emissions. However, this must be considered in relation to the physical characteristics of Rother District, including specific constraints such as land designations and flood risk, as outlined in the following sections.

1.3.1 Environment

Bexhill, the low lying coastal areas to the west and the reclaimed land around Rye and Camber to the east are distinct landscape areas. They include the High Weald (122), the Romney Marshes (123) and the Pevensey Marshes (124) as illustrated together with the Rother District Council boundary in Figure 1.1 below.

Figure 1-1: Rother District Landscape areas, Natural England

The Strategic Flood Risk Assessment (August 2008) outlines key areas of flood risk (flood risk Zones 2-3) within the District and thus determines areas where development is restricted or will have to be determined in accordance with the Sequential Test. Areas of significant flood risk include Camber, Cooden Beach, Harbour Road in Rye, Jury's Gap, Norman's Bay, Winchelsea Beach and Rye Harbour.

The vast majority of Rother (82%) lies within the High Weald AONB, which is of national conservation importance. Its ridges and valleys largely define Rother's landscape, with the highest ridge traversing the District from Dallington in the west, dipping towards the sea at the cliffs at Fairlight to the east. A further 7% is outside the AONB, but is a designated Site of Special Scientific Interest (SSSI) as outlined in Figure 1.2 below.

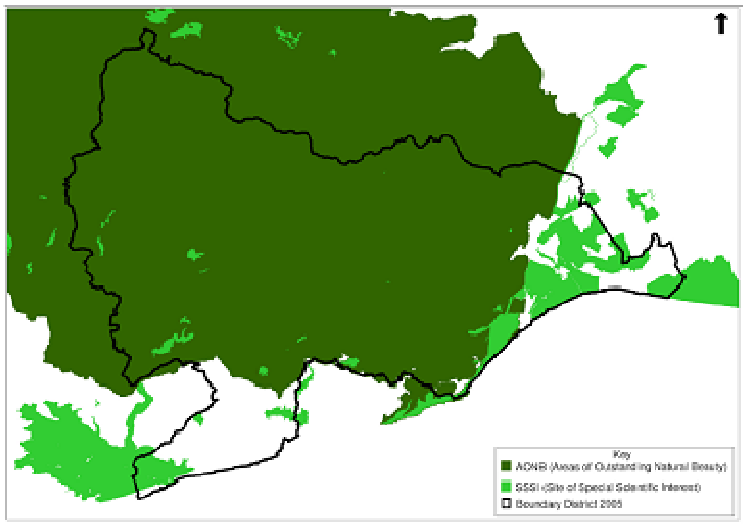


Figure 1-2: Rother District Council AONB & SSSI

Areas of international nature conservation interest along with sites of local nature conservation importance within Rother cover 8,285 hectares or 16% of the area of the District.

Woodland coverage accounts for 19% of the area of the District. Of the total woodland coverage 97% is classified as ancient woodland. Figure 1.3 illustrates the conservation areas including ancient woodland within the District.

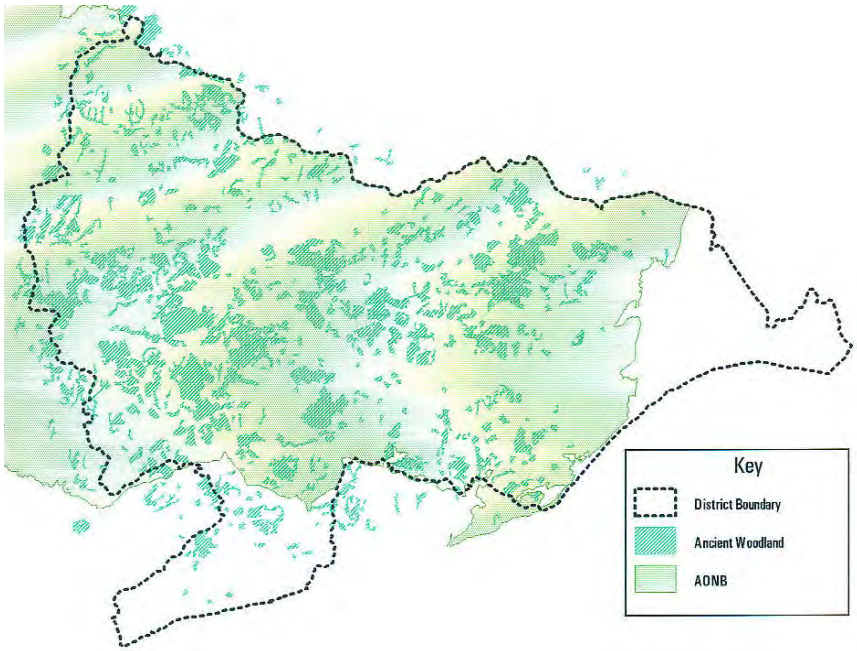


Figure 1-3: Area of Outstanding Natural Beauty and Ancient Woodland

Sites of nature conservation importance are illustrated in Figure 1.4. Special Areas of Conservation (SAC), Special Protection Areas (SPA), Wetlands of International Importance (Ramsar); National Nature Reserves (NNR); Sites of Special Scientific Interest (SSSI) and Sites of Nature Conservation Interest (SNCI) within Rother District have been highlighted.

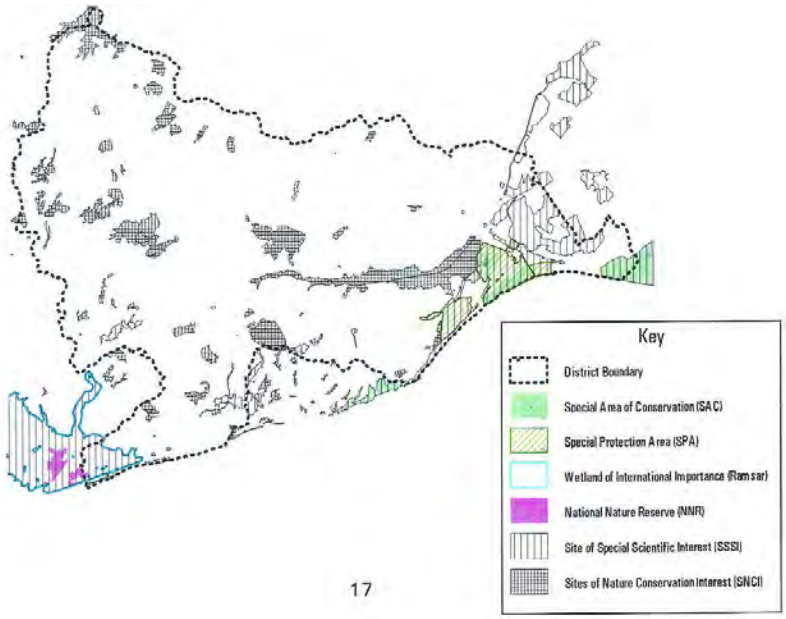


Figure 1-4: Sites of Nature Conservation Importance

1.3.2 Maps of the District showing environmental designations and constraints can be obtained from the Rother District Council website via the following website link:

http://rother.devplan.org.uk/map.aspx?map=19&layers=all

1.3.3 Historic Environment

Rother District includes the historic towns of Battle and Rye, as well as the late Victorian/ early Edwardian town of Bexhill-on-Sea. A number of buildings are 'listed' (currently 2,114) and nine Conservation Areas of special architectural and historic interest are designated at Battle, Bexhill Old Town, Bexhill Town Centre, Burwash, Northiam, Robertsbridge, Rye, Ticehurst and Winchelsea.

There are 39 Scheduled Ancient Monuments that are of national importance, and numerous Sites of Archaeological Interest (SAI), nationally important historic parks and gardens and battlefields within the District.

1.4 International & European Policy

The following is a review of national, regional and local policies relevant to Rother District Council's 'Renewable Energy and Low Carbon Development Study'.

1.4.1 Kyoto Protocol Agreement

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialised countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012.

The Kyoto Agreement is currently being updated using the 'Bali Roadmap'. Following the Copenhagen summit in December 2009, no agreement was reached in terms of committing the UK to further carbon reductions, technology development and investment. Therefore, UK planning policy currently reflects internal ambitious targets that the Government has set.

1.4.2 EU Energy Performance of Buildings Directive (EPBD)[1]

The principal objective of the Energy Performance of Buildings Directive (EPBD) is to promote the improvement of the energy performance of buildings within the EU through cost-effective measures. Key requirements include:

- A calculation methodology, which must be implemented to ascertain the energy performance of buildings, taking account of all factors that influence energy use.
- Minimum energy performance standards to be set for buildings.
- An energy performance certificate (EPC) to be produced for new buildings.

1.4.3 Renewable Energy (RE) Directive[2]

The RE Directive sets out how the EU will increase the use of renewable energy sources in order to meet the overall target of **20% renewables by 2020**. Under this Directive, the UK will be required to ensure that at least 15% of its final energy consumption comes from renewables by 2020. The Directive sets UK's interim targets at 4% for 2011/2012, 5.4% for 2013/2014, 7.5% for 2015/2016 and 10.2% for 2017/2018.

1.4.4 European Air Quality Framework Directive (96/62/EC)[3]

The **Air Quality Framework Directive (96/62/EC)** on ambient air quality assessment and management defines the policy framework for 12 air pollutants known to have a harmful effect on human health and the environment. The limit values for the specific pollutants are set through a series of Daughter Directives:

- **Directive 1999/30/EC** sets limit values (values not to be exceeded) for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (dust) and lead in ambient air.
- **Directive 2000/69/EC** establishes limit values for concentrations of benzene and carbon monoxide in ambient air.

[1] http://ec.europa.eu/energy
[2] http://www.r-e-a.net/document-library/thirdparty/rea-and-fqd-documents/REDDoc_090605_Directive_200928EC_OJ.pdf
[3] EU (1996*) Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management* [online] available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0062:EN:HTML

- **Directive 2002/3/EC** establishes long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.
- **Directive 2004/107/EC** establishes a target value for the concentration of arsenic, cadmium, nickel and benzo pyrene in ambient air so as to avoid, prevent or reduce harmful effects of arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons on human health and the environment as a whole.
- **Directive 2008/50/EC**, which incorporates the Daughter Directives, came into force in June 2008, and will be transposed into UK national legislation by June 2010.

1.5 National Policy

The following sets out the overarching policies of the UK national Government.

1.5.1 Securing the Future

Securing the Future is the UK's Sustainable Development Strategy (March 2005) which sets out the principles for sustainable development with a focus on environmental limits. Four priority areas were identified; consumption and production, climate change, natural resource protection and sustainable communities.

1.5.2 UK Strategy for Sustainable Construction

In June 2008, the Government released a Strategy for Sustainable Construction. The Strategy, developed in collaboration with the Strategic Forum for Construction, is aimed at "*providing clarity around the existing policy framework and signalling the future direction of Government policy*".

The Strategy for Sustainable Construction is a joint industry and Government initiative intended to promote leadership and behavioural change, as well as delivering benefits to both the construction industry and the wider economy. Developed by BERR in conjunction with the Strategic Forum for Construction, the strategy is intended to fulfill the following functions:

- Providing clarity to business on the Government's position by bringing together diverse regulations and initiatives relating to sustainability;
- Setting and committing to higher standards to help achieve sustainability in specific areas; and
- Setting specific commitments by industry and the Government to take the sustainable construction agenda forward.

To deliver the Strategy, Government and industry have devised a set of overarching targets related to the goals and the initiatives required to achieve the goals. The goals relate directly to sustainability issues, such as climate change and biodiversity; the initiatives describe processes to help achieve the goals. The final Strategy was released on 11th June 2008.

1.5.3 Planning Policy Statement 1: Delivering Sustainable Development[4]

PPS1 sets out the Government's overarching planning policies on the delivery of sustainable development through the planning system. It includes the key principle that local planning authorities should ensure that development plans promote the development of renewable energy resources. It also sets out that development plan policies should seek to promote and encourage, rather than restrict, the use of renewable resources, and that local authorities should promote small scale renewable and low carbon energy schemes in developments.

1.5.4 Planning Policy Statement: Planning and Climate Change Supplement to PPS1[5]

In December 2007, the Government published Planning Policy Statement – Planning and Climate Change, a supplement to PPS1. This document gives an indication of the issues to be taken into account in attempting to achieve sustainable development as a contribution to addressing climate change.

Key planning objectives include:

- Enabling new development, securing the highest viable standards of resource and energy efficiency and reduction in carbon emissions;
- Delivering patterns of urban growth that secure sustainable transport movements;
- Securing new development resilient to the effects of climate change; and
- Sustaining biodiversity.

PPS1 supplement on Planning and Climate Change requires Local Authorities to mitigate and adapt to climate change through appropriate location and patterns of development. It states that spatial strategies should abide by the principle that *"new development should be planned to make good use of opportunities for decentralised and renewable or low carbon energy"*. The Supplement, therefore, strengthens the requirement for planners to acknowledge a national need for renewable and low carbon technologies. Planning Authorities should provide a framework that promotes and encourages renewable and low-carbon energy and supporting infrastructure and develop positive policies towards that end. The Supplement sets out several other measures intended to increase uptake of renewable energy that encourage renewable energy in new development, promote consistency with PPS22, encourage the identification of suitable areas for renewables and supporting infrastructure, and expect a proportion of energy supply from new development to be from decentralised and renewable or low-carbon energy sources. Further measures are set out through Local Development Orders (LDOs), selecting land for development, local requirements for energy to supply new development and for sustainable buildings and the design of proposed developments and impact of proposed development on renewable energy supplies.

[4] http://www.communities.gov.uk/publications/planningandbuilding/planningpolicystatement1
[5] Communities and Local Government (2007) *Planning Policy Statement: Planning and Climate Change* [online] available at: http://www.communities.gov.uk/documents/planningandbuilding/pdf/ppsclimatechange.pdf

Web-based Practice Guidance[6] has been developed to assist with the implementation of the PPS on Climate Change and to secure good practice. It draws upon the principles in PPS 22: Renewable Energy.

1.5.5 Planning Policy Statement 22: Renewable Energy[7]

PPS 22 on Renewable Energy sets out UK National Policy on renewable energy. It includes a requirement for local authorities to allocate specific sites for renewable energy and to encourage developers to provide on-site renewable energy generation as appropriate.

It requires Local Planning Authorities and developers to consider opportunities for the incorporation of renewable energy into all new developments. Accordingly, Local Authorities should encourage renewable energy schemes through their inclusion in Local Development Documents.

1.5.6 Planning Policy Statement 3 (PPS3): Housing[8]

PPS3 states that "*Local Planning Authorities should encourage applicants to bring forward sustainable and environmentally friendly new housing developments, including affordable housing developments, and in doing so should reflect the approach set out in the forthcoming PPS on climate change, including the Code for Sustainable Homes*".

In addition to considerations at the regional level, it adds that Local Development Documents should set out a strategy for the planned location of new housing which contributes to the achievement of sustainable development, including identifying locations that take into account: *"The contribution to be made to cutting carbon emissions from focusing new development in locations … where it can readily and viably draw its energy supply from decentralised energy supply systems based on renewable and low-carbon forms of energy supply, or where there is clear potential for this to be realised"*.

1.5.7 Planning Policy Statement: Eco-towns - A supplement to PPS1[9]

This PPS sets out a range of minimum standards that go beyond what is normally required for new development. Although they are aimed at eco-towns, the standards *"could potentially be adopted by other developers as a way of meeting the wider objectives of the Planning Policy Statement on Climate Change planning policy"*. The Supplement includes a standard for zero carbon so that, over a year, the net CO_2 emissions from all energy use within the buildings on the eco-town development as a whole are zero or below.

1.5.8 Climate Change Act[10]

The Climate Change Act 2008 sets targets for green house gas emission reductions through action in the UK and abroad of at least 80% over 1992 levels by 2050, and reductions in CO_2

[6] http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/ppsclimatechange/practiceguidance/
[7] ODPM (2004) *Planning Policy Statement 22: Renewable Energy* [online] available at: http://www.communities.gov.uk/publications/planningandbuilding/pps22
[8] http://www.communities.gov.uk/publications/planningandbuilding/pps3housing
[9] http://www.communities.gov.uk/publications/planningandbuilding/pps-ecotowns
[10] The Climate Change Act 2008 is available at: http://www.defra.gov.uk/environment/climatechange/uk/legislation/

emissions of at least 26% by 2020 against a 1990 baseline. As part of the package of measures to achieve this, Government has set a target to generate 20% of the UK's energy demand from renewable sources by 2020.

The Climate Change Act, passed in November 2008, and PPS 22 set out the Government's policies and targets on carbon emissions and renewable energy. These are primarily:

- to reduce UK greenhouse gas emissions to 12.5% below 1990 levels by 2008-2012;
- to reduce UK carbon dioxide (CO_2) emissions to 26% below 1990 levels by 2020, with a long term target of 80% below 1990 levels by 2050;
- to meet 10% of UK electricity demand from renewable energy by 2010 and 20% by 2020;
- to have at least 10 GW (gigawatts) of combined heat and power (CHP) capacity in the UK by 2010; and
- to comply with the system of binding five year "carbon budgets", with requirements set out for the Government to report every 5 years on their progress against these and on other climate change impacts and policies.

The April 2009 Budget included a proposal to amend the Climate Change Act to include an interim target for the period covering 2018 – 2022 and increase the 26% reduction in CO_2 emissions to 34%.

1.5.9 UK Renewable Energy Strategy[11]

Published in July 2009, the UK Renewable Energy Strategy aims to tackle Climate Change by reducing carbon dioxide emissions and setting guidelines and targets to increase the renewable energy supply in the UK. It sets out the path for the UK to meet its legally-binding target to ensure 15% of its energy comes from renewable sources by 2020: almost a seven-fold increase in the share of renewables in scarcely more than a decade. The document provides strategies for meeting the following targets for energy:

- More than 30% of electricity generated from renewables, 12% of heat generated from renewables.
- 10% of transport energy from renewables.
- Drive delivery and clear away barriers.
- Increase investment in emerging technologies and pursue new sources of supply.
- Create new opportunities for individuals, communities and business to harness renewable energy.

1.5.10 Planning & Energy White Papers[12]

The UK Fuel Poverty Strategy (2001) set out how the Government proposes to ensure affordable warmth for all households. The subsequent Energy White Paper: Our Energy Future – Creating a Low Carbon Economy (2003) includes the key energy policy goal to "ensure that every home is adequately and affordably heated" and the aim "in England, within reason, for no household to be

[11] www.decc.gov.uk
[12] http://www.communities.gov.uk/publications/planningandbuilding/planningsustainablefuture

in fuel poverty by 2016". The Paper outlines national commitments on CO_2 reduction, energy efficiency and energy security, addresses the challenges facing the current energy system and outlines a long term framework for developing policies to ensure that the UK has access to reliable and affordable energy. Furthermore, it sets a priority for strengthening the contributions of energy efficiency and renewable energy, sets out plans for funding and support for innovation in – and deployment of – low carbon technology (such as renewables) and a more supportive approach to planning. It also sets an aspiration by 2020 to double renewables' share of electricity from the 2010 target.

The revised 2007 Energy White Paper includes a strategy to accelerate the deployment of low carbon technologies. It states that "planning is one of the most significant barriers to the deployment of renewables", sets out a 'statement of need' for renewables, sets out plans to improve the renewables grid connection and builds upon three underlying principles:

- improving the strategic context (i.e., national policy) against which individual planning decisions should be made;
- introducing more efficient inquiry procedures in the current consent regimes; and
- exploring options for more timely decision-making.

The 2007 White Paper: Planning for a Sustainable Future sets out detailed proposals for reform of the planning system, stating that planning can *"speed up the shift to renewable and low carbon forms of energy"*. It is intended to assist, amongst other targets, in delivering the Government's ambition of zero carbon development and in delivering greater use of renewable and low carbon sources of electricity through improved infrastructure.[13]

The 2009 Energy White Paper: *The UK Low Carbon Transition Plan* sets out a twelve-year plan for the UK to reduce CO_2 emissions by 18% on 2008 levels. This plan is the first that allocates specific carbon budgets for each of the Government departments and presents a roadmap to decarbonising the grid, including a target for the production of 30% of the electricity through renewable resources.

As part of the Low Carbon Transition Plan, the Government have allocated £3.2 billion to help households become more energy efficient and are piloting "pay as you save" ways to help people make their whole house greener. Furthermore, smart meters are being rolled out in every home by 2020. The Low Carbon Transition Plan also proposes mandating social price support, particularly for the older pensioners and lowest incomes. In order to deliver green homes in low income areas, the Government will also be piloting a community-based approach expected to help around 90,000 homes.

1.5.11 Code for Sustainable Homes and Building Regulations[14]

To strengthen the sustainability requirements of new dwellings, the Government launched the Code for Sustainable Homes (CSH or 'the Code') in 2006 to operate in parallel to the Building Regulations for energy use for new residential development (Approved Document Part L1A).

[13] The Draft Consultation on Zero Carbon (December 2008), has expanded the definition of 'zero carbon' homes to include homes which achieve at least a minimum level of carbon reductions through a combination of energy efficiency, onsite and/or offsite energy supply.
[14] CLG (2008) *The Code for Sustainable Homes: setting the standard in sustainability for new homes* [online] available at: http://www.communities.gov.uk/documents/planningandbuilding/pdf/codesustainhomesstandard.pdf

CSH sets out the national standard for sustainable design and construction of new homes. From April 2008, achieving Level 3 of the Code became mandatory for new social housing developments.

The Code includes sections on a number of different sustainability headings that cover, for example, the energy use in a home, the materials used for its construction and its effect on the site's biodiversity. Credits awarded for the Dwelling Emission Rate category within the energy section of the Code are based on percentage improvement of carbon dioxide emissions over Building Regulations.

The Code is currently undergoing consultation in view of Building Regulations requiring higher levels of efficiency; the Building Regulations will be progressively tightened requiring buildings to be 'carbon neutral' from 2016 onwards, which is equivalent to Level 5/6 of the Code. In terms of carbon emissions Level 3 equals a 25% carbon improvement relative to current 2006 standards in the Building Regulations. New housing developments will have to comply with Level 4 by 2013 (44% carbon improvement relative to current 2006 standards in the Building Regulations) and Level 6 by 2016 (zero carbon). Table 1.1 below summarises the proposed relationship between the Code and current and future Building Regulations.

Code Level	Current energy standard (Percentage improvement over 2006 Part L)	When change to regulations takes place	2009 Code consultation proposals (Percentage improvement over 2006 Part L)
1	10%		25%
2	18%		25%
3	25%	2010	25%
4	44%	2013	44%
5	100% regulated emissions		70% onsite + 30% allowable solutions
6	zero carbon onsite – 100% onsite plus appliances (equivalent to approximately 150% in total)	2016	"Zero Carbon Home" – 70% onsite + allowable solutions to reach zero carbon

Table 1.1: The Code for Sustainable Homes Consultation and Building Regulations

UK Building Regulations[15]

The 2006 amendments to Part L of the Building Regulations aim to reduce CO_2 emissions from buildings. Key additional requirements of Part L are as follows:

- New buildings must produce 20-28% less CO_2 than a 2002 Building Regulations compliant building.
- All new buildings must be designed to meet the design CO_2 emission target using the Simplified Buildings Energy Model (SBEM) or other approved software.

[15] www.communities.gov.uk

- Systems should be provided with appropriate controls to enable the achievement of reasonable standards of energy efficiency in use.
- In buildings with floor areas greater than 1,000m^2, automatic meter reading and data collection facilities should be included.
- An Energy Performance Certificate (EPC) must be provided for buildings over 1,000m^2.

1.5.12 Climate Change Levy

Renewables are exempt from the CCL, which is designed to encourage the business and public sectors to improve energy efficiency and reduce emissions of greenhouse gases through a price based signal on energy usage.

1.5.13 Carbon Reduction Commitment (CRC)

The CRC, aimed at reducing carbon emissions from large organisations, requires commercial and public sector organisations consuming at least 6,000MWh of electricity on all half-hourly (HH) electricity meters to participate in mandatory emissions trading. The cap-and-trade scheme will begin in January 2010, and the first capped phase will begin in January 2013.

1.5.14 Air Quality Strategy (2000)

Prepared under the Environment Act (1995), the strategy contains plans to improve and protect air quality in the UK and a statutory duty for local air quality management (LAQM) under the Environment Act 1995.

1.5.15 SOGE Targets

The Sustainable Operations on the Government Estate (SOGE) has set the following targets for carbon emissions from offices and for energy efficiency and renewables:

- Reduce carbon emissions by 12.5% by 2010-11, relative to 1999/2000 levels.
- Reduce carbon emissions by 30% by 2020, relative to 1999/2000 levels.
- Departments to increase their energy efficiency per m² by 15% by 2010, relative to 1999/2000 levels.
- Departments to increase their energy efficiency per m² by 30% by 2020, relative to 1999/2000 levels.
- Departments to source at least 15% of electricity from Combined Heat and Power (2010).

1.6 Regional Policy

1.6.1 The South East Plan

The South East Plan aims to reduce the region's carbon emissions by 20% by 2010 and by at least 25% by 2015. Policy CC2 on Climate Change includes the encouragement of renewable energy development and use. Policy CC4 on Sustainable Design and Construction requires a

proportion of the energy supply of new development to be secured from decentralised and renewable or low-carbon sources. The Plan sets out several specific policies for Renewable Energy:

- NRM11: Development Design for Energy Efficiency and Renewable Energy – includes, where applicable, the target (in advance of local targets being set in development plan documents) for new developments of more than 10 dwellings or 1000m^2 of non-residential floorspace to secure at least 10% of their energy from decentralised and renewable or low-carbon sources.
- NRM12: Combined Heat and Power (CHP) – encouraging integration of CHP and district heating in developments, including biomass investigation and promotion.
- NRM13: Regional Renewable Energy Targets – sets minimum regional targets for electricity generation from renewable sources of: 620MW installed capacity and 5.5% electricity generation capacity by 2010, 895MW and 8% by 2016, 1,130MW and 10% by 2020 and 1,750MW and 16% by 2026.
- NRM14: Sub-regional targets for land-based renewable energy – Development plans should include policies and development proposals, where practicable, to contribute to sub-regional targets which for East Sussex and West Sussex are: 57MW towards the 2010 Renewable Energy Target; and 68MW towards the 2016 target. ECSC is the identified 'champion' for this purpose. To assist, Local Authorities should: collaborate and engage with communities, the renewable energy industry and other stakeholders; undertake detailed assessments of local potential; encourage small scale community-based schemes; encourage development of local supply chain (especially for biomass); and raise awareness, ownership and understanding of renewable energy.
- NRM15: Location of renewable energy development – LDDs should encourage development of renewable energy in order to achieve the above targets. The policy sets out how locations may be prioritised to avoid adverse impacts (e.g. on AONBs and protected landscape) and should be informed by landscape character assessments where available.
- NRM16: Renewable energy development criteria – Local Authorities should support development of renewable energy in principle and develop policies that consider: regional and sub-regional targets; renewables' integration in existing and new development; potential benefits to communities and the environment; the proximity of biomass combustion plants to the fuel source and the adequacy of local transport networks; and availability of connection to the electricity distribution network.

1.6.2 Existing Stock

Policies in the South East Plan also encourage energy efficiency when refurbishing existing stock:

- NRM11 & NRM12 (as outlined above); and
- Policy CC4.

1.6.3 Regional Strategy for Energy Efficiency and Renewable Energy[16]

This Energy Efficiency and Renewable Energy Strategy is a regional framework that sets out a vision for the substantial increase in the efficiency of energy use and the proportion of energy supplied by renewable sources in South East England. It includes a target for the region to generate at least 5.5% of its electricity from renewable sources by 2010 and at least 16% by 2026.

1.6.4 East Sussex Biomass Fuel Strategy (2004)[17] and Environmental Management Policy (2001)

This Strategy was developed in 2004 to support East Sussex's Environmental Management Policy (which was revised in February 2001). This Revised Policy includes Policy E2 – increase the use of renewable energy. The Biomass Strategy states that *"ESCC's first choice fuel for heating its buildings will be biomass. However, any installation of a biomass fuel boiler must be based upon a sound technical and economic business case including a full risk assessment."*, and explains how this will be implemented.

1.6.5 Local Climate Impact Profile (LCLIP) for East Sussex

The LCLIP process reveals the vulnerability of an area to severe weather events and the impact these may have on local communities as well as Local Authority assets, infrastructure and capacity to deliver services. By reviewing the impact of past severe weather events, the LCLIP can be used to help understand how resilient (or vulnerable) an area is likely to be to severe weather in the future. A county-wide media research study has been carried out as the initial stage of an LCLIP for East Sussex. In Rother, this is being used to inform a policy review relating to the Council's work in addressing National Indicator 188 (Planning to Adapt to Climate Change).

The UK Climate Impacts Programme (UKCIP) has suggested that individual Councils or regional organisations should compile Local Climate Impact Profiles (LCLIPs) as a cost-effective and simple means of determining the degree to which extreme weather has impacted local people and services. An LCLIP could also help to identify whether improvements have been or could be implemented to lessen the impact of similar events in the future. The first was successfully developed by Oxford County Council in 2006, and many more have been and continue to be developed since.

An LCLIP has been developed[18] on both a District and county level for Rother and East Sussex, based on a media trawl through local newspaper archives over the period 1998 – 2008.

LCLIP Results

There were 107 extreme weather events over the period of 1998 – 2008, spread over time as illustrated below:

[16] http://www.southeast-ra.gov.uk/sustainability_energy_efficiency.html
[17] http://www.eastsussex.gov.uk/yourcouncil/agendasreportsminutes/cabinet/corporateresourcesdecisions/reports/LMCR31Mar2004Item6AppendixBiomass.pdf
[18] A Local Climate Impact Profile (LCLIP) for East Sussex, Prepared by Patrick Austin, Media trawl – submitted 12/01/2009

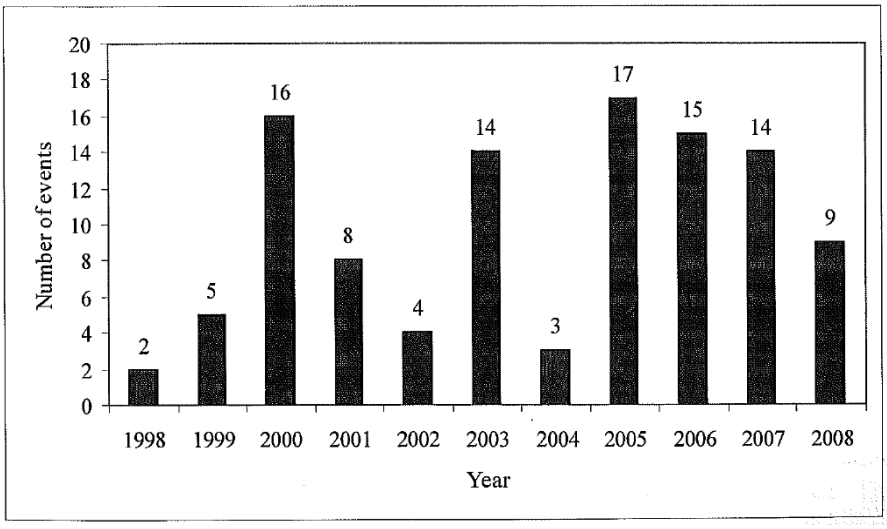


Figure 1-5: Number of reported extreme weather events 1998 - 2008 (East Sussex LCLIP)

These have further been subdivided into categories of type of event, as illustrated below:

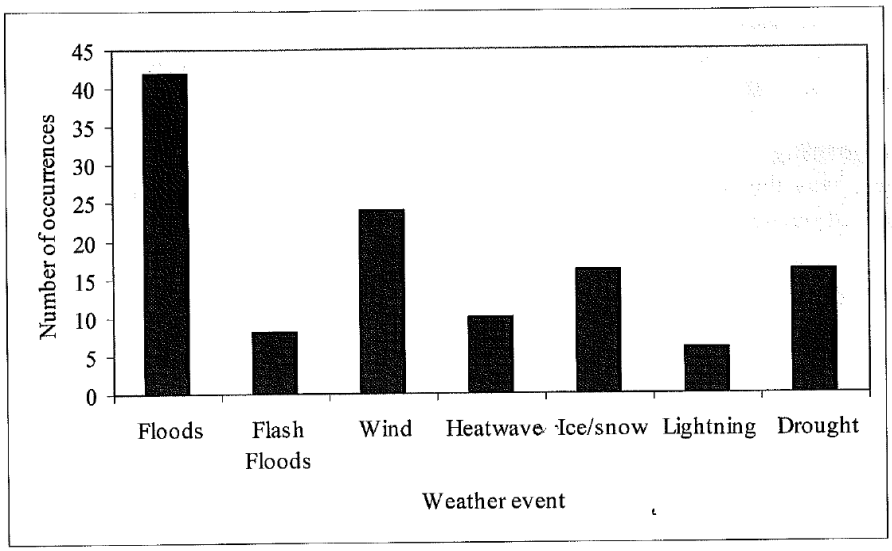


Figure 1-6: Frequency of extreme weather events (East Sussex LCLIP)

It is interesting to note in the context of the LCLIP and the work of the UKCIP that flooding is already the most frequent cause of reported extreme weather incidents. The prognosis of the UKCIP under a medium emissions scenario (e.g. emissions projection A1B as described below in Section 1.8) is that winter precipitation has a 50% likelihood of increasing by 22% by 2080. These two figures for floods and increased precipitation do not, of course, necessarily correlate (e.g. this increase in precipitation could be in 'normal' rain that does not cause any undue strain on services or people), but with an increase of 22% it intuitively seems more likely that flooding events may occur.

1.7 Local Policy

1.7.1 Rother District Local Plan

The Local Plan – which expired in July 2009 – does not have a specific policy on renewable energy. However, Chapter 7 sets out that the Council supports the use of renewables and reducing the needs to burn fossil fuels; to *"encourage wherever appropriate, the harnessing of renewable energy sources and the development of renewable energy schemes"*. The Plan also states that there is short-term potential for biomass, but that any proposals for biomass need to be compatible with the Area of Outstanding Natural Beauty designation. In the longer term, offshore wind power and photovoltaic solar power are acknowledged as having potential.

1.7.2 Rother District's Emerging Policy, including The Core Strategy Consultation on Strategy Directions 2008

Rother District's emerging policy sets out specific strategies for Bexhill and Hastings fringes; Rye and Rye Harbour; Battle; and the Rural Area. None of these strategies identify renewable energy or low carbon development as a local priority. The document also sets out a District-wide, thematic policy relating to 'sustainable resource management'.

The background text highlights that:

- Within Rother District there is some potential for biomass, while favourable wind conditions prevail along the Fairlight – Hastings – Heathfield ridge for on-shore wind power. However, any proposals for renewable energy generation would need to be compatible with the AONB and nature conservation designations.
- In terms of reducing the demand for energy and water through efficiency measures, the District currently relies on Building Regulations.
- The policy sets out two options:

  Option 1 - Meet central and regional Government targets, including through setting renewable energy production thresholds for strategic sites;

  Option 2 - Go beyond CSH requirements and set District-wide and strategic site requirements for on-site renewable energy production – often set at 10% (Merton rule); and identify areas suitable for strategic renewable and low-carbon energy generation and supporting infrastructure in line with PPS1 Supplement (this would be most appropriate on a sub-regional joint working basis).

1.7.3 Affordable Housing SPD

Affordable units should be designed to accord with 'the EcoHomes standard'. No level is specified.

1.7.4 A Review of Potential Sustainable Energy Measures for North East Bexhill SPD

A key principle is for the development to be an exemplar of sustainable design, construction and energy generation.

The SPD is not prescriptive in the measures to be employed, but specific consideration should be given to the range of potential energy efficiency and renewable energy generation options indicated below:

- The use of solar heat, daylight and natural ventilation should be optimised by some 90% of dwellings having a principal glazed elevation facing to within 25% of south.
- The potential for a centralised Combined Heat and Power (CHP) facility run on gas or renewable biomass fuels should be specifically investigated as part of an overall assessment and report on sustainable energy measures proposed for the development.
- If a CHP facility is feasible, its siting should be provided for within an employment allocation.
- The potential for wind energy should be exploited, provided established standards concerning noise, shadow flicker and telecommunications interference can be met.
- If wind energy is feasible, its siting should be on the edge of the development areas.
- The use of Modern Methods of Construction (MMC), including modular building systems, will be encouraged where it can be demonstrated that such systems are of sustainable high quality manufacture and are consistent with urban design objectives.

The above should enable housing development to achieve Code Level 4 of the Government's Code for Sustainable Homes.

1.7.5 Draft Rock Channel Area Rye Development Brief SPD

The Draft Rock Channel Area Rye Development Brief SPD states that "*sustainable construction techniques and renewable energy technologies should be incorporated into the planning and design of development where possible. The energy efficiency of buildings, both residential and commercial, should be a central consideration in the design process*".

1.7.6 Local Area Agreements (LAAs)

A Local Area Agreement (LAA) is a three year contract between central and local Government setting out the priorities for a local area and how these will be tackled in partnership. The LAA also provides a way of strengthening partnerships and partnership working, pooling budgets and streamlining performance management systems.

Each Local Authority has its own Local Strategic Partnership (LSP), which is responsible for setting up LAAs. Rother District's LSPs lie under the East Sussex County Council, which is the body accountable for Local Area Agreements in the region.

The new East Sussex Local Area Agreement (2008-2011) highlights 42 areas for improvement, known as performance indicators, including 10 focusing on education and early years. Each performance indicator includes targets to measure progress. The performance indicators used in the East Sussex LAA have been taken from a set of 198 national indicators created by central Government.

Targets that Rother District Council is working towards include increasing the number of energy efficiency grants delivered.

1.8 UKCIP09 Projections

1.8.1 Introduction

The UK Climate Projection[19] (UKCIP09) provides projections of climate change for the UK, giving greater spatial and temporal detail than previously released UK climate scenarios. The work of the UK Climate Projections programme gives perspective to the targets and aims of the environmental policy measures that Rother District Council is developing in its Core Strategy. Understanding of human impact on climate change is continually improving, and this section provides a brief overview of the latest set of climate predictions for the UK (UKCP09), and the probability of different levels of climate outcomes occurring locally to Rother.

The UKCIP does not attempt to predict the degree to which economic and social change will affect emissions levels, but rather takes as its starting point three different emissions scenarios (A1FI or 'high', A1B or 'medium' and B1 or 'low'), and then calculates the probability of different climate scenarios resulting from these emissions level changes. The level of ambition of different policy scenarios under examination in this study are effectively contributing to the shift towards a lower emissions scenario, and thereby reducing the probability of more severe climate change impacts occurring, as calculated to the best of their ability by Climate Change experts.

The levels of annual global emissions adopted under different scenarios are illustrated in Figure 1.7 below:

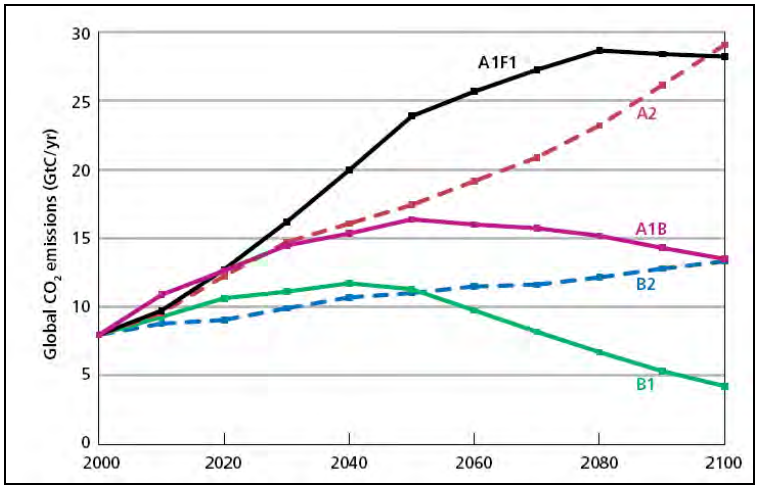


Figure 1-7: Global annual CO2 emissions under the three IPCC scenarios in UKCP09.

NB: The dotted lines in Figure 1.7 show UKCIP02 scenarios.

Regarding the level of confidence which we should attribute to the results of modelling, UKCP09 states 'Models will never be able to exactly reproduce the real climate system; nevertheless there

[19] UK Climate Impacts Programme, DEFRA, DECC, DOE, The Scottish Government, the Welsh Assembly Government, the Met Office Hadley Centre, July 2009.

is enough similarity between current climate models and the real world to give us confidence that they provide plausible projections of future changes in climate'[20].

The figure below[21] illustrates projections in global temperature from 21 global models (mean series shown in black dots) under the A1B ('medium') emissions scenario.

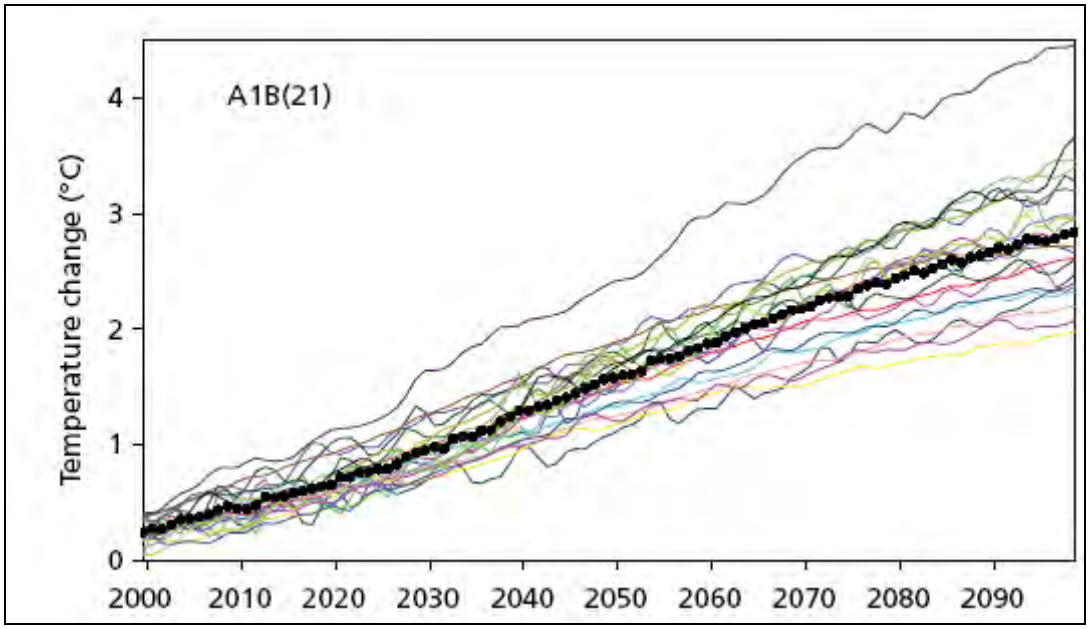


Figure 1-8: Temperature changes under A1B emissions

Whilst global weather changes are critical to the sustainability of human existence, local climate changes also bring home the relevance of intervention at a local level. The latest projections of UKCP09 show changes for the administrative regions:

[20] Ibid, page 8.
[21] Ibid, page 29

Figure 1-9: Administrative regions over which changes are averaged in the UKCP09 regional key findings

For the South East of England, under a medium emissions scenario, the following statements are made by UKCP09[22] for 2080:

- Under medium emissions, the central estimate of increase in winter mean temperature is 3ºC; it is very unlikely to be less than 1.6ºC and is very unlikely to be more than 4.7ºC.
- Under medium emissions, the central estimate of increase in summer mean temperature is 3.9ºC; it is very unlikely to be less than 2ºC and is very unlikely to be more than 6.5ºC.
- Under medium emissions, the central estimate of change in winter mean precipitation is 22%; it is very unlikely to be less than 4% and is very unlikely to be more than 51%.
- Under medium emissions, the central estimate of change in summer mean precipitation is –23%; it is very unlikely to be less than –48% and is very unlikely to be more than 7%.

The 50% probability levels (e.g. as likely to happen as not to happen) for annual mean temperature, summer precipitation and winter precipitation in the South East of England are displayed in the Appendices to this document[23]:

[22] http://ukcp09.defra.gov.uk/content/view/38/6/, accessed 02 November 2009
[23] http://ukclimateprojections.defra.gov.uk/content/view/1480/543/#50, accessed 02 November 2009

2 Government Energy Standards & Financial Implications

2.1 The Code for Sustainable Homes

The Code for Sustainable Homes (CSH) was introduced in April 2007 as a voluntary measure to provide a comprehensive assessment of the sustainability of a new home and replaces the EcoHomes methodology. It is developed by the BREEAM centre at the Building Research Establishment under contract to Communities and Local Government and can be used by developers to differentiate the performance of their homes and to give the consumer the necessary information to help make a more sustainable choice of dwelling. The Code Level is awarded on the basis of achieving both a set of mandatory minimum standards for waste, material, surface water run-off, energy and potable water consumption and also a minimum overall score.

Ratings under the Code are attributed to each dwelling type within a development and specific mandatory energy targets are set for each level of the Code as outlined in Table 2.1 below.

CSH Level and Star rating	Energy Requirements (Improvement over TER)	Overall Performance Improvement over Baseline
Level 1 (*)	10%	36%
Level 2(**)	18%	48%
Level 3 (***)	25%	57%
Level 4 (****)	44%	68%
Level 5 (*****)	100%	84%
Level 6 (******)	Zero Carbon	90%

Table 2.1: CSH Level and Performance Improvement

The targets above are based on improvements to Part L of the Building Regulations. Currently Level 6 of the Code (zero carbon) is obtained through offsetting all of the $C0_2$ from both Part L regulated energy uses and non-regulated energy sources such as household appliances and cooking (not assessed under Part L). Unregulated energy accounts for approximately 30-40% of a household's energy consumption and will require a reduction on the Target Emission Rate (TER) of approximately 150% to attain Code 6. See Figure 2.1 which illustrates regulated and unregulated emissions overleaf:

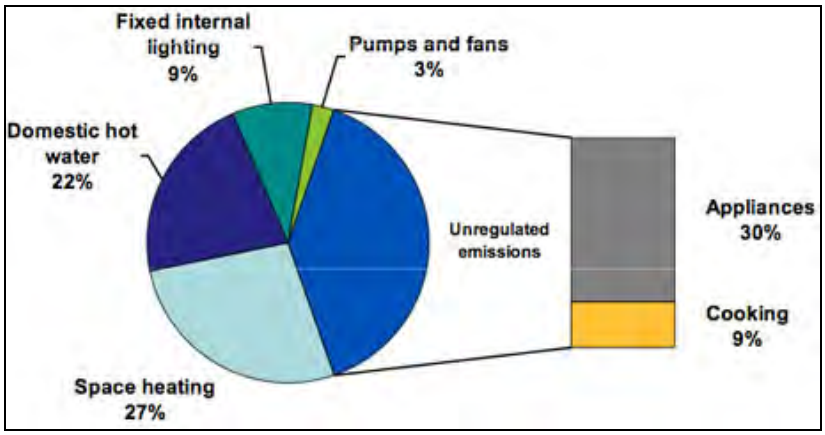


Figure 2.1: Regulated and unregulated emissions as defined by Part L

'Zero carbon' homes as defined by the Code are required to have a maximum heat loss parameter (HLP) from the building fabric of 0.8Wm^{2}K. Additionally, low and zero carbon energy generation are required to be either located on the development site or be physically connected to a dwelling via private wire or a District Heat (DH) network. The Code is currently undergoing consultation, which is likely to replace the HLP measure with an energy demand measure in kWh/m^2. Furthermore, Building Regulations will be requiring higher energy efficiency levels as part of the Roadmap to zero carbon homes (refer to Section 1.5.11 in this report for further details).

There is still ambiguity over the definition of zero carbon and how this is defined by part L of the Building Regulations, however the consultation paper released by the Department of Communities and Local Government sets out the following:

1. A minimum standard of energy efficiency will be required.
2. A minimum carbon reduction should be achieved through a combination of energy efficiency, onsite low and zero carbon (LZC) technologies, and directly connected heat. This is referred to as achieving carbon compliance.
3. Any remaining emissions should be dealt with using allowable solutions, including offsite energy.

Developers will need to employ some combination of the following 'allowable solutions' in order to deal with the residual emissions after taking account of the minimum carbon compliance standard - expected to be somewhere between 44% and 100%. Allowable solutions are proposed to be as follows:

- carbon compliance beyond the minimum standard (towards or fully mitigating 100 per cent of regulated emissions plus emissions from cooking and appliances);
- a credit for any energy efficient appliances or advanced forms of building control system installed by the house builder that reduce the anticipated energy demand from appliances or reduce regulated emissions below the level assumed by the Government's Standard Assessment Procedure (SAP);

- where, as a result of the development, low carbon or renewable heat (or cooling) is exported from the development itself, or from an installation that is connected to the development, to existing properties that were previously heated (or cooled) by fossil fuels, then credit will be given for the resulting carbon savings;
- a credit for S106 Planning Obligations paid by the developer towards local LZC energy infrastructure;
- retrofitting works undertaken by the developer to transform the energy efficiency of existing buildings in the vicinity of the development;
- any investment by the developer in LZC energy infrastructure (limited to the UK and UK waters) where the benefits of ownership of that investment are passed on to the purchaser of the home;
- where offsite renewable electricity is connected to the development by a direct physical connection (and without prejudice to any regulatory restrictions on private wire), a credit for any carbon savings relative to grid electricity; and
- any other measures that Government might in future announce as being eligible.

Box 1: What does a zero carbon home mean?

Building A Greener Future (July 2007) set out that all new homes are to be built from 2016 in such a way that, after taking account of:

- emissions from space heating, ventilation, hot water and fixed lighting
- expected energy use from appliances
- exports and imports of energy from the development (and directly connected energy installations) to and from centralised energy networks,

the building will have net zero carbon emissions over the course of a year.

The present consultation retains the approach of looking at net emissions (including from appliances) over the course of a year. It proposes that, to meet the zero carbon homes standard, homes should:

- be built with high levels of energy efficiency
- achieve at least a minimum level of carbon reductions through a combination of energy efficiency, onsite energy supply and/or (where relevant) directly connected low carbon or renewable heat; and
- choose from a range of (mainly offsite) solutions for tackling the remaining emissions.

Box 2.1: Extracted from the "Definition of Zero Carbon Homes and Non-domestic Buildings: Consultation"[24]

Often overlooked and fundamental in terms of policy is that the energy targets are only part of the Code. The Code for Sustainable Homes also addresses other environmental issues:

- Water
- Materials
- Surface Water runoff
- Waste

[24] www.communities.gov.uk/publications/planningandbuilding/building-a-greener

- Pollution
- Health and Wellbeing
- Management
- Ecology

Mandatory credits are included for energy reduction, water use, construction materials, surface water runoff and construction Site Waste Management.[25] Although the significant proportion of the cost of delivering Code levels is attributed to energy, the other categories will also require some due consideration throughout the development planning process. Nevertheless, for the purpose of this study we focus on the energy targets only and, therefore, do not evaluate in detail the wider sustainability requirements.

2.2 BREEAM

BREEAM (Building Research Establishment Environmental Assessment Method) is a tool used to review of the sustainability performance of non-domestic buildings throughout the life cycle of the project; from planning through to detailed design, construction and finally building handover. In the UK, BREEAM has been accepted as representing best practice for building appraisal and is now being used extensively by property professionals to provide a benchmark for the environmental performance of buildings that they are designing, refurbishing or operating. BREEAM is flexible and can be applied to provide a benchmark of environmental performance at any stage of the building's life cycle, through an iterative assessment process against three principal components as follows.

Figure 2.2: BREEAM Process

2.2.1 Core Component

The issues assessed as part of the core component provide a comparative assessment of a building's environmental impact during operation. Core issues are addressed during both Design and Procurement and cover essential elements of key environmental topic areas: Health and

[25] Following the current Code consultation, it is likely that the requirement for a Site Waste Management Plan will be removed, as this is already a mandatory requirement under national policy.

Wellbeing, Energy, Transport, Water, Materials and Pollution. They can be applied at any stage of the building's lifecycle, providing a consistent tool for the property market.

2.2.2 Design and Procurement

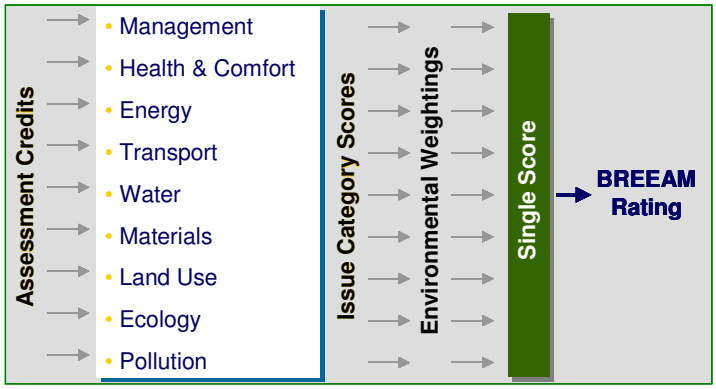
This usually takes place during the detailed design stage of all new build and refurbishments. It includes an assessment of issues under key topic areas that are of relevance during the design process such as construction project commissioning and cooling tower design, thermal comfort, predicted noise, building materials selection, re-use of façades and specification of thermal insulation materials. It also includes an assessment of sub-elements to additional key topic areas of Land Use (contaminated land, remediation, etc.) and Ecology (habitat diversity, habitat enhancement etc.).

2.2.3 Post-Construction Review

Following the Interim Design Stage assessment a Post-Construction Review (PCR) is carried out by a qualified BREEAM Assessor to verify the building was constructed as per design specifications. Following a formal submission from the BREEAM Assessor to the Building Research Establishment (BRE) and provided the evidence meets all the BRE's requirements and Quality Assurance, a separate PCR certificate would be awarded by the BRE.

Depending on the type of building and the use of the building, it can be assessed under various BREEAM methodologies. For each issue, there are a number of credits available. Where the building attains or exceeds various benchmarks of performance, an appropriate number of credits is awarded. Although a wide range of credits is available for each assessment, each credit does not carry equal importance to the overall score. The findings are weighted based upon their perceived importance as determined by consensus, via detailed research and consultation by BRE with a variety of interest groups.

The weightings obtained as a result of this research are applied to the individual issue categories to provide an overall BREEAM Assessment score.



Depending on the number of credits attained in the various issue categories, the results are translated into a corresponding overall single score which gives consideration to the environmental weightings. This single score translates into the BREEAM rating, in accordance with the thresholds illustrated in Table 2.2.

BREEAM Industrial Rating	Percentage Score
Pass	**>30%**
Good	**>45%**
Very Good	**>55%**
Excellent	**>70%**
Outstanding	**>85%**

Table 2.2: BREEAM score and associated rating

2.3 Energy Performance Certificates

The Energy Performance Certificate (EPC) is a measure introduced across Europe to reflect legislation under the EU Performance of Buildings Directive (EPBD) which aims to reduce buildings' carbon emissions. An Energy Performance Certificate is required for all homes whenever built, rented or sold. The certificate records how energy efficient a property is as a building and provides ratings on a scale of A-G, with 'A' being the most energy efficient and 'G' being the least.

Alongside the need for an Energy Performance Certificate to be produced for all new buildings, large public buildings must now also have Display Energy Certificates which illustrate how energy efficient public buildings are, and therefore create an incentive to ensure that buildings incorporate energy efficiency in construction as well as operation.

Specific levels of EPC are mandatory in accordance with different levels of BREEAM. For example, in order to achieve a BREEAM 'Excellent' rating an EPC of 40 is required and for a rating of 'Outstanding' and EPC of 25. There is currently no mandatory EPC requirement for BREEAM Very Good, although an appropriate level in line with the Very Good performance from our experience of projects would be an EPC of 50.

2.4 Future Energy Targets – Non-Domestic

Subsequent policy and standards have also been set in order to create a step change to zero carbon for non-domestic buildings. The UK Sustainable Construction Strategy sets out and anticipates the following step change to zero carbon with new schools, public sector buildings and other non-domestic buildings to be zero carbon from 2016, 2018 and 2019 respectively. See Table 2.3 below:

Figure 2.3: Anticipated Carbon Reduction Targets all Building Types

2.5 Costs & Delivery Options - Codes

A number of studies into the technologies and projected costs for the delivery of varying levels of the Code for Sustainable Homes have been carried out for the DCLG by Cyril Sweett. Scott Wilson has used the outputs of these studies to inform the viability testing of policy measures considered within this study.

There will be a variety of development styles within Rother over the plan period, and hence for each of the dwelling types (flats, mid-terrace, semi-detached/ end terrace, detached), the projected uplifts in base build costs are illustrated overleaf[26] (see Figures 2.4 – 2.7):

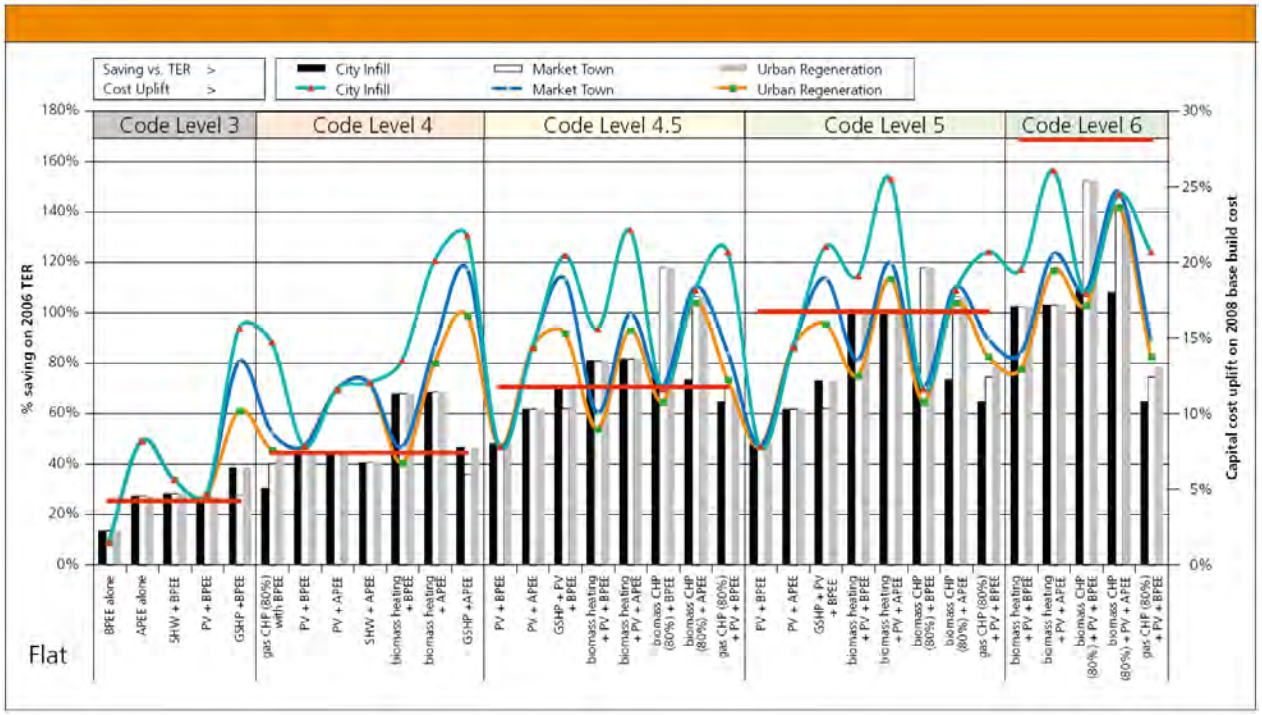


Figure 2.4: DCLG Cost uplift and carbon saving projections (flats)

[26] Costs and Benefits of Alternative Definitions of Zero Carbon Homes, DCLG, February 2009,

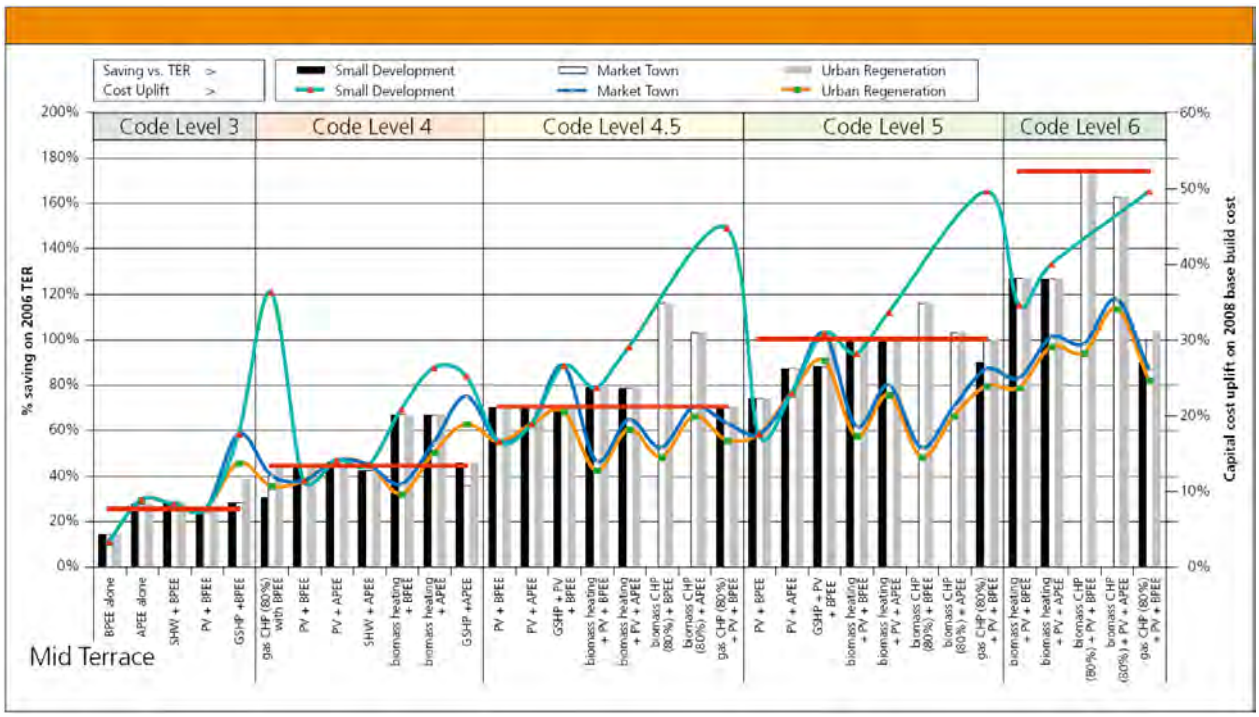


Figure 2.5: DCLG Cost uplift and carbon saving projections (mid-terrace)

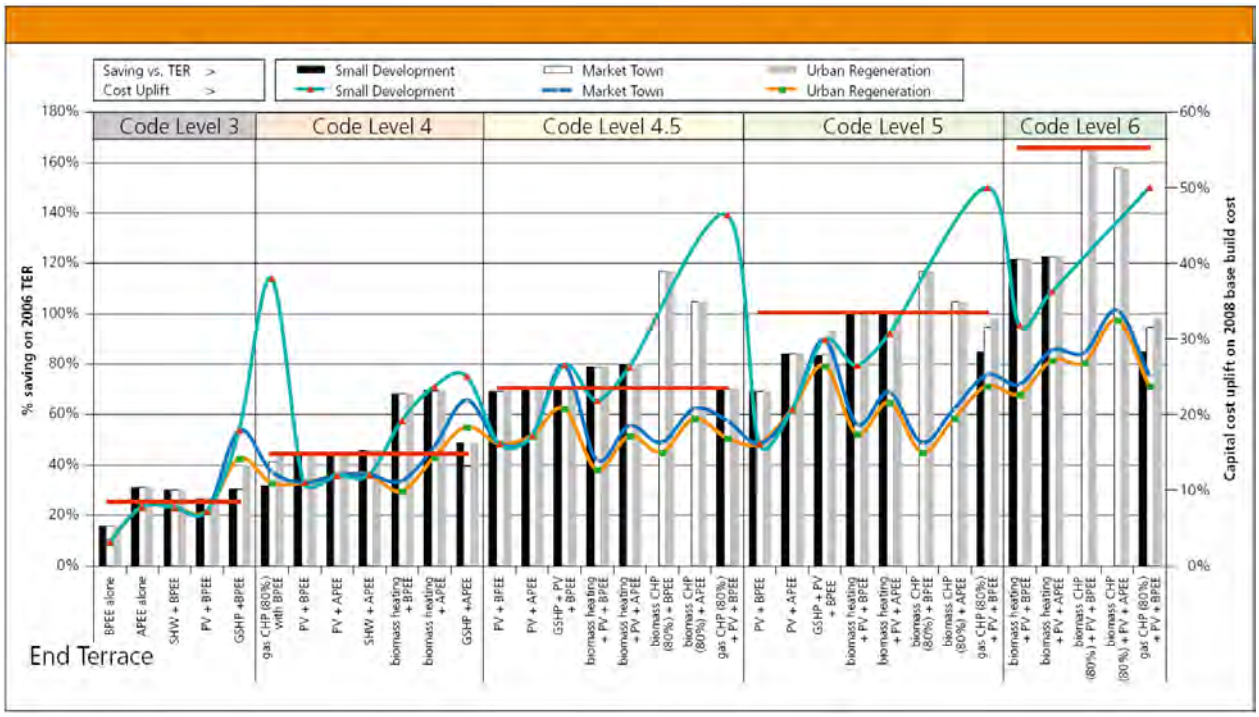


Figure 2.6: DCLG Cost uplift and carbon saving projections (semi-detached/ end-terrace)

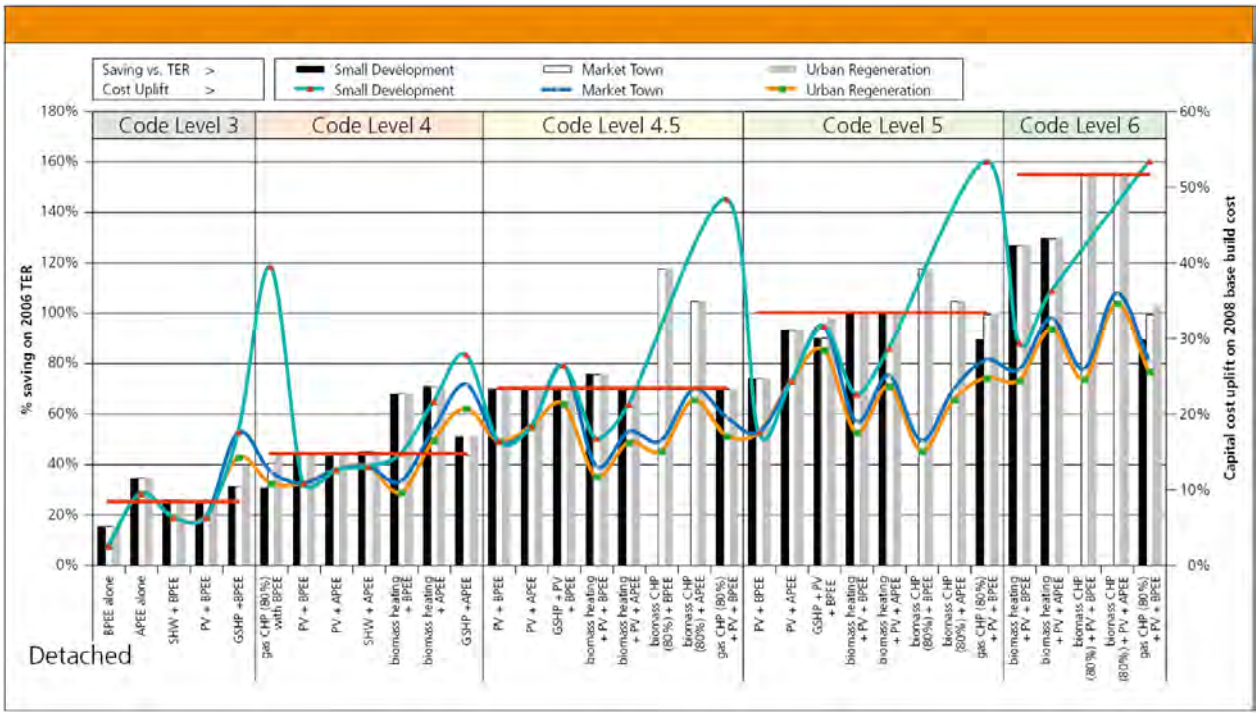


Figure 2.7: DCLG Cost uplift and carbon saving projections (detached)

These graphs provide an indication of the uplift cost for achieving the energy targets for differing Code levels in respect to energy-specific technology which will have wide-ranging implications. However, it must also be emphasised that these are generic figures, and local circumstances may impact the costs illustrated here. Nevertheless, these figures represent a useful starting point upon which to base policy decisions.

Figure 2.8 below provides an indication of the likely build cost (residential buildings) for achieving both energy and sustainability targets up to Code level 6 which have been used to inform the development viability analysis specific to Rother, detailed in Section 5.8 and **Appendix C**.

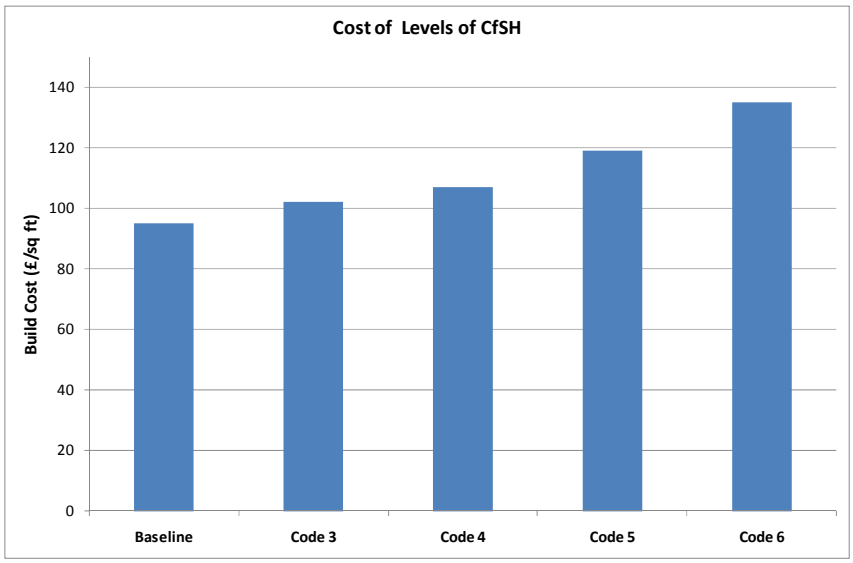


Figure 2.8: Cost Uplift for Code Levels

2.6 Costs of Delivering BREEAM Targets

The cost of delivering BREEAM targets is derived from research carried out by the BRE in conjunction with Cyril Sweet and Faithful and Gould for offices[27] and schools[28] respectively.

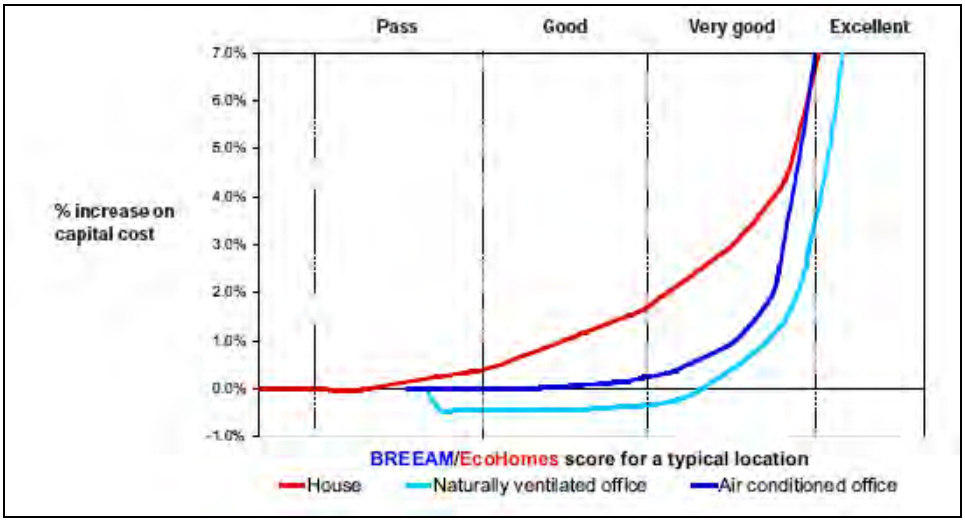


Figure 2.9: Cost for Achieving BREEAM Targets, Offices compared to Housing

In summary, Figure 2.9 identifies the base build cost to deliver Good, Very Good and Excellent ratings under BREEAM Offices 2004 and BREEAM Schools 2006 in Figure 2.10:

[27] *Putting a price on Sustainability – BRE, 2005*
[28] *Putting a price on sustainable Schools – BRE 2008*

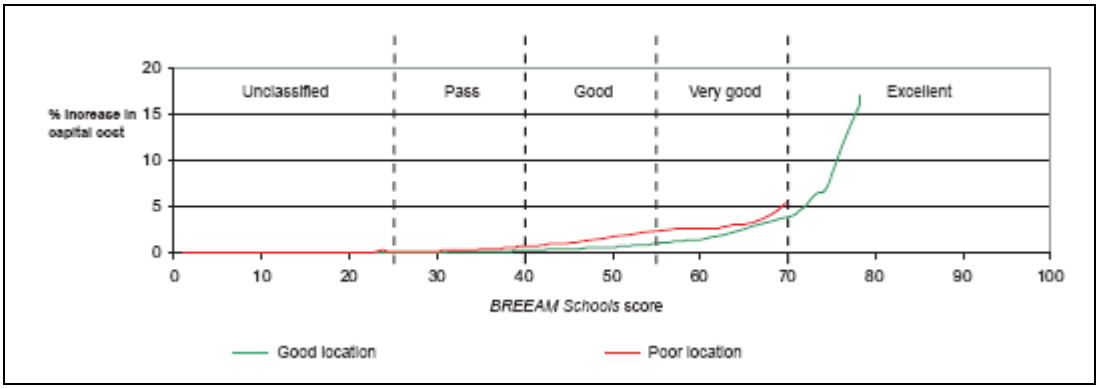


Figure 2.10: Cost for Achieving BRREAM Schools

Figure 2.10 from the BRE report, *Pricing Sustainability in Schools* suggests an uplift of between 3-15% to deliver BREEAM 'Excellent' based on a secondary school block (3,116m2).

There is very limited published information on the costs to deliver energy targets for non-domestic buildings and no published cost data based on meeting BREEAM Offices targets since 2004, therefore cost data is not currently available for the new 2008 methodology which has mandatory targets for energy (based on the EPC rating – see Section 2.3 in this report for details).

2.7 Government Incentives

2.7.1 Feed-In Tariffs (FITs)

The Energy Act 2008 provides broad enabling powers for the introduction of feed-in tariffs (FITs) for small-scale low-carbon electricity generation, up to a maximum limit of 5 megawatts (MW) capacity - 50 kilowatts (KW) in the case of fossil fuelled CHP. It has been proposed that the FITs be introduced through changes to electricity distribution and supply licences intended to encourage the uptake of small-scale low-carbon energy technologies. FITs will guarantee a price for a fixed period for electricity generated using small-scale low carbon technologies, currently estimated to be 38p/kWh, thus encouraging the installation of small scale low carbon technologies. The Government is committed to introducing FITs by April 2010. Nevertheless, the Renewables Obligation (RO) continues to be the main support mechanism for large scale renewable energy deployment.

The intention from DECC is that the deployment of small-scale low-carbon technologies will:

- engage communities, businesses and domestic households in the fight against climate change;
- reduce reliance on centrally generated electricity;
- increase security of supply; and
- reduce losses through transmission and distribution networks.

DECC states small-scale low-carbon electricity technologies include:

- Wind;
- Solar photovoltaics (PV);
- Hydro;
- Anaerobic digestion;
- Biomass and biomass combined heat and power (CHP); and
- Non-renewable micro-CHP.

2.7.2 Renewable Heat Incentive (RHIs)

In order to meet the 2020 15% renewable energy target as set out by DECC, generating heat from current and new forms of renewable energy will be required. Examples of renewable heat technologies include: air- and ground-source heat pumps, biomass fuelled stoves and boilers, solar thermal water heaters and combined heat and power plants, which use renewable fuels.

Heat generated from renewable sources accounts for only 0.6% of total heat demand – which will need to rise to 12% to hit the UK's binding EU targets. DECC have confirmed that financial assistance will be provided to compensate for cheaper alternatives to heating sources. This financial assistance is expected to expand the market and create economies of scale for renewable heat generation.

Powers in the Energy Act 2008 allow the setting up of a Renewable Heat Incentive (RHI). The Act allows the RHI to provide financial assistance to generators of renewable heat, and producers of renewable biogas and biomethane. Details of the scheme have not yet been finalised and consultation was proposed for the end of 2009, although it has not started at the time of this study. However, the following will be key features:

- It is expected that the incentive will apply to generation of renewable heat at all scales, whether it be in households, communities or at industrial scale.
- The incentive should also cover a wide range of technologies including biomass, solar hot water, air- and ground-source heat pumps, biomass CHP, biogas produced from anaerobic digestion, and biomethane injected into the gas grid.
- The incentive will apply across England, Scotland and Wales. (Northern Ireland will be required to develop their own legislation)
- The RHI will be banded for example by size or technology (e.g. larger scale biomass heat may require less support per MWh than others).
- The incentive payments will be funded by a levy on suppliers of fossil fuels for heat. These are mainly licensed gas suppliers but also include suppliers of coal, heating oil and LPG.

Through a consultative process, DECC propose to develop the RHI which will be set out in regulations to be approved by Parliament and aim to have it in place by April 2011.

2.8 Delivery Partners (ESCos)

The draft Practice Guidance to support PPS1 Supplement emphasises the value of ensuring adequate delivery arrangements are in place to secure new low and zero carbon energy infrastructure. This is of particular importance where decentralised energy equipment requires significant investment that is to be funded entirely or in part through revenue generated by energy sales and/ or there will be a requirement for co-ordinated operation and management arrangements to be put in place. The Practice Guidance recognises the value of third party involvement in the investment in, and operation of, heating and power networks and recommends the use of Energy Services Companies ('ESCos') as a partner to delivery.

There is no fixed definition or form for an ESCo. Their primary purpose can include promoting fuel security, combating fuel poverty, promoting energy efficiency and retailing energy to private, public or commercial customers. Similarly there is no single model for the establishment of an ESCo, with a range of different approaches in place including Local Authority-led ESCos (either singularly or via cross-border joint initiatives), joint venture enterprises, public-private partnerships and commercial energy providers. Depending on its business objectives, an ESCo can provide design expertise, investment finance, dedicated operation and management resources and customer services.

The involvement of an ESCo as a delivery partner will often mean a developer is more willing to include decentralised energy networks in a scheme as this can help to reduce the developer's capital expenditure and provides a means of avoiding legacy responsibilities beyond completion of a development.

If a Local Authority elects to take a lead role in the formation of an ESCo this may offer a number of benefits:

- As a dedicated entity with the primary purpose of delivery of a Council's climate change and spatial planning low carbon energy infrastructure objectives, an ESCo can operate with a sharper focus and purpose that is not available to existing Council services.
- An ESCo can operate as a commercial entity outside a Council's existing services and business structures. This creates a business-orientated environment in which to progress an ESCo's objectives with the consequence that it may be more entrepreneurial in its activities and less directly affected by shorter term Local Authority service objectives.
- The creation of an ESCo provides a means by which a Council can identify and manage its investment risk, maintaining separation between the ESCo and its core services.

The presence of an ESCo within a locality can help to stimulate further development of low carbon energy infrastructure. An initial development with a small distributed energy network operated by an ESCo can provide the catalyst for further expansion and connection to serve later phases of a large scheme, or subsequent developments nearby. This is reflected in paragraph 27 of the Supplement to PPS1 which states that:

> *'Where there are existing decentralised energy supply systems, or firm proposals, planning authorities can expect proposed development to connect to an identified system, or be designed to be able to connect in future.'*

Additionally, the presence of an ESCo will also incentivise the connection of existing buildings to an energy network, by providing enlargement of the ESCo's customer base. This may take the form of physical connection via a heat main to provide district heating to existing buildings; a distributed cooling network to provide air conditioning and cooling; and/ or electricity supply via a private wire network (PWN). Alongside the pipe and cable infrastructure, some ESCos also supply local buildings with electricity via the existing local District Network Operator's (DNO) network. These 'virtual' private wire networks have enabled ESCos to supply surplus electricity generated through CHP equipment to customers such as schools and civic buildings within a local community when they are located too far from the CHP to justify the cost of providing a dedicated private wire connection.

2.9 Policy Implications

The cost of achieving Codes 3, 4, 5 and 6 and BREEAM 'Very Good and 'Excellent' are significant and may prove challenging to achieve for developers in Rother unless developers engage in pre-application discussions with Rother and develop innovative approaches to funding and the release of profit on developments.

Accounting for reductions in infrastructure and energy costs and the potential price premium on a Code Level dwelling is likely to improve viability. This has not been evaluated in detail within this study as there is no established evidence base in the industry. Please refer to Section 5.8 for a summary of development viability review, which tests the impact of achieving specific levels of the Code in Rother District based on current market estimations. Further detail is provided in Appendix C.

The cost uplift is an essential consideration in terms of policy and is discussed in Section 5. Achieving national Government targets is going to be challenging and policies with respect to affordable housing and Section 106 Obligations may need to be considered in order to accommodate high levels of the Code on strategic sites. Section 4 also reviews the carbon footprint within Rother and the implication of achieving more aspirational policies. This in turn has informed the policies evaluated in Section 5 and recommended in Section 6.

3 Baseline District Energy Demand & Emissions Projection

3.1 Introduction

The aims of the carbon footprint assessment and carbon mapping undertaken on behalf Rother District Council were twofold: first, to quantify the level of emissions currently generated by the building stock in the District; and, second, to identify those areas with the highest density of carbon emissions. The high density emissions areas represent locations where greatest impact on the overall carbon footprint could be made through suitable policy intervention.

Unless otherwise stated all energy and emissions figures shown in this section refer to total energy (e.g. the sum of regulated and unregulated energy).

3.2 Methodology and Data Sources

Several sources of data have been explored and adapted in compiling the base data to create a carbon snapshot of Rother. Avenues explored included:

- Census 2001 data
- East Sussex in Figures
- Valuation Office Agency data
- National Statistics Office data
- Energy suppliers
- National Grid
- Site survey
- Rother District Council supplied data
- BRE published data
- DECC published data

A number of previous statistical studies have addressed the issues of fuel use at a District level, and high quality data (e.g. that has achieved the status of National Statistics) is available. Already available figures include the level of carbon emissions arising from buildings at District level, displayed below. The figures corresponding to the National Indicator 186 methodology have been selected in order to ensure compatibility between this document and the Council's internal monitoring and reporting methodology.

However, for the purposes of this study, where the effect of policy intervention must be assessed at individual development level, District-wide data only has limited relevance. Hence, one focus of research and efforts in this study has been to break down District-level statistics into a mixture of Middle Layer Super Output Area (i.e., the smallest geography at which both domestic and

commercial energy consumption data is available), Parish and Census Output Area levels, such that a more detailed picture of carbon impacts can be obtained.

3.3 Rother District Council Carbon Footprint

DECC has published statistics for Rother in the following form, based on 2007 data:

Fuel Type	Industrial	Domestic	Agriculture	Other	Total
Electricity	97	114			**211**
Gas	61	97			**159**
Oil	14	19	12		**44**
Solid Fuel	1	3	0		**4**
Wastes and Biofuels	2				**2**
Petrol and Diesel				192	**192**
Others	7	3	0	1	**11**
TOTAL	**182**	**236**	**12**	**193**	**623**

Table 3.1: Rother District Council Carbon Emissions Derived from DECC Data

The results highlighted in green above summarise the District-wide carbon emissions that are anticipated from the buildings' sector, forming the focus of this report. A pie chart of emissions by sector for the District is shown below, illustrating the contribution of the built-environment to the wider basket of carbon emissions.

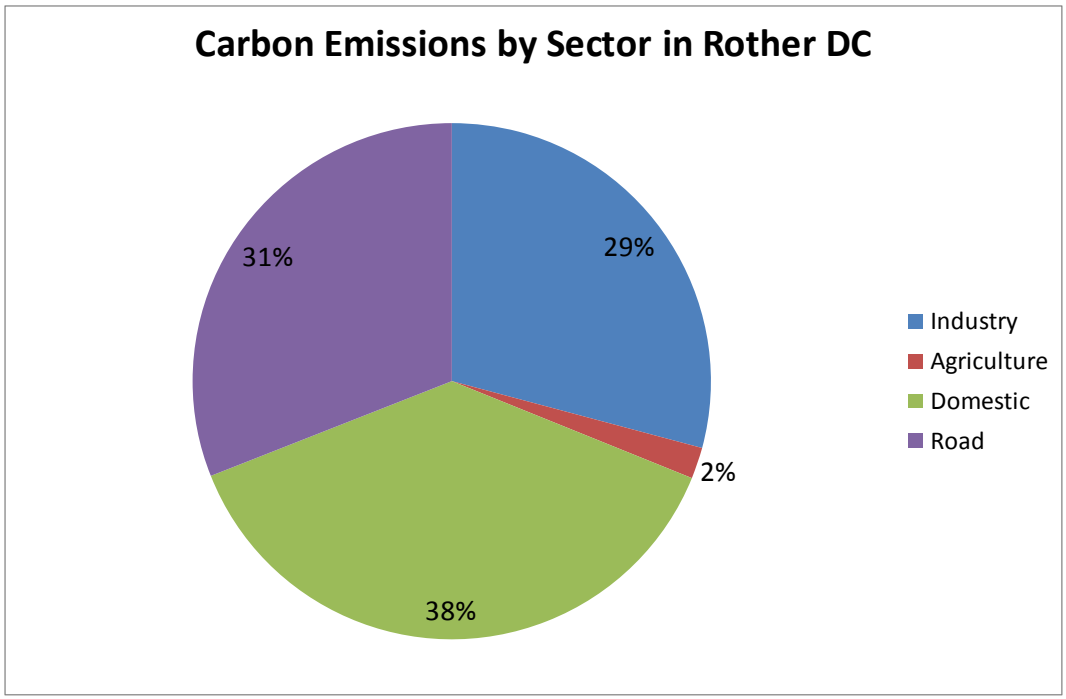


Figure 3-1: Carbon Emissions by Sector in Rother

This chart illustrates that the majority of the District's emissions arise from the industrial and domestic sectors (67%), and that the sector with the highest portion of emissions is the domestic sector (38%).

The overall carbon footprint for Rother is:

NI186 DECC 2007 figures	Total NI186 Carbon Footprint thousands of tonnes carbon dioxide per annum (% of UK total)	NI186 Carbon Footprint from Domestic and Industrial Sectors – thousands of tonnes carbon dioxide per annum (% of UK total)
Rother District Council	623 (0.14%)	418 (0.13%)
SE Region	55,062 (12.7%)	40,042 (12.4%)
UK Total	432,727 (100%)	323,767 (100%)

Table 3.2: Rother District Council Overall Emissions Footprint

In the context of the SE England, Rother's emissions are illustrated below:

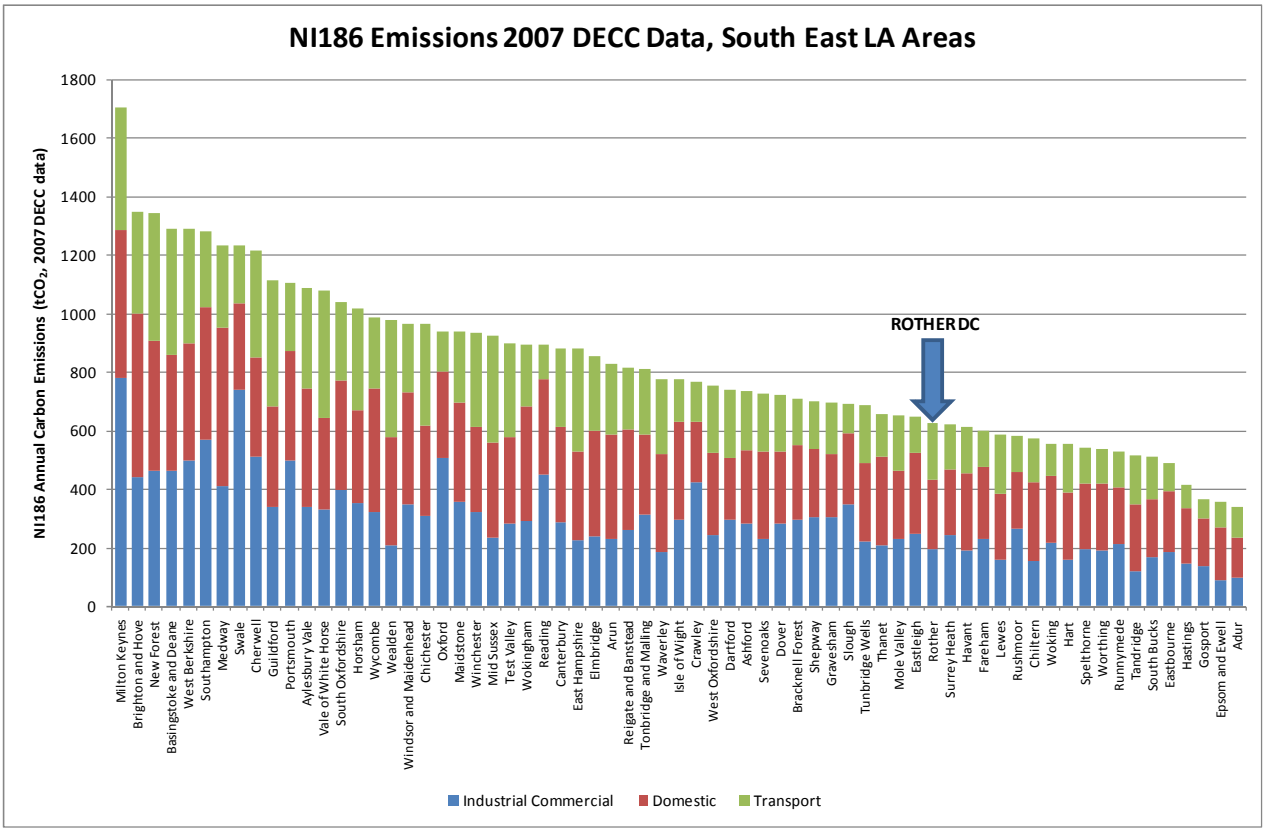


Figure 3-2 NI 186 Emissions of SE England LA Areas

In the national context, the figures for electricity consumption on a per dwelling basis can be seen to be fairly typical for domestic properties, and low in terms of industrial / commercial consumption levels, as displayed on the maps following[29]:

[29] DECC, Maps showing domestic, industrial and commercial electricity consumption at local authority level, Publication URN 09D/535,

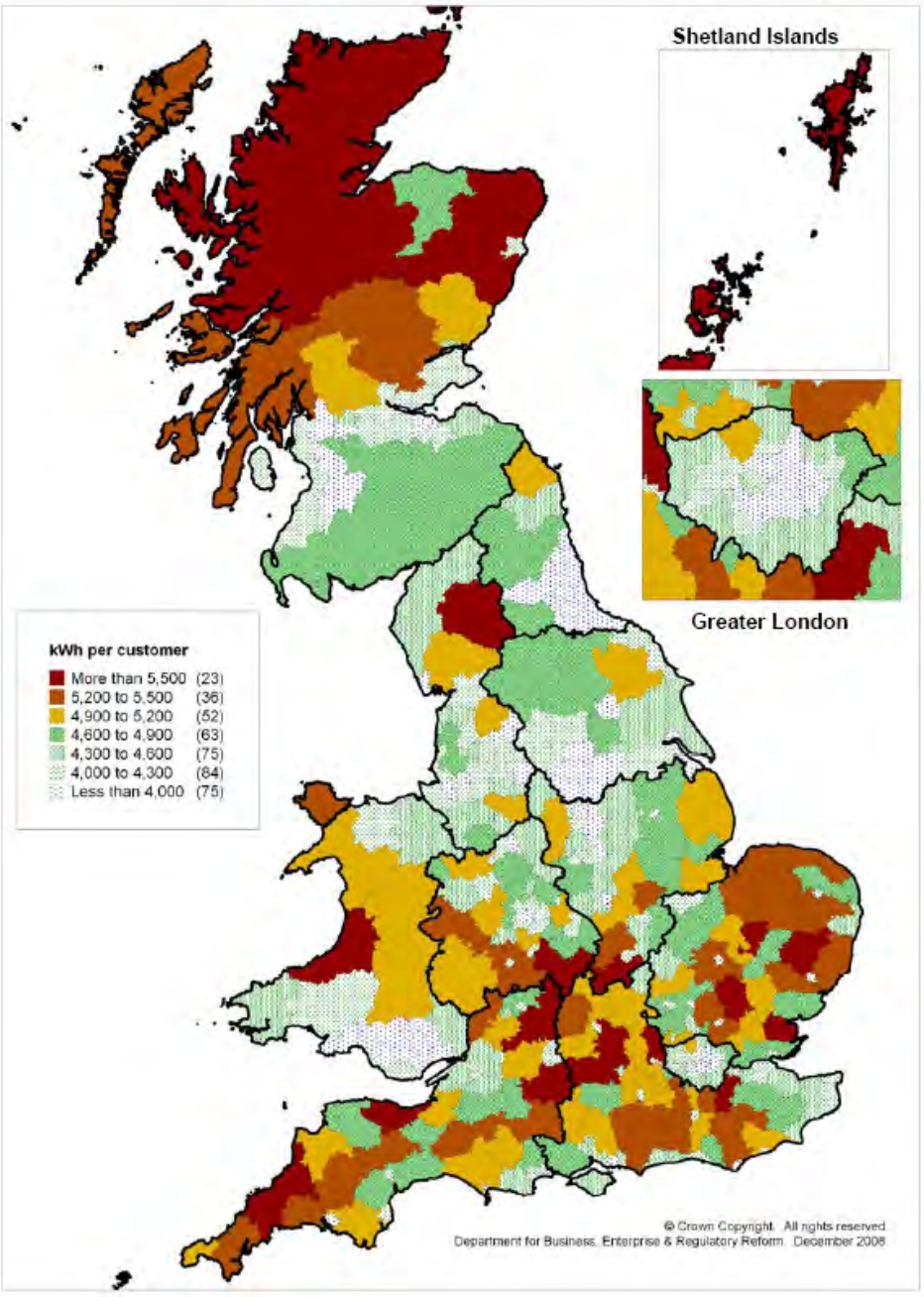


Figure 3-3: Average Domestic Electric Consumption per Meter Point in 2007 (kWh)

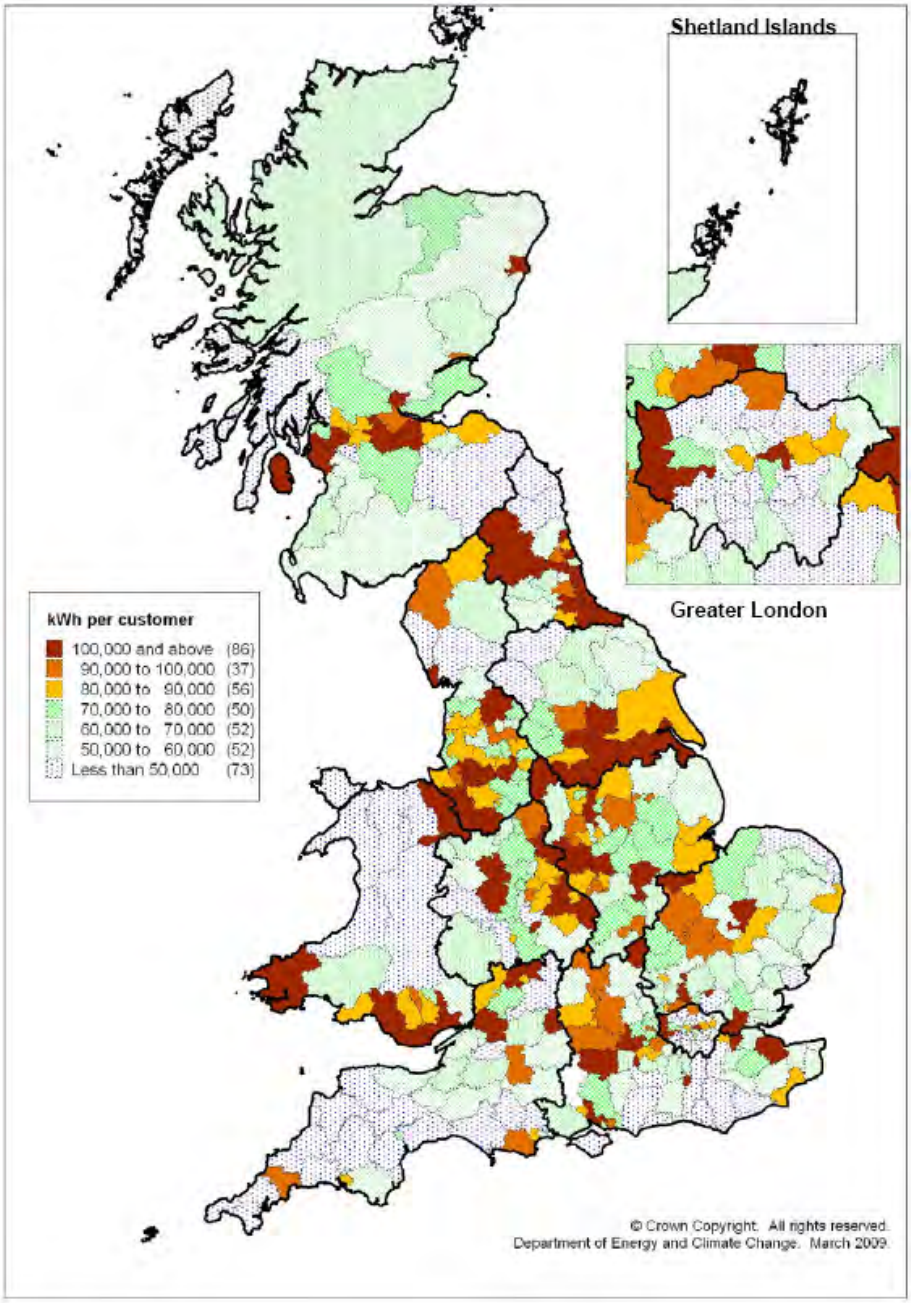
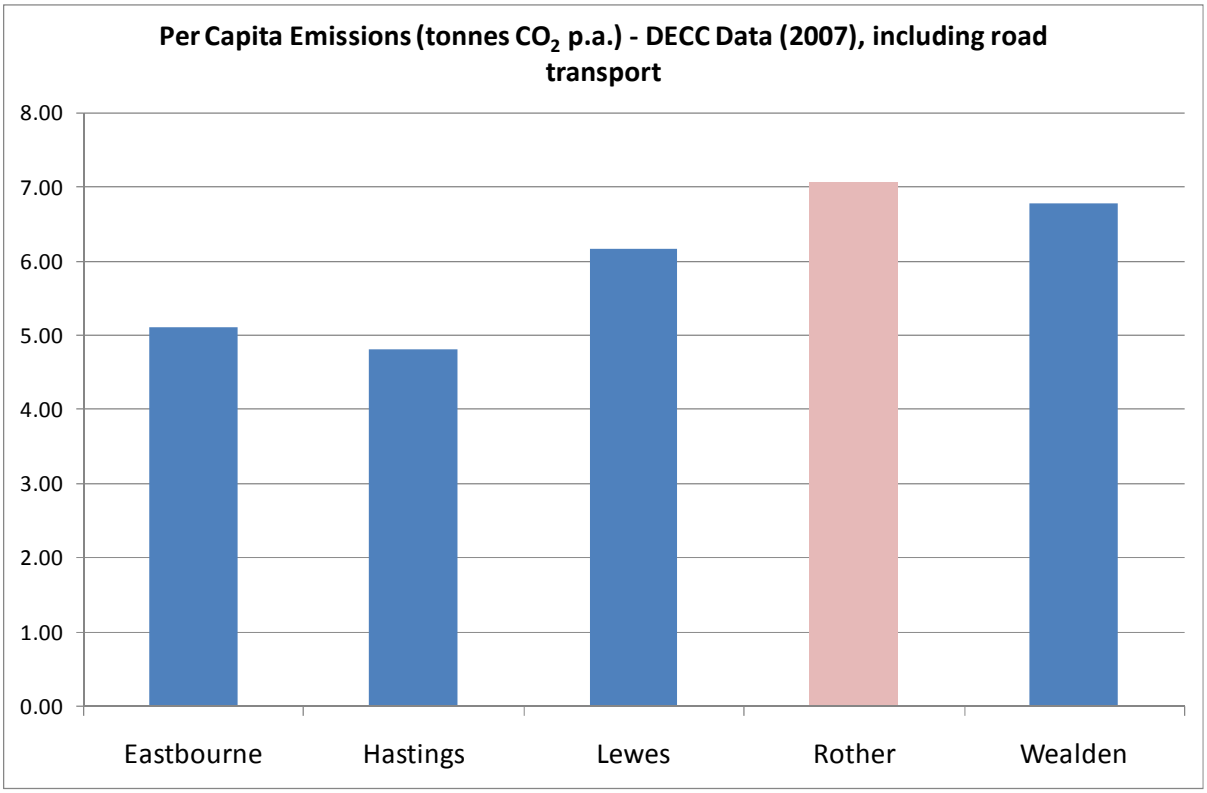


Figure 3-4: Average Industrial / Commercial Electricity Consumption per Meter Point in 2007 (kWh).

The following charts illustrate the NI186 (DECC 2007) figures for per capita emissions in a number of neighbouring Districts.



3.4 Local Emissions Distribution

Further work has been carried out to break down the District level emissions to smaller geographic areas. The methodology adopted in carrying out this work is included within **Appendix B** of this document and only the core results are illustrated here for brevity.

3.4.1 Middle Layer Super Output Area (MLSOA) Level

The smallest geography at which both domestic and commercial energy consumption data is available is Middle Layer Super Output Area (MLSOA) level. A combined map of emissions density at this resolution is displayed overleaf:

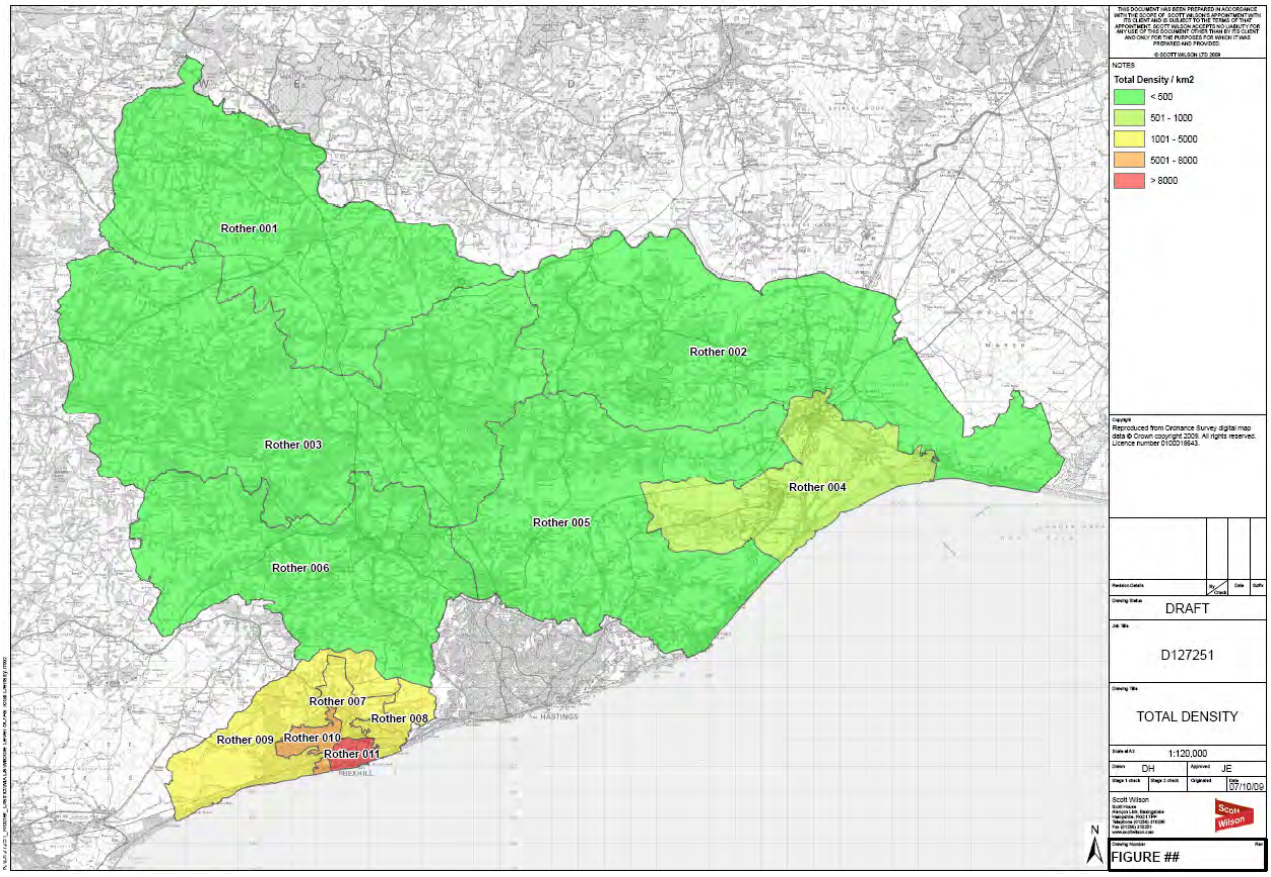


Figure 3-5: MLSOA Emissions Densities

This figure illustrates, as would be expected, that the density of emissions in the predominantly rural areas is very low and that, at this scale, significantly higher levels of emissions are only seen in the smaller urban MLSOAs of Bexhill.

3.4.2 Valuation Office Agency (VAO) Data - Commercial

The Valuation Office Agency (VAO) is a UK Government Executive Agency. VAO data has been obtained for this study as a means to generating localised non-domestic energy consumption data. The VOA maintains the national database of Business Rates, a tax on the occupation of non-domestic property. Rating lists are created and maintained by the VOA and new valuation lists are created every five years.

Nearly all types of non-domestic properties are subject to Business Rates – the exceptions are:

- Agricultural land and buildings.
- Fish farms.
- Places of public religious worship.

- Lighthouses, buoys and beacons occupied by or belonging to Trinity House.
- Sewers and accessories belonging to a sewer.
- Certain property of drainage authorities.
- Parks.
- Property developed for use by the disabled.
- Air raid protection works, provided the hereditament is not used or occupied for any other purpose.
- Swinging moorings.
- Roads crossing over or under watercourses.
- Hereditaments in Enterprise Zones.
- Visiting forces premises.

It can be seen from this list that the majority of non-domestic properties in Rother District will be subject to Business Rates and, therefore, should be included within the VOA database for the Rother Billing Authority.

The VOA database does not contain information regarding energy consumption or fuel use, and hence the carbon footprint of the non-domestic sector of the Rother economy has been estimated through the use of benchmark energy consumption figures applied to the sectors identified in the VOA database. A list of these sectors and the benchmarks applied is contained within **Appendix B**. In order to preserve the confidential nature of the data contained within the database, the greatest level of resolution at which data can be displayed is Census Output Area. Therefore, on this basis, maps have been created for Bexhill at Census Output Area level and for Rother District as a whole at Parish level. These maps are displayed in the Appendices to this document.

A number of limitations to this data must be noted. Firstly, not all buildings are rateable. Secondly, the summary valuation list on which the calculations have been based is also not a complete list of properties; the national proportion of evaluated properties to total properties is around 80%, and the degree to which this national figure is applicable to Rother District is unclear. Thirdly, it is also possible that in some instances benchmarks radically underestimate energy use, for example, in small-footprint energy-intensive industries such as chemical works, metal processing, etc. Fourthly, some large facilities such as power stations are also not listed, and hence major energy consumers might not feature in the VAO summary data that have been adopted in this study. In light of these limitations, it is worth noting that these figures should not be taken or interpreted as definitive values, but rather as illustrative trends and localities that should assist in policy decisions.

3.5 Emissions Projections

As a core element of this study, Scott Wilson has carried out carbon emissions projection modelling for the period until the end of 2026. Using the starting point of the carbon footprint for the District identified above, the level of impact on the different policy options for energy is

investigated. The two policy direction proposals for sustainable resource management, as outlined in the draft Core Strategy document for the District, are:

Option 1 - Achieve more sustainable development through the promotion and application of new Government targets and set supportive criteria for both efficient use of resources and renewable energy production.

This would involve **policies that will**:

- Promote and encourage sustainable design and construction techniques, including energy efficiency and grey water systems in development.
- Develop supportive criteria for renewable energy production in line with the South East Plan policies as directed by PPS22 and for the efficient use of resources in line with PPS1 Supplement.
- Set renewable energy production thresholds for strategic sites.
- Promote the Government-led mandatory level of the Code for Sustainable Homes: Level 3 in 2010; Level 4 in 2013; and Level 6 in 2016.

Option 2 - Achieve exemplar sustainable development by extending beyond the Government targets and setting locally specific targets and criteria for the efficient use of resources and identify opportunities for renewable energy production.

This would involve **policies that will**:

- Promote and encourage high standards of sustainable design and construction.
- Set requirement for levels of the Code for Sustainable Homes to be met in advance of Government standards, e.g. Level 4 in 2010; Level 5 in 2013; and Level 6 by 2015 (more research required).
- Set District-wide and strategic site requirements for on-site renewable energy production – often set at 10% (Merton rule).
- Identify areas suitable for strategic renewable and low-carbon energy generation and supporting infrastructure in line with PPS1 Supplement (this would be most appropriate on a sub-regional joint working basis.

3.5.1 Domestic Emissions Scenarios

Scott Wilson has modelled three policy scenarios, equivalent to the two above (Options 1 and 2), and with a third option which is more ambitious in its aspirations, imposing zero carbon standards even earlier than under Policy Option 2. The three scenarios are represented by the following timetables for Code for Sustainable Homes levels implementation:

CSH Levels	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017
Option 1	0	3	3	3	4	4	4	6
Option 2	3	4	4	4	5	5	6	6
Aspirational standards	3	4	5	5	6	6	6	6

Table 3.3: Modelled domestic CSH scenarios

3.5.2 Housing Numbers

The basis for the projection of housing expansion has been provided by Rother District Council and can be summarised as follows:

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	TOTAL
Rother District (excluding NE Bexhill)	207	241	558	189	119	116	116	116	116	116	116	239	239	239	239	239	239	**3444**
NE Bexhill	-	-	-	210	166	123	123	123	123	123	123	-	-	-	-	-	-	**1114**

Table 3.4: Number of new dwellings projected by year

These figures have been derived from the new build projections contained within the Rother LDF Assessment of Housing Land Supply[30] and GVA Grimley's Draft North East Bexhill Masterplan - Viability report (May 2009). We have spread the projections across 8 years for Policy BX 2 and 1.5 year for BX3, as suggested in the latter report.

3.5.3 Domestic Emissions Projections

In the projection of domestic emissions over the lifecycle of the Core Strategy, we have also integrated the progress made by Rother District Council in improving insulation and other energy performance aspects of existing stock. The following projection of emissions is obtained, assuming that electricity and gas performance of the existing stock is improving by 0.15% per

[30] Assessment of Housing Land Supply, Rother District Council LDF, June 2009.

year (equivalent to a saving of approximately 800kg CO_2 in 400 houses per annum). NB the Code for Sustainable Homes targets are based on regulated emissions until Code Level 6 (when total energy consumption is addressed).

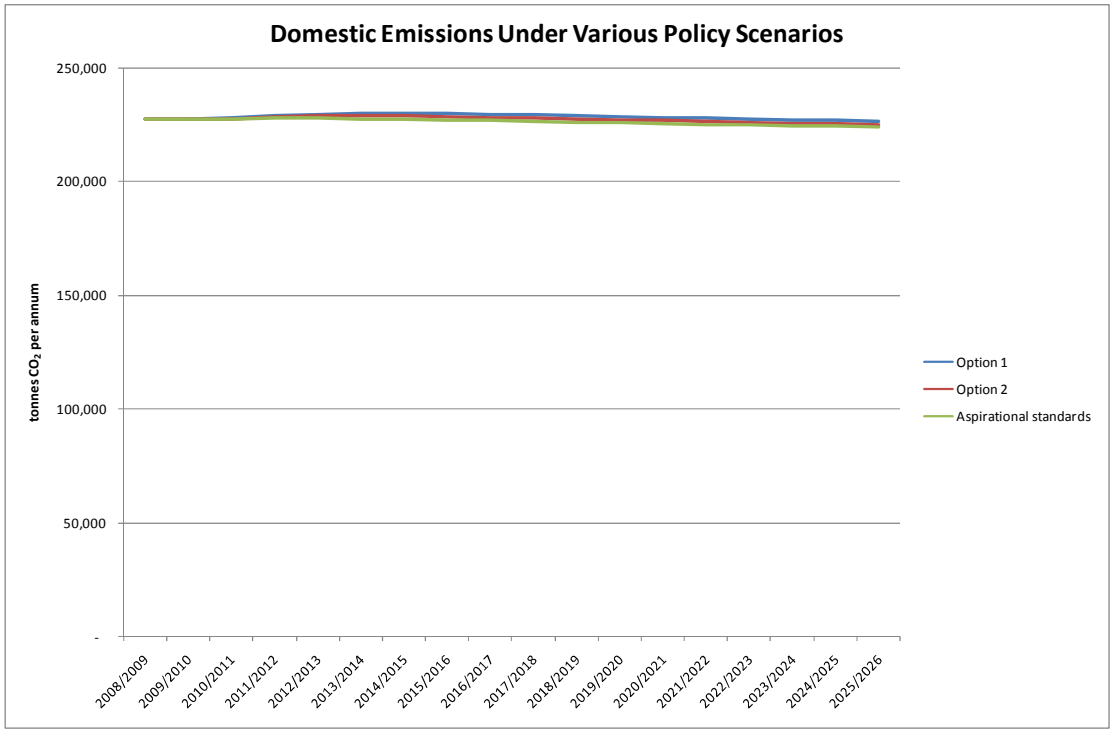


Figure 3-6: Domestic emissions projections under varying policy scenarios

This is a key graph in this study. It can be seen that **the impact of different policy measures is small when set against the level of emissions from the domestic property portfolio in the District as a whole**.

When the differences in emissions levels are quantified on a cumulative basis over the Core Strategy lifespan, the following comparisons can be made: by 2026, the adoption of 'Option 2' or 'Aspirational Standards' would lead to emissions savings equivalent to the following number of 'average' stock houses continuing to emit at current rates:

Policy Scenario	Emissions savings - no. of existing houses equivalent
Option 1	n/a
Option 2	150
Aspirational standards	347

Table 3.5: Emissions savings under varying policy scenarios; equivalent numbers of existing houses

This means that if Policy Option 2 is implemented, emissions from the equivalent of 150 current homes between now and 2026 would be avoided.

It must be noted that these modelling results represent a scenario whereby all new homes projected to be built are subject to the emissions requirements alluded to in the draft policy. Therefore, this does not introduce a policy-size threshold level above which more challenging environmental targets would be implemented (a minimum figure of 10 houses is commonly used).

3.5.4 Commercial / Industrial Policy Scenarios

The three policy scenarios examined for non-domestic properties are illustrated below:

	% reduction in emissions from….	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	2019/ 2020
Option 1	regulated energy	0%	25%	25%	25%	44%	44%	44%	100%	100%	100%	100%
	non-regulated energy	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Option 2	regulated energy	25%	44%	44%	44%	100%	100%	100%	100%	100%	100%	100%
	non-regulated energy	0%	0%	0%	0%	0%	0%	0%	100%	100%	100%	100%
Aspirational standards	regulated energy	44%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	non-regulated energy	0%	0%	0%	0%	100%	100%	100%	100%	100%	100%	100%

Table 3.6: Non-domestic emissions reductions required under varying policy scenarios

3.5.5 Commercial/ Industrial New Build Rates

The Core Strategy for Rother District Council contains the target of providing 100,000m^2 employment floorspace over the Plan period, with the majority within the first 10 years. On this basis, the following projection has been made:

	2009/2010 to 2018/2019	2019/2020 onwards
Employment Floorspace Increase p.a. (m^2)	7,200	4,000
No. of years	10	7
Total Provision (m^2)	72,000	28,000
Total (m^2)	100,000	

Table 3.7: Assumed employment floorspace provision over Plan period

Non-domestic emissions have been plotted under the policy scenarios as above, with the following results:

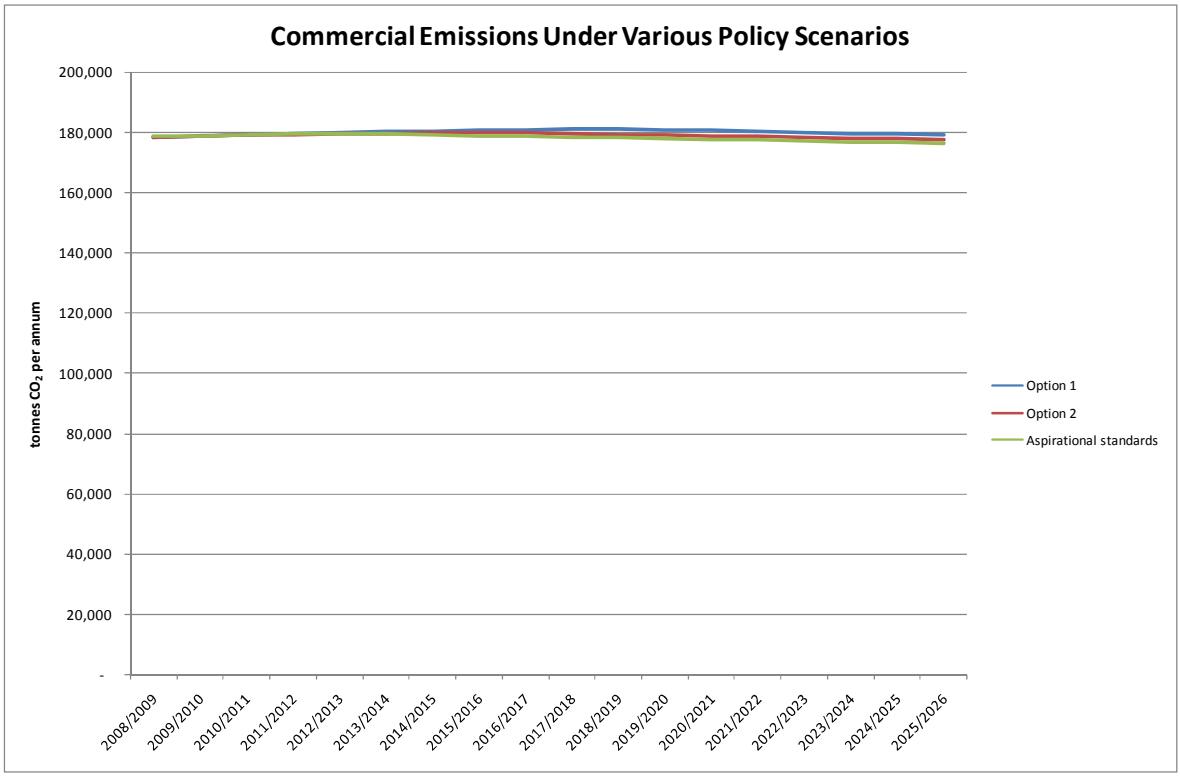


Figure 3-7: Non-domestic emissions projections under varying policy scenarios

As above for the domestic emissions scenarios, the emissions reductions modelled above do not introduce any size 'threshold' qualification level for the enhanced policy levels to be applied.

3.6 Policy Orientation

The figures above for domestic and commercial emissions projections illustrate clearly that **there is only a limited level of impact on overall building stock emissions that new-build policy can make**. If the overall goal of policy design and implementation is to reduce global carbon emissions, then this analysis strongly points towards the need for policy measures that target the emissions of existing buildings as well as new construction.

4 Constraints & Opportunities Analysis

4.1 Introduction

This section provides an analysis of low carbon and renewable technologies within Rother District Council: it reviews existing energy studies relevant to the South East; assesses the renewable energy potential across Rother with respect to wind, biomass, solar, hydropower and energy from waste; and investigates specific opportunities for implementing renewable energy within strategic sites allocated within the Local Plan.

4.2 Electricity Distribution Network

One element of the assessment of the potential for stand-alone renewable technologies, and to an extent assessment of the potential for decentralised generation, is the accessibility of connection to the electricity distribution/ transmission network. In this context, we opened a dialogue with EdF Networks and have obtained a network map to ascertain viability and accessibility of specific locations evaluated in this study. Please refer to **Appendix A** for more information. Whilst this network map does not give details of the specific loading and spare capacities available at particular network points, some inferences can be drawn.

On an informal basis we asked EdF whether the existing network was operating at, or close to, capacity in the District as a whole. The response to this was that there were no particular difficulties or known shortfalls in capacity in terms of existing infrastructure. The network over the District as a whole was considered fairly robust.

Second, and addressing the specific strategic sites of North East Bexhill and West Bexhill, and also considering Rye as a possible location for wind, the following points can be made:

North-East Bexhill - The significant growth anticipated here is almost certain to require additional or upgraded substation infrastructure to be installed. However, it appears from the network map (see extract below) that there is already a 33kV to 11kV substation adjoining the site. This is seen at the interface between the dark green line (33kV network) and red lines (11kV distribution). Please note that the light green lines are Parish boundaries and the blue lines are watercourses.

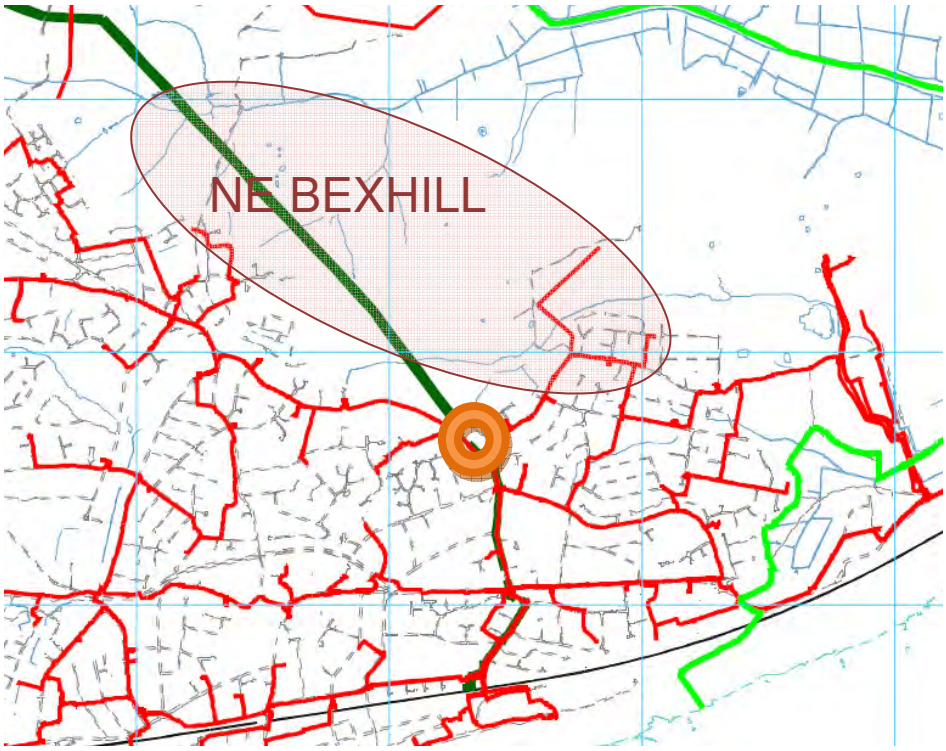


Figure 4.1: Electricity Network Infrastructure around NE Bexhill

Whilst a detailed study would be needed to confirm any projections of the resilience and capacity of the 33kV network and the substation, the presence of network at this voltage would suggest that substation upgrade and additional capacity could be provided at low cost in comparison with other less well connected locations.

West Bexhill – Similarly to NE Bexhill, it would appear that a 33kV / 11kV substation is located within reasonable proximity to the potential development site.

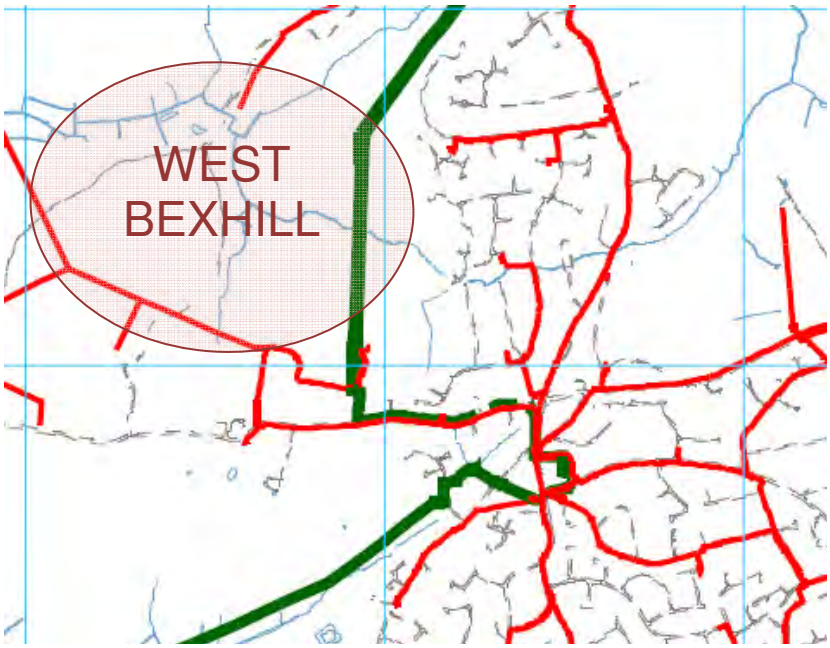


Figure 4.2: West Bexhill Electricity Network Infrastructure

Rye / Rye Harbour Area – The Rye area is discussed in this document as a potential location for wind generation. To the north of Rye is a 33kV/11kV substation (indicated by orange circle on plan below). There are also overhead 132kV cables running southwest – northeast in the area to the north-west of Rye, but as far as is discernable from the network plans, there does not appear to be a substation at this voltage level in the area. In terms of substantial new generation (e.g. a new multi-turbine onshore wind farm), EdF expressed the preference for generation at 33kV and above, but as noted above, all such projects would require detailed network analysis to be undertaken for each specific location considered.

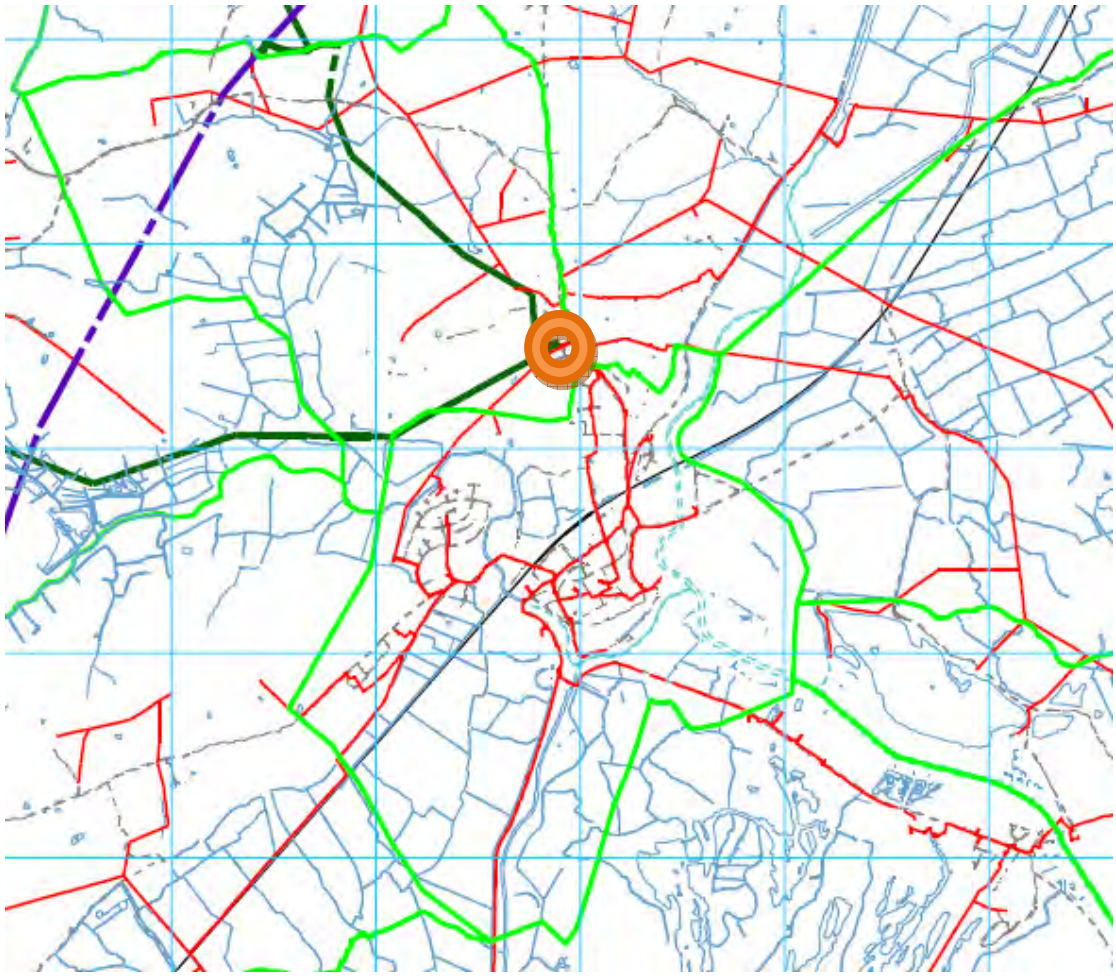


Figure 4.3: Rye / Rye Harbour Electricity Network Infrastructure

4.3 Heat Demand Mapping

A recent publication[31] prepared for the South East England Partnership Board has addressed the potential for CHP and Distributed Heat. An element of this study has been to conduct heat mapping of the region. This study was intended to meet the expectation in the Supplement to PPS1 that regional strategy should provide a framework to ensure that opportunities for renewable and low carbon sources of energy supply and supporting infrastructure are maximised. In this context it shares many of the aims of this study.

The results of the work carried out in the CHP and Distributed Heating study show, however, that Rother is not an area identified as having a high level of strategic opportunity. At the same time, it is also noted that broad-brush techniques for identifying potential have had to be employed to allow the large geographic area to be covered. The potential for localised systems were also considered as part of this study, under the following points of consideration:

- District heating networks are only viable in areas of high heat demand density, ideally with a mix of uses; and
- Opportunities for policy intervention are primarily in areas of new development and their surroundings – there are significant barriers to retrofit solutions, not least the inertia of entrenched ideas and systems.

Even when only considering these two criteria for a district heating scheme, it can be seen without recourse to extensive modelling, that major opportunities for district heating are likely to be limited within Rother District. Heat densities are generally low, and where there is new development planned – e.g. North-East Bexhill, North and West Bexhill, the surrounding areas are of low density and the economic viability of expansion is likely to be very limited.

As a result of the outline analysis above, it has not been considered necessary or appropriate to carry out significant heat demand mapping of the District. This contrasts with the neighbouring District of Hastings, for example, where the higher density of built environment justifies closer examination of heat demand densities.

4.4 Renewable Energy Potential in Rother District

This section explores the renewable energy potential across Rother District. The objective of this study is to develop a high level understanding of the renewable resource available in the District, and to investigate the constraints and opportunities in developing renewable energy across Rother.

It should be noted that this study will not provide sufficient detail to verify the viability of specific schemes in Rother, but rather presents an overview of the potential of these systems in the District. As most renewable energy technologies are site specific, the analysis presented here will focus primarily on wind and biomass energy.

[31] Assessing the Potential for CHP & Distributed Heat in South East England, Beyond Waste, TV Energy and RPS on behalf of the South East England Partnership Board, October 2009.

The renewable energy potential has been assessed primarily through a review of other existing studies. Specific relevance to Rother District will be identified from the studies where they are available. The renewable energy potential assessment will also provide a case study to illustrate more specifically the potential within Rother District. The assessment will begin with a brief description of renewable energy systems, followed by a review of key findings from existing studies, and finally an analysis of the specific potential in Bexhill and Rye.

4.4.1 Wind Energy Potential

Description of Wind Technology

Wind turbines convert a proportion of the power in wind into electricity via a generator. There is a wide variety of wind turbines with different power capacity. Generally, the larger the turbine the more power it is able to generate. The figure below shows the size and power of a range of Vestas wind turbines. The largest turbine, the V90, is able to generate 9,152 MWh/year which is enough to supply the electrical demand for approximately 2,000 homes.

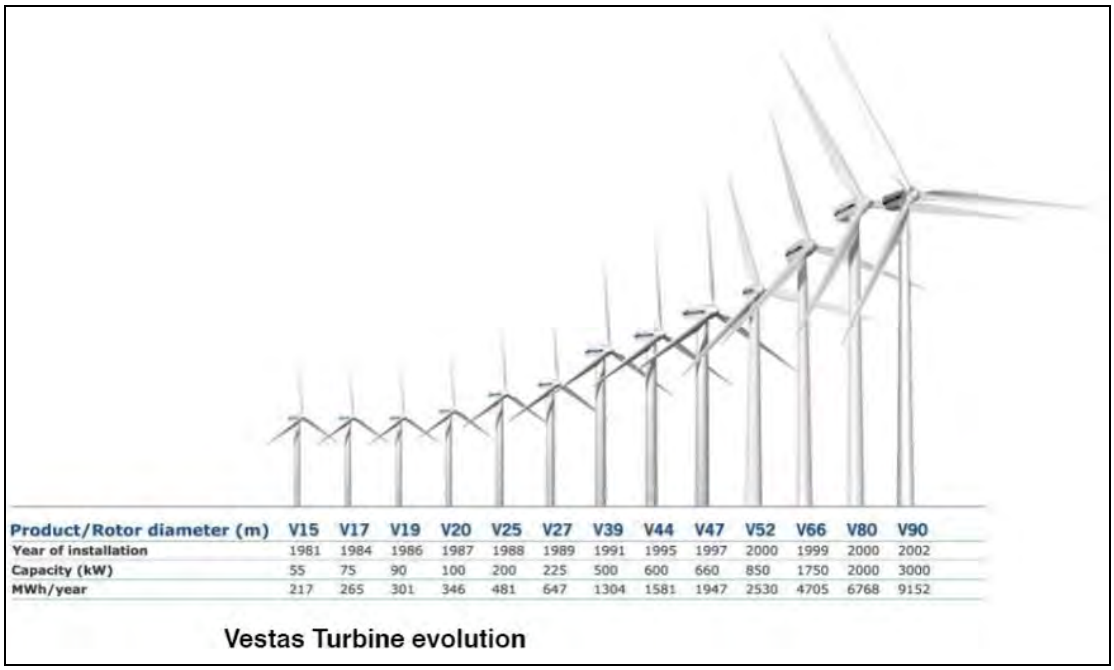


Figure 4.4: Turbine Capacity and Output

Existing Industry Energy Potential Studies

A wind energy potential study has been carried out for the High Weald region, which covers the majority of Rother District. The report '***Wind Energy Regional Assessment for the High Weald AONB'*** concluded that there are significant constraints in developing wind energy in the High Weald area.

Key findings of the report are as follows:

- There are currently no existing large wind energy sites within Rother. However, the closest is a 2MW wind turbine located in Marine Fields in Hastings. A 59 MW wind farm is located in Little Cheyne Court's consisting of 26 turbines, at 2.3MW each.
- Wind speeds around Rother are favourable for wind energy, particularly around Bexhill and Rye, for example.
- There are a number of significant impacts and constraints, which would need to be addressed by potential wind developments, such as protected areas, public rights of way and scattered settlements.
- The most appropriate wind energy developments may be single-turbine or small clusters of up to 3 turbines, probably of 1.5-2MW capacity.

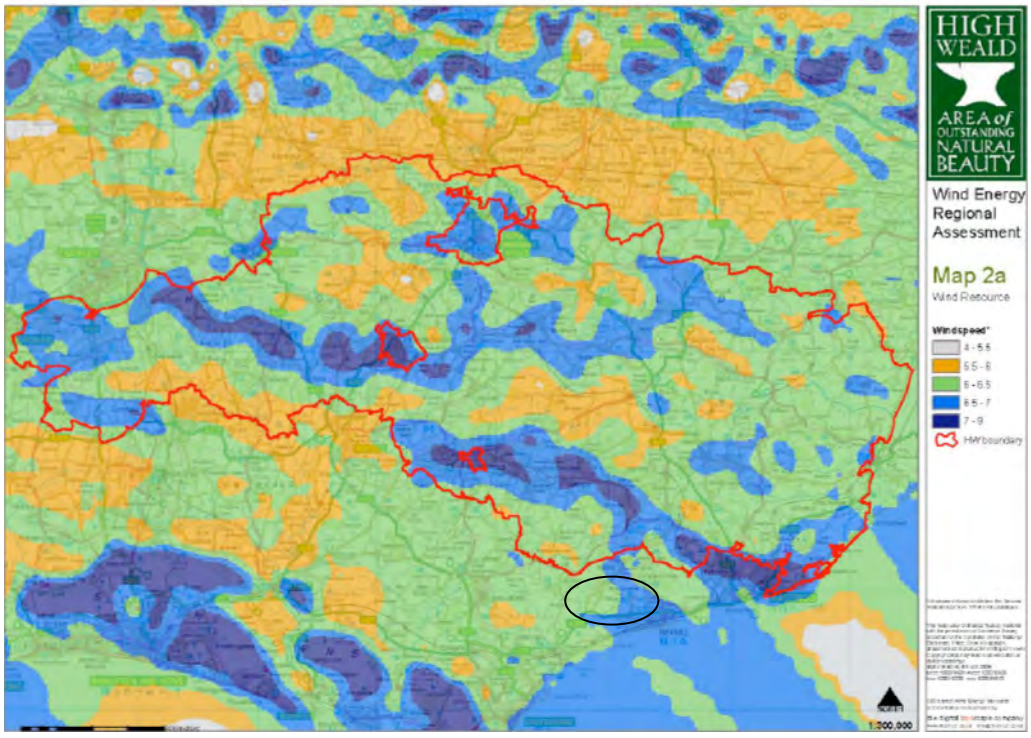


Figure 4.5: Wind speeds in the AONB region

As the majority of Rother falls within the High Weald AONB, there are limited opportunities available for the development of on-shore wind turbines. Any wind development within the AONB will be likely to be rejected based on landscape and visual intrusion.

Bexhill

There are potential sites to the north east of Bexhill that may be suitable for developing wind turbines. The area, as indicated in Figure 4.5 above, has favourable wind speeds, averaging 6.5-9m/s (see Figures 4.6-4.7) and is located outside the High Weald Area of Outstanding Natural Beauty boundary.

The proposed North East Bexhill strategic site could potentially benefit from a wind energy development. From the Local Plan, the area north of Bexhill has been allocated for a mix of housing and businesses. Approximately 1,100 dwellings are expected to be built in North-East Bexhill over the next 8 years.

The combined estimated electrical demand for the above dwellings would be approximately 4,500 MWh/yr (based on an annual electrical consumption of 3,500 kWh per dwelling)

1x V66 1.75MW turbine can produce 4,700 MWh/yr, which would be sufficient to meet the estimated electrical demand of North East Bexhill, as outlined in the SPD.

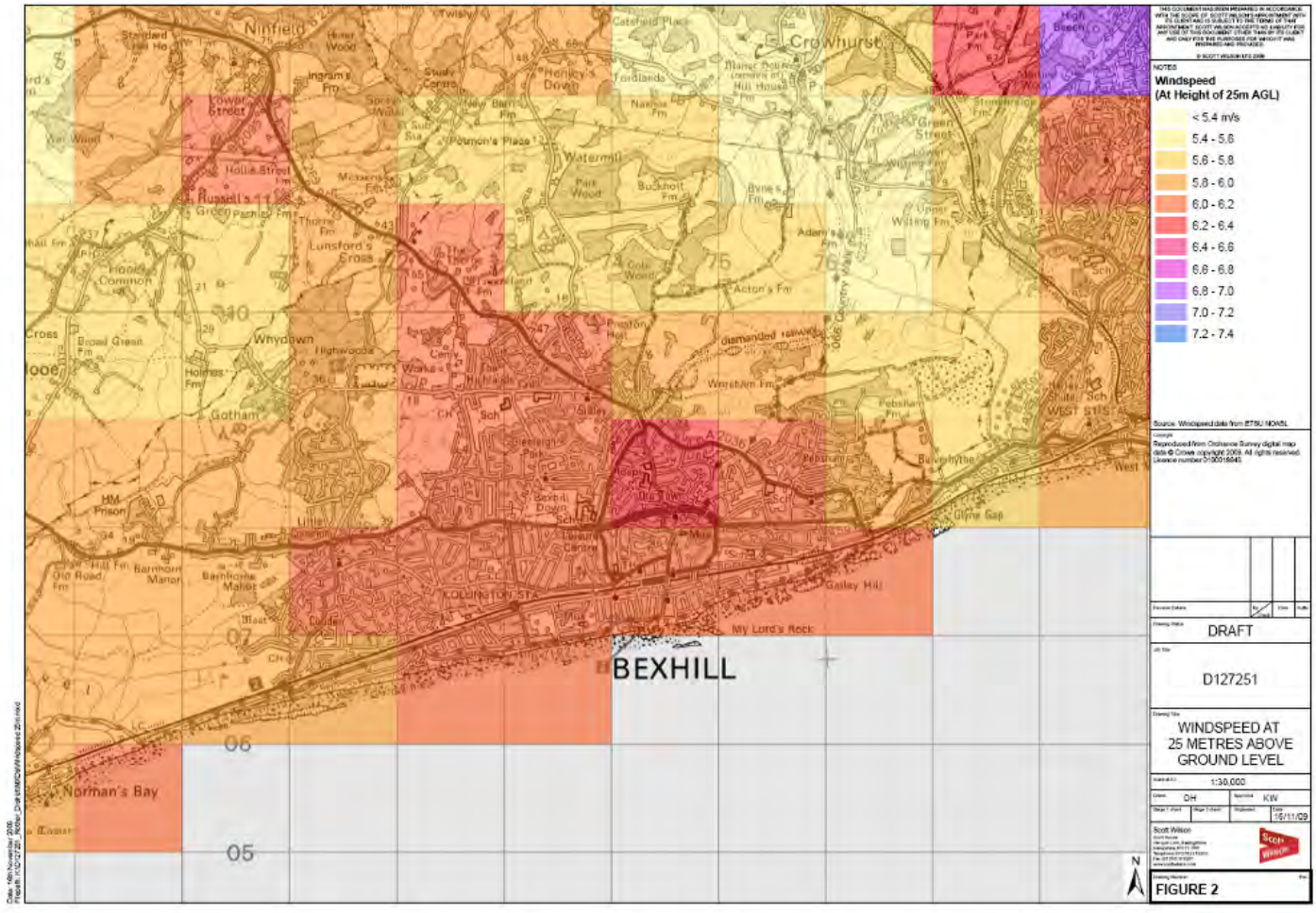


Figure 4.6: Wind speeds at 25m in and around Bexhill

Rye Harbour Area

A GIS map of the average wind speeds in Rye Harbour is presented below, in order to illustrate the potential adjacent to the second most significant town in the District. The wind speeds in Rye Harbour are not as favourable as at Bexhill. Nonetheless, they are still high enough to support use of wind turbines, particularly in the coastal areas; however, in this context is must be noted that there is a high level of flood risk (Flood Zone 3) in many of these zones.

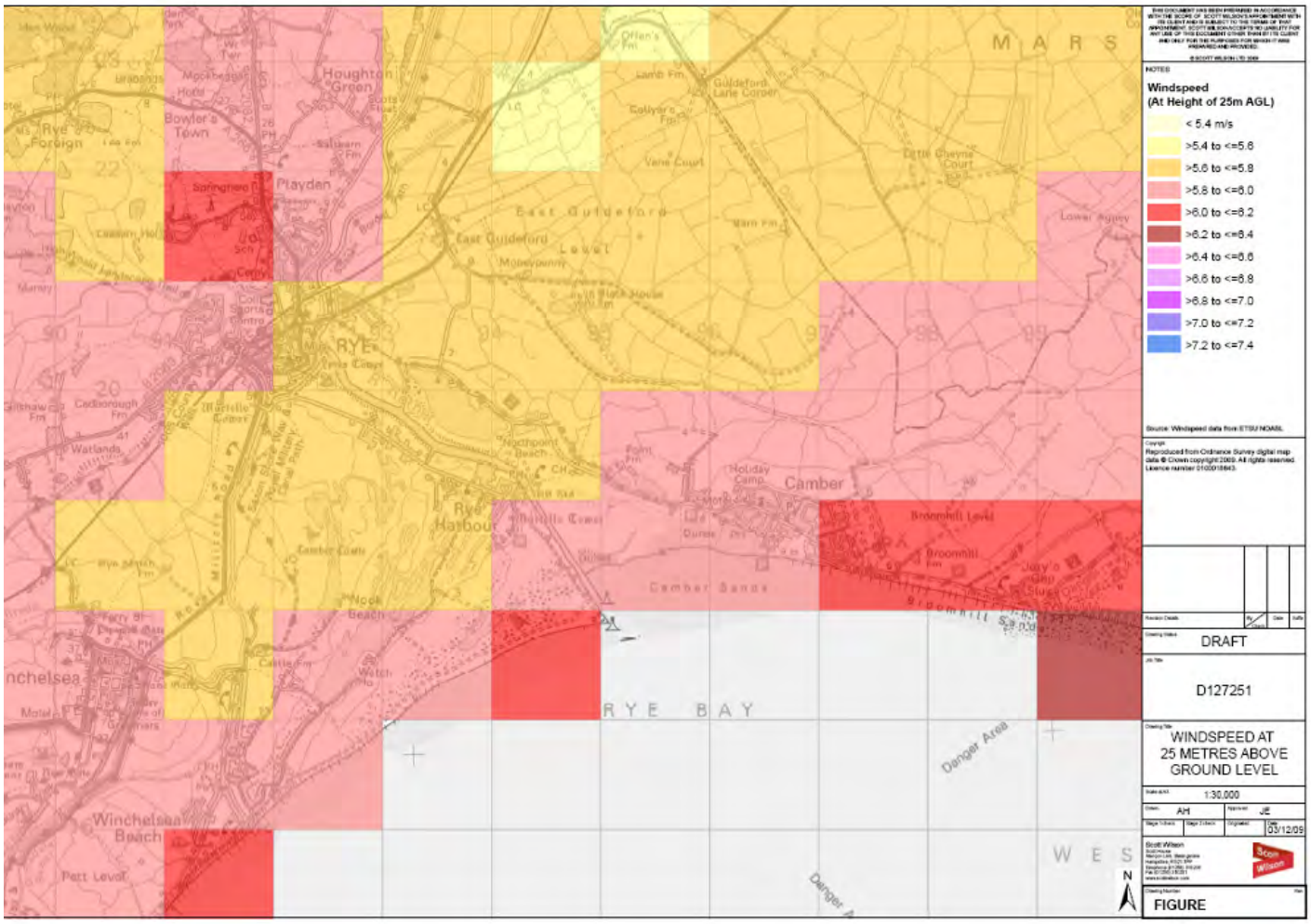


Figure 4.7: Wind speeds at 25m in and around Rye Harbour

According to the Rother Local Plan, approximately between 200 and 250 dwellings are expected to be constructed in the Rye Harbour area. Based on the same assumptions as for the Bexhill analysis, it is estimated that a **500kW wind turbine** will be sufficient to meet the electrical requirements of the new residential dwellings anticipated in Rye.

Potential Constraints

The high level analysis presented above suggests that large-scale wind turbines might be suitable for implementation in Bexhill and in the Rye Harbour area, although this will be subject to local constraints. Particular consideration will need to be given to the following before any wind turbine development can be considered viable:

- Land ownership.
- Noise.
- Telecommunications and existing distribution networks.
- Visual impact.
- Distance from development.
- Electrical connection.

4.4.2 Biomass Resource Potential

Description of Biomass Fuel

Biomass is biological material derived from living, or recently living organisms. In the context of biomass used for energy, biomass is often used to mean plant based material[32].

Raw materials that can be used to produce biomass fuels are widely available across the UK and come from a large number of different sources and in a wide variety of forms. All of these forms can be used for fuel production purposes, however, not all energy conversion technologies are suitable for all forms of biomass[28].

- **Virgin wood** - Wood can be derived from conventional forestry practice, and trimming, as part of sustainable management of woodland. It can also tree surgery operations and the management of parks, gardens and tra The wood can come in a range of physical forms such as bark, logs, sawdu wood pellets.

- **Energy crops** - Energy crops are grown specifically for use as fuel and off hectare with low inputs. The main type of energy crops is short rotation willow, or forestry species such as eucalyptus or poplar. Poplar and wil popular crops with an achievable yield of around 8 tn p.a.

- **Agricultural residues** - Agricultural residues are of a wide variety of types, and the most appropriate energy conversion technologies and handling protocols vary from type to type. Sources can include arable crop residues such as straw or husks, animal slurries or organic material from excess production or insufficient market, such as grass silage.

- **Industrial waste and co-products** - Many industrial processes and manufacturing operations produce residues, waste or co-products that can potentially be used or converted to biomass fuel. Wood waste can

[32] www.biomassenergycentre.org.uk

be utilised by a range of thermal conversion technologies such as a boiler for the generation of heat for space heating or process heat, or used for electricity generation in a dedicated system or combined heat and power (CHP) co-generation system.

Review of existing Biomass Potential Studies

A number of studies have been carried out to assess the potential of utilising biomass as an energy source across the UK regions. However, few studies are available on a District level and none that specifically cover Rother District. Nonetheless, it is also useful to consider the potential in the South East region. The main reports reviewed are as follows:

- Woodfuel Resource in Britain by DTI.
- Opportunities and Optimum Sitings of Energy crops by Defra.
- National woodfuel statistics by Forestry Commission.

Summary and key findings of each report are presented below.

DTI: Woodfuel Resource in Britain: Main Report

A woodfuel resource assessment was carried out by the Department of Transport and Industry (DTI) (predecessor to BERR) in 2003. The objective of the report was to quantify the present resource from traditional forests, sawmills, urban areas, roadside and energy crops.

According to the woodfuel resource report, in 2003 there was a total potential operational resource of 3 million Oven Dried Tonnes (ODT) per year available across the UK, with around 1.4 million ODT from England.

Product	ODT/yr (000s)
Sternwood 7-14 cm diameter	298
Poor quality stemwood	94
Stem tips	14
Branches	225
Sawmill product	290
Arboricultural arisings	456
Short rotation coppice	16
Total	1,393

1.4 million tonnes of wood waste, if utilised completely, is sufficient to generate approximately 6 TWh of heat or 1.5 TWh of electricity.

The assessment concluded that across Britain as a whole, the greatest uncommitted resource lies in branches and poor quality stems, with arboricultural arisings being the single biggest uncommitted resource in England. However, no specific relevance to the South East or Rother District is available in the assessment. The following studies by Defra and the Forestry Commission provide more regional-specific assessment of the biomass potential from energy crops and forestry products.

DEFRA: Opportunities and Optimum Locations for Energy Crops

The Government has also produced some guidance on the potential for developing energy crops across the South East[33]. The guidance consists of a series of maps for different regions in the UK. The maps relevant to the potential for energy crops are as follows:

- **Yield map for miscanthus.** This map identifies areas where high, average and low miscanthus yields may occur.
- **Yield map for Short Rotation Coppice (SRC).** This map identifies areas where high, average and low SRC yields may occur.
- **Existing energy crop locations.** This map identifies areas of existing energy crops, planted under the 2000 – 2006 Energy Crops Scheme. This map allows consideration of opportunities to develop biomass projects and energy supply chains.[28]

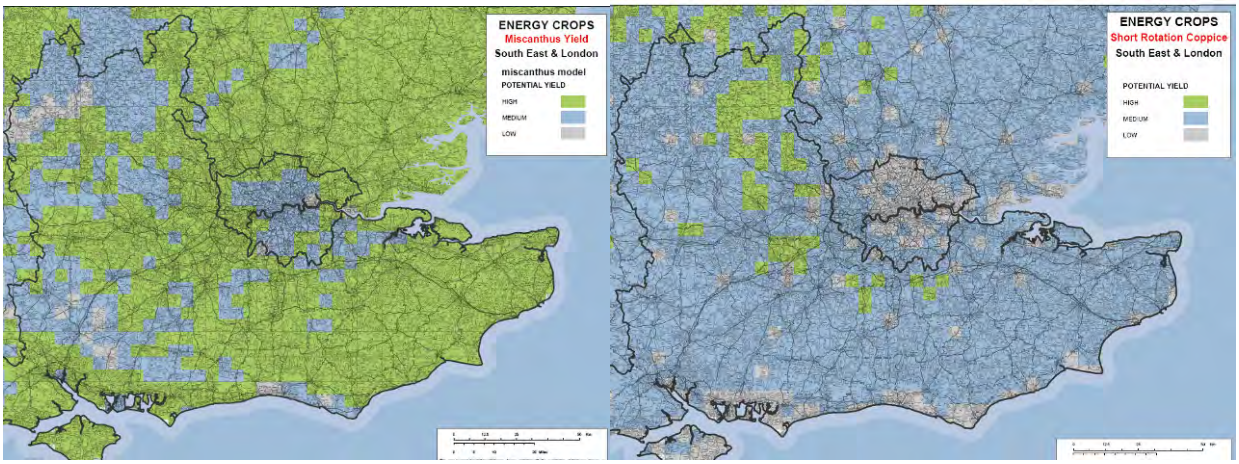


Figure 4.8: Yield Map for Miscanthus and SRC

[33] http://www.defra.gov.uk/foodfarm/growing/crops/industrial/energy/opportunities/se.htm

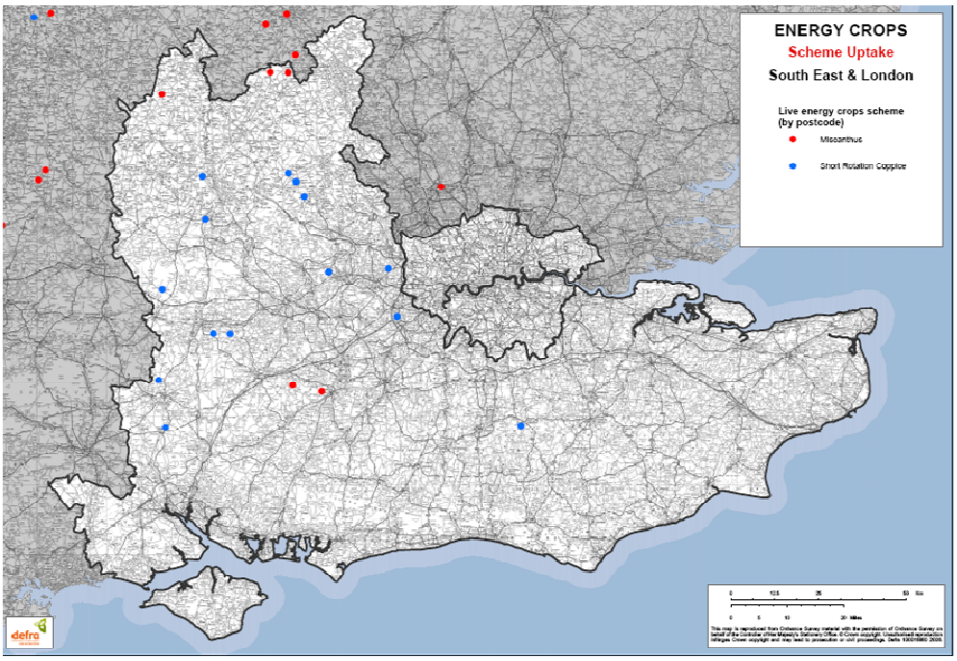


Figure 4.9: Existing Energy Crop Locations

The outputs of the Defra study suggest that there are currently no existing energy crop schemes in the Rother (Figure 4.9). However, it was identified that there is a high potential for developing miscanthus in Rother District but low/ medium potential for SRC.

There are several limitations to the modelling work carried out by Defra, which have been acknowledged in their study. The model input data includes data on soil types and structure, average rainfall and climatic conditions used to estimate the potential yield of the energy crops. The analysis also used data derived from disaggregation of selected sample studies carried out in the region and therefore locally specific conditions have not been assessed.

Forestry Commission: National Statistics Data

The Forestry Commission provides statistical data on the woodfuel resource available in the UK, broken down into regions. Data for the South East has been extrapolated and presented below. The data estimates the felling and thinning of biomass products in the South East. It includes biomass from pines, spruces, conifers and broadleaves and shows a trend of increasing harvest of biomass products to the year 2021. It is forecast that in the year 2021, there will be an annual production of around a million tonnes of biomass potentially available as woodfuel in the South East as illustrated in Figure 4.10 below.

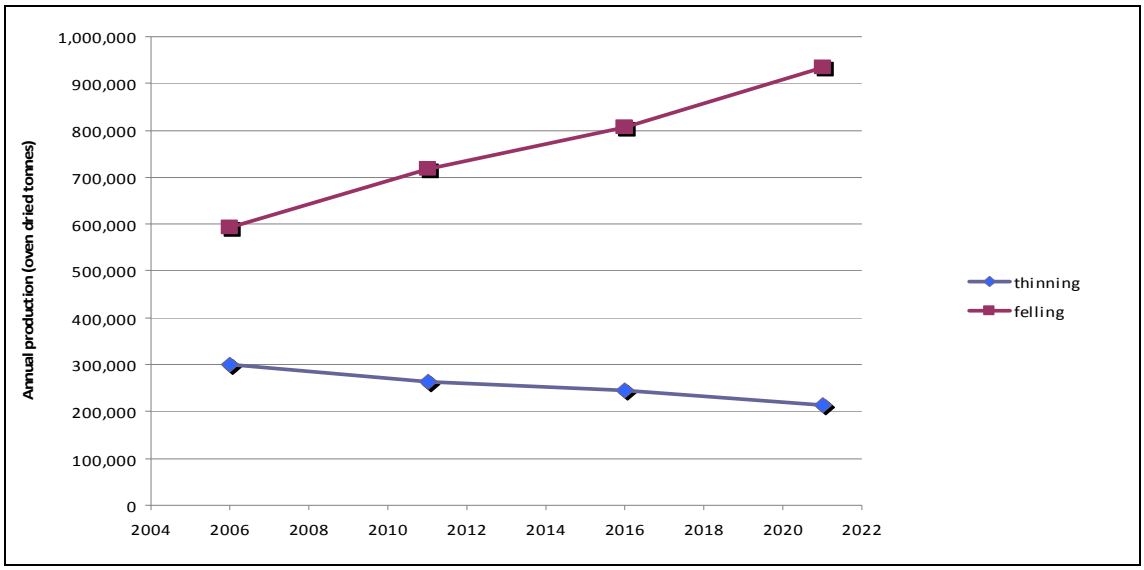


Figure 4.10: Graph showing forecast of woodfuel production in South East

Available data for evaluating biomass has been limited to South East regional data derived from the Forestry Commission Statistics Unit. The availability of data specific to Rother and other areas is currently not available until 2011.

Summary of key findings of existing biomass studies:

- There is a reasonably high potential for use of biomass as an energy source across the UK as a whole (3 million ODT/yr).
- There are currently few energy crop schemes around Rother, but there is high potential for future development.
- Production of biomass from forestry products is already high and is likely to increase even more in the South East in the next 10 years (1-1.3 million ODT/yr).

Rother District Biomass Potential

The following figures illustrate the area of woodland within Rother District. Figure 4.11 illustrates the type of woodland (derived from the Forestry Commission's current National Inventory of Woodland and Trees - a more recent survey is currently being conducted although it is unlikely the gross figures will change significantly).

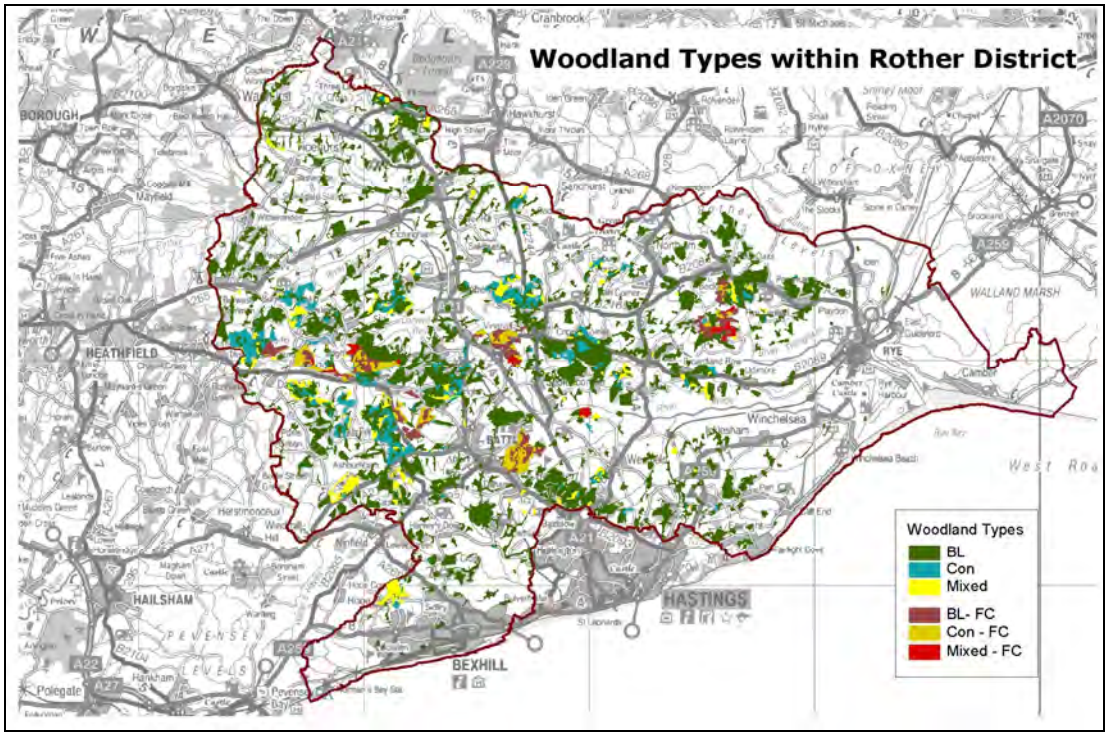


Figure 4.11: Woodland in Rother District by Type[34]

Figure 4.12 overleaf illustrates those woods which are currently 'managed' (in this case this means that they are currently the subject of a grant scheme or felling licence and hence this does not mean that all the potentially harvestable material from these woods is being harvested and neither does it mean that there is no activity in the other woods).

[34] Forestry Commission, provided by Matthew Woodcock, December 2009

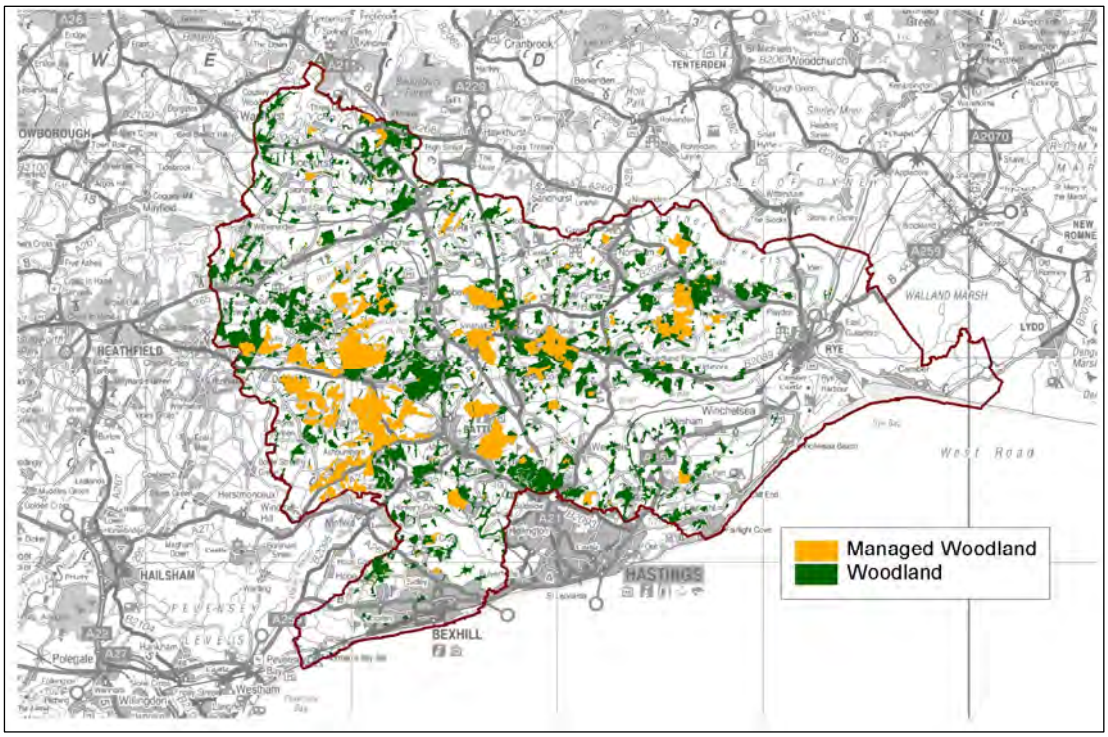


Figure 4.12: Managed Woodland in Rother[35]

- The total area of woodland in the District equals 9,777 ha (of which about 10% is managed by the Forestry Commission).
- The total area managed equals 2,977 ha (including 955 ha by the Forestry Commission).
- Of the total woodland area, 7,644 ha are classified Broadleaved, 1,348 ha Conifer and 785 ha Mixed.

Estimating the potential of these woods to provide woodfuel is an inexact process, but, as a coarse estimate, the Forestry Commission has suggested the following approach.

Broadleaved woodland has the potential to grow at a minimum rate of 4m^3 per ha per year(a cubic metre of wood equates to about one tonne of 'wet' wood i.e. about 50% moisture content). Practically, well-managed coppice sweet chestnut or ash can grow at nearly double this, but not all woodland could be managed in this manner and hence the conservative estimate. Conifers grow slightly quicker but, again being conservative, they have been estimated to grow at a minimum rate of 6 m^3 per ha per year.

Therefore, the potential annual increment of woodland in Rother is:

(7,644 x 4) + (1,348 x 6) + (785 x 5) = 42,589 m^3 per ha per year or approximately at least:

40,000 m^3 per ha per year

[35] Forestry Commission, provided by Matthew Woodcock, December 2009

Not all woodland owners will be interested or incentivised sufficiently by the market price for their wood to manage their woodlands and hence not all of the potential annual increment could ever be harvested. In addition there are established markets for woodland products including the domestic firewood, fencing material, chestnut palings, glulam beam manufacturers etc. However, there is certainly a significant resource which is currently not being used.

Bexhill and Rye Harbour Heating Potential

As with the wind analysis, this section will provide an estimate of the likely biomass requirement in order to meet the heating demand of the anticipated new developments in Bexhill and Rye harbour. Approximately 1,500 dwellings are expected to be constructed in Bexhill and Rye Harbour according to Rother District's Local Plan. Based on an assumption of approximately 3,000 kWh_{th} space and water heating demand a year, the total gas demand will be 4,500 MWh_{th}/yr.

Biomass has a calorific value of approximately 3,500 kWh/tonne. Therefore, if all the new dwellings are to be heated by biomass resource, approximately **1,300 tonnes** will be required. Compared to the current and potential capacity within the South East, this quantity can be easily supplied.

Whilst this study identifies there is reasonably good potential for use of biomass in Rother, the actual feasibility of resource use will be dependent on a number of local opportunities and constraints. These will need to be evaluated further to ascertain whether biomass is potentially suitable for use within Rother. Such constraints include:

- Adequate suppliers being able to deliver to the District.
- Financial feasibility in the medium to long term.
- Local constraints such as storage space, delivery access and air quality will need to be assessed on a case by case basis within the developments in Rother District.

Future Potential for Biomass in Rother

With the availability of biomass fuel locally and in particular wood fuel there is significant potential to develop woodfuel opportunities in Rother District. Facilities are already in place to facilitate local supply of woodfuel.

South East Woodfuels located in Shawfield, East Sussex just outside Rother District, already supplies or intends to supply wood fuel into facilities within and in close proximity to Rother including:

- Environment Agency – Rye
- Bexhill High School (currently Kier construction site)
- Community College – Crowborough

Additionally Rother has Woodnet, a local organisation based in Filmwell, which connects timber growers and wood users in South East England. Woodnet also encourages working practices that help growers to sell their wood profitably at the same time as caring for the environment.

With the logistics to supply woodfuel locally in conjunction with Woodnet, Rother has the facilities in place to develop biomass potential further and our understanding is that despite the recent refusal of the 4.5 MW_e facility in Northiam (Application RR/2009/1283/P November, 2009) on the grounds of adverse effect to AONB, visual impact and traffic movements and noise, the desire to promote this type of facility is supported by the Council and the Local Strategic Partnership. Therefore, should a suitable location be identified policies developed to encourage strategic sites for this type of facility should be encouraged. Biomass as a provider of heat would also benefit from the Renewable Heat Incentive (RHI) via incentive payments funded by a levy on suppliers of fossil fuels for heat (see Section 2.7.2 for details).

4.5 Other Technologies

In addition to wind energy and biomass resources, there are also other renewable energy and low carbon technologies that have the potential for application within Rother District. However, these technologies would need to be evaluated on a site-specific basis and, therefore, evaluating them on a District level is neither accurate nor wholly meaningful. The following section, however, provides an indication of their application, giving specific attention to the strategic site of North East Bexhill, where appropriate.

4.5.1 Photovoltaics (PV) & Solar Hot Water (SHW)

There is a range of solar technologies that can be potentially utilised across Rother District. Photovoltaic systems produce electricity from sunlight through semiconducting cells utilising the photo-electric effects to generate electrical energy. Photovoltaic panels come in modular panels, which can be fitted to the top of roofs, but other building-integrated panels are also available. A typical PV panel can generate around 100kWh/m^2/yr. Solar thermal collects heat from the sun to produce hot water. A typical solar collector can generate around 500kWh/m^2/yr.

Feasibility of solar technologies is site-specific, depending on the constraints of individual households and buildings such as orientation, roof structures, roof areas, surrounding obstacles as well as individual financial considerations. It is therefore difficult to carry out a high level analysis in order to determine the potential for carbon reduction through solar technologies throughout Rother that would be meaningful and provide a valuable interpretation to support the development of policy.

However, due to great hours of daylight and days of sunshine, the south coast of the UK is likely to be more favourable to solar technologies, as solar radiation along the south coast, including Bexhill, is above the national average and, therefore, should be considered as a solution to meeting policy targets identified in this study.

4.5.2 Ground and Air Source Heat Pumps

It is difficult to generalise regarding the viability of ground source heat pumps for such a wide geographical area such as Rother District and, even on a MLSOA or Census Output Area basis, general conditions may not be reflected in individual plots.

The geology of the area is heterogeneous comprising relatively thin beds of fine-grained sandstones separated by bands of siltstone and mudstones. These sediments belong to the Ashdown Beds and Wadhurst Clay from the Lower Cretaceous age. The sandstones come form

localised secondary aquifers, however, the extensive geological faulting has effectively divided the aquifer into relatively small discrete units. Although Ground Source Heat Pumps (GSHP) may be viable in certain areas, the diverse geology of Rother does not allow GSHP technology to be deployed in all locations. The use of GSHP should be evaluated on a site by site basis with consideration of the geology and hydrogeology and may involve ground investigations to verify desk study conclusions.

Air Source Heat Pumps (ASHP) are site-specific depending on the constraints of individual households and buildings, such as space availability, the electrical generation required, its Coefficient of Performance (electricity required as a ratio to heat produced – usually 1:3) as well as individual financial considerations. It is, therefore, difficult to carry out a high level analysis in order to determine the potential for carbon reduction from ASHP throughout Rother that would be meaningful and provide a valuable interpretation to support the development of policy. The application of this technology should be reviewed on a site and dwelling basis.

4.5.3 Energy from Waste

Whilst Energy-from-Waste can contribute to regional energy targets, this technology has not been included within the outputs of this current study, which has been conducted in parallel with the development of a separate regional waste strategy. Scott Wilson has not attempted to anticipate the outcomes of this study, and therefore any energy generation opportunities identified for Rother District from waste should be considered as additional to the recommendation and findings outlined here.

4.5.4 Hydropower Opportunities within Rother

Hydroelectric schemes are classified into three major categories based on their installed capacities; large hydro; medium hydro; and small hydro schemes. Small hydro schemes are further categorised as mini-, micro- and pico-hydro schemes. The definition of hydro scheme sizes varies from country to country.

Table 4.5 below illustrates the classification widely followed in UK[36, 37]

Scale Description	Installed Capacity
Large hydro	50MW and above
Medium hydro	5-50 MW
Small hydro*	Below 5MW
Mini-hydro	500kW-5MW
Micro-hydro	500kW -10kW
Pico-hydro[38]	Below 10kW

**Small hydro further categorised into mini-, micro- and pico-hydro.*

[36] *The Watt committee on Energy, (1985), Small-scale hydropower. In: Sixteenth consultative council meeting of the watt committee on energy, London, Watt committee on energy Ltd.*
[37] European Small hydropower Association, (1998), Layman's handbook on how to develop a small hydro site, (2ndEd), [online], Available from: http://ec.europa.eu/energy/library/hydro/layman2.pdf, [Accessed 3rd Dec 2009]
[38] Thames Valley Energy, (2004), Low Head Hydro Power in the South-East of England –A Review of the Resource and Associated Technical, Environmental and Socio-Economic Issues, [online], available from: http://www.tvenergy.org/pdfs/Final%20Hydro%20Report%2022April04.pdf, [Accessed on 3rd Dec 2009].

An analysis at the highest level demonstrates that Rother offers no opportunities for large, medium and small scales of hydro installations due to the geography (i.e., available head – see relevant paragraph below) and the river flow conditions of the District. However, we have performed a preliminary feasibility review to explore opportunities for micro- and pico-scale installations. Results show that lack of available head minimises the potential for significant output, and the overall potential for the district is restricted to pico-hydro (domestic level) installations. Details of the analysis conducted can be found in **Appendix G**.

5 Evaluation of Policy Options and Site Testing

5.1 Introduction

Against the background of the carbon footprint of the District, the financial impact of potential policy scenarios and the opportunity for low carbon and renewable energy growth in the District, the following section evaluates policy options for consideration by Rother District Council.

5.2 Existing Initiatives in Rother

The following outlines a number of initiatives already in place within Rother District:

Rother District Council set up the **Affordable Warmth Steering Group**, which includes Councillors from Rother District Council, East Sussex Healthy Homes and Hastings and Rother Primary Care Trusts. It was adopted May 2009 to raise awareness on fuel poverty and consult with local residents and key stakeholders.

The **Warm Fronts Scheme** provides grants for retrofitting existing stock to upgrade insulation and replace heating systems. Further grants up to £6,000 are available to enable existing households to connect with the gas mains and fuel oil, which is considerably more expensive and carbon intensive.

East Sussex Energy Partnership (ESEP) is the regional delivery vehicle for the above schemes and grants and discounts on renewable technology. The ESEP, which consists of four Councils - Rother District Council, Hastings Borough Council, Wealden District Council and Eastbourne Borough Council, was awarded for its campaign to provide Government-funded grants to help privately owned and privately rented households insulate their homes, and/ or install renewable energy technologies to save energy and cut fuel costs.

ESEP are a potential delivery vehicle in the District to support the delivery of energy policies through training, knowledge and the dissemination of information to residents.

5.3 General Core Strategy Policies

5.3.1 Defining Criteria-Based Policies

Planning Policy Statement 22 (Renewable Energy) advises that planning applications for stand-alone renewable energy installations should be assessed against specific criteria that are set out in local development documents (see Paragraph 6). Criteria-based policies should be drafted to reflect local circumstances, focusing on the key criteria that will be used to judge applications, with more detailed issues set out in Supplementary Planning Documents (see Paragraph 7). In areas that are nationally designated (such as the High Weald Area of Outstanding Natural Beauty), there is a presumption that small-scale developments should be permitted, provided that there is no significant environmental detriment to the area concerned.

The Companion Guide to PPS22 makes it clear that policies should be expressed positively, with the presumption being that stand-alone renewable energy developments will be permitted unless

they fail to meet defined criteria. Typically, criteria may include impact on landscape (particularly in designated areas) including visual, cultural and historical character and attributes, as well as a range of other environmental impacts such as noise, dust, odour and traffic generation (see Paragraph 4.11 in the Companion Guide to PPS 22).

Clearly, the policy criteria by which a proposal is to be assessed that are set by a Planning Authority must be demonstrably related to the specific circumstances (and in particular environmental sensitivities) that exist within a given area. Visual and landscape character sensitivity will be of paramount concern in the High Weald AONB. However, these should not necessarily preclude any opportunities for renewable energy, particularly where resource opportunities (such as wind speed and availability of wood fuel) may favour the location of renewable energy installations, either as stand-alone projects, or where proposed as part of another development proposal. The Council's Local Development Framework Core Strategy Consultation acknowledges the potential for use of biomass as a renewable energy source within the District with woodlands within the AONB described as an *"under-utilised source of renewable energy".*

Development proposals for a stand-alone biomass energy plant at Northiam were refused planning consent by Rother District Council at its meeting on 19 November 2009 (application reference number RR/2009/1283/P). The proposed development comprised a 4.5 MW_e power-generating installation, using approximately 50,000 tonnes of biomass fuel per annum. In its assessment of this proposal the Council acknowledged its Local Plan policies provided no specific guidance relating to renewable energy and based its judgement on national and regional policy, referring to general design policies. The proposal was refused planning consent on the grounds that the scale of the development would adversely affect the AONB by virtue of the visual impact of its buildings, chimney flue, haulage vehicle movements and noise.

It is reasonable to assume that as the market for renewable energy grows with the introduction of new financial incentives such as the proposed Renewable Heat Incentive, further proposals will come forward for renewable energy installations within the District.

5.3.2 Consequential Improvements

In common with many other Local Planning Authorities, the majority of planning applications relate to proposals for small extensions to private dwellings ('Householder Applications'). In 2008, these accounted for nearly two thirds of all applications determined by the Council. Whilst individually they have very limited impact in terms of increased energy demand and carbon emissions, the cumulative impact of these proposals is significant, even compared with many major schemes proposing new development. As a result, a number of Councils have considered the introduction of planning policies that seek to address the impact of extensions to existing dwellings. This also provides the opportunity for Planning Authorities to bring about measures that will contribute to National Indicator 186 (per capita reduction in CO_2 emissions).

Uttlesford District Council in Essex has adopted an SPD and uses planning conditions in order to ensure household extensions are carbon neutral through 'consequential improvements' to the property as a whole. Consequential improvement comprises improving the energy efficiency of a building to negate (either in part or entirely) the effect of increased energy use arising from an extension to the building. Uttlesford DC's approach is designed to improve the energy performance of existing residential stock, an area often considered to be outside the remit of the

planning process. There is a close relationship between this and Part L (Conservation of Fuel and Power) of the Building Regulations, with a similar requirement for 'consequential works' originally proposed to be implemented through the 2006 revision to Building Regulations. However, this was not included in the adopted version and is not proposed in the amended Regulations to be introduced in 2010.

Uttlesford DC's planning condition '*Improving energy efficiency in an extended dwelling*' states that for any extension or loft or garage conversion granted planning permission after 1st April 2006: *"The Council will require simple, cost effective energy efficiency measures to be carried out on the existing house if possible and practical".* This was originally introduced on the basis of the Supplementary Planning Document on home extensions adopted in November 2005 and has been reinforced through a more recent SPD on energy efficiency and renewable energy. When planning approval is granted for an extension or conversion of a dwelling, the applicant is asked to complete a home energy form. This becomes the basis of a report produced by the Council recommending measures that could be implemented to improve the energy efficiency of the existing building. These are drawn from a menu of eight different measures to improve insulation, the energy efficiency of heating systems or reduce electricity consumption.

Uttlesford Council's Building Control team is responsible for agreeing with the householder which measures are to be implemented to the rest of the building fabric as part of the condition. Householders are asked to implement as many of the eight measures as are practical and cost effective (defined by a payback period of less than 7 years), limited to no more than 10% of the total cost of the extension. In the first two years of implementation of these measures, Uttlesford believes it has achieved a reduction in energy consumption in the District's dwellings of nearly 2,000 MWh, equivalent to over 400tonnes of CO_2 emissions per annum.

Rother District Council may wish to implement a similar requirement to ensure its contribution to achieving the targets defined in the LAA in respect of NI 186 is not undermined by the many small but incremental increases in energy consumption that arise through household extensions. The introduction of measures to secure consequential improvements would provide an effective and measureable strategy to help address this challenge.

5.4 Applying the standards set in the South East Plan

The South East Plan (May 2009) includes a number of policies relating to sustainable development, energy and water infrastructure and reducing carbon emissions, as previously summarised (see Section 1.6). Policy NRM 11is set out in full below:

POLICY NRM11: DEVELOPMENT DESIGN FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY

Local authorities should:

i. promote and secure greater use of decentralised and renewable or low-carbon energy in new development, including through setting ambitious but viable proportions of the energy supply for new development to be required to come from such sources. In advance of local targets being set in development plan documents, new developments of more than 10 dwellings or 1000m^2 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

ii. use design briefs and/or supplementary planning documents to promote development design for energy efficiency, low carbon and renewable energy

iii. work towards incorporation of renewable energy sources including, in particular, passive solar design, solar water heating, photovoltaics, ground source heat pumps and in larger scale development, wind and biomass generated energy

iv. actively promote energy efficiency and use of renewable and low carbon energy sources where opportunities arise by virtue of the scale of new development including regional growth areas, growth points and eco-towns.

Local authorities and other public bodies, as property owners and managers, should seek to achieve high levels of energy efficiency when refurbishing their existing stock.

Section (i) of Policy NRM11 defines a target for on-site generation of decentralised and renewable or low carbon energy as a minimum requirement for development proposals exceeding a specified size (greater than 10 dwellings or 1,000m^2 of non-residential floorspace). The policy proposes this target be adopted by local planning authorities as an interim measure in advance of setting their own targets and thresholds through their DPDs. The supporting text that follows the policy in the South East Plan gives no direction on how Local Planning Authorities should implement the policy.

Rother District Council has not yet sought to implement SEP Policy NRM11 in any planning decisions that we are aware of since publication of the South East Plan. However, NRM11 presents the opportunity to the Council to bring forward a policy framework that can be designed to reflect the specific circumstances within Rother as outlined in the following sections.

5.4.1 Defining Parameters of Energy Policy

Defining which elements of building energy use should be included within the policy.

Policy NRM11 makes no distinction between 'regulated' and 'unregulated' energy use. The term 'regulated' energy relates to all energy consumed within a building for purposes that are included in assessment of compliance with Part L of the Building Regulations. For example, within a house, regulated energy relates only to comfort heating and hot water (including heating system pumps and fans), and fixed lighting (i.e. ceiling and wall-mounted lights). All other energy uses such as cooking and electrical appliances are excluded, and together comprise 'unregulated' energy use. The proportion of total energy demand (i.e. the sum of regulated and unregulated energy) arising through unregulated energy uses can be significant, as shown below.

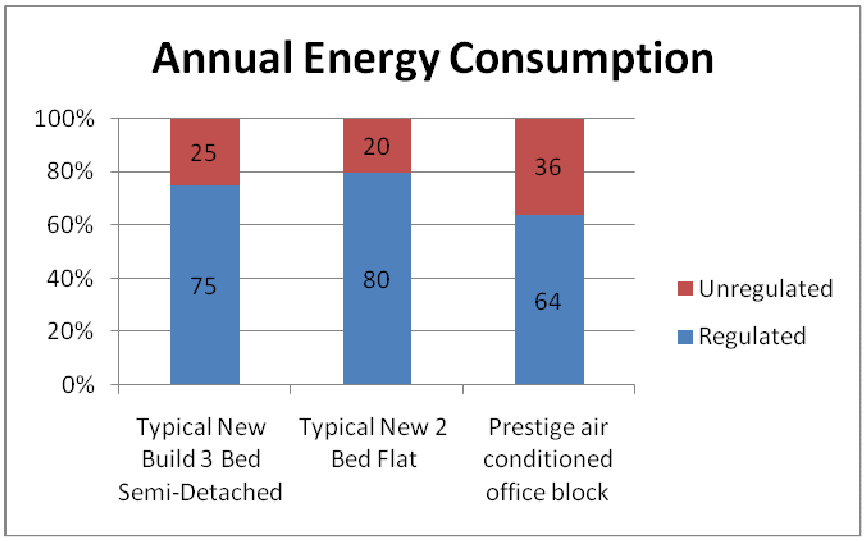


Figure 5.1: Annual Energy Consumption of Different Dwellings

Some Local Planning Authorities have set out in their supporting information an expectation that planning applications shall be assessed in terms of their anticipated total energy consumption. This removes a distinction based on regulatory measures that fall outside the planning system and ensures the policy aligns more closely with the planning objective that the whole impacts of a development proposal be considered.

5.4.2 Policy Targets Based on Carbon Emissions

Expressing the policy targets in terms of carbon emissions.

Policy NRM 11 sets a minimum requirement for decentralised renewable or low carbon (LZC) energy production, expressed as a percentage of energy consumption. The purpose of this policy is to address the objectives of reducing carbon emissions arising from energy use in new buildings. However, the mechanism by which this policy is to be assessed is the amount of low or zero carbon energy generation. The consequence of this is that the policy focuses on the means (LZC energy generation), rather the objective (reduced carbon emissions).

The relative levels of carbon savings are partly dependent on the 'carbon intensity' of input energy. In wind, solar or hydro energy, the input energy has a carbon intensity of zero. Biomass wood fuel has much lower carbon intensity than natural coal, oil or gas. However, where grid electricity is used as the input energy the carbon intensity is much higher. The relative carbon intensity of a number of fuels is shown below:

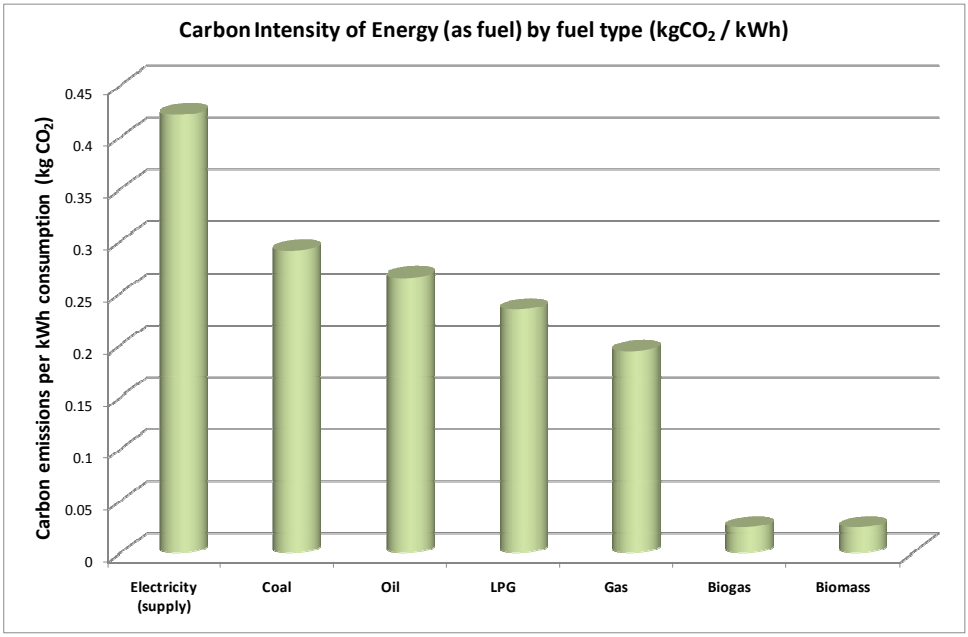
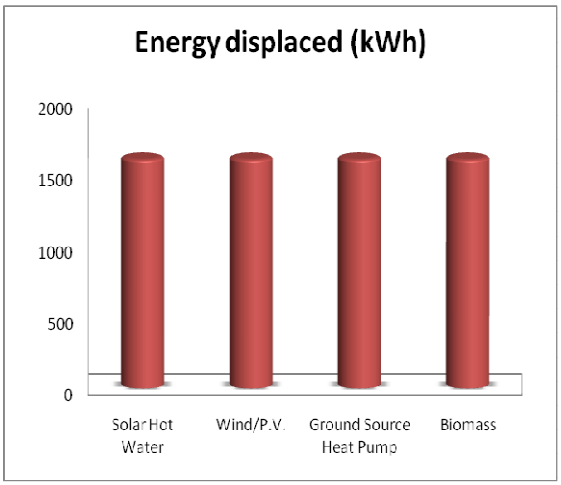


Figure 5.2: Carbon Intensity of Fuel Types

Therefore, the reduction in carbon emissions arising from different types of LZC technology is dependent on the type of conventional energy that they are replacing. As a general rule, renewable electricity generation (for example from a photovoltaic panel) provides a greater saving in carbon emissions than an equivalent amount of energy generated by a renewable heat source (such as a solar hot water panel). Furthermore, heat-producing LZC technologies that require an input of electricity to operate (such as ground source heat pumps) make the smallest contribution to reducing carbon emissions. As a result, some proposals may meet the target defined in NRM 11 by generating at least 10% of energy on site through LZC means, but achieve a significantly more modest reduction in carbon emissions. The figure below illustrates this.



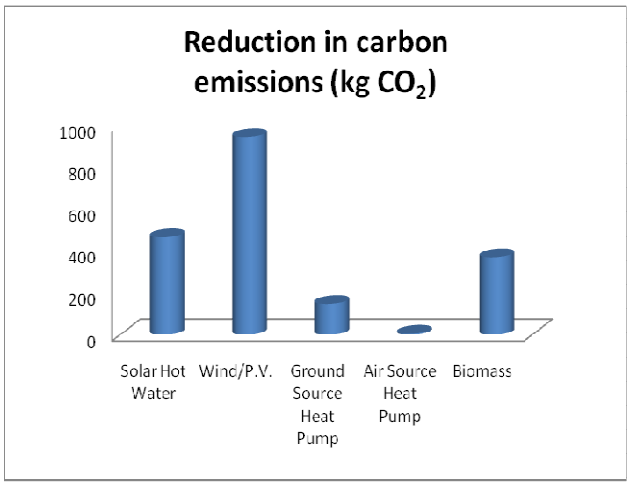


Figure 5.3 & 5.4: Energy Displaced and Reduction in Carbon Emissions

By defining a policy in terms of a target level of reduction in carbon emissions, the Council will be able to ensure it is focusing on the desired outcome of the policy.

5.4.3 Setting a Policy Based on Betterment over the Building Regulations

As described above there are clear linkages between planning and building control. The Council should be clear about how it intends to define the relationship between the two regulatory environments in order to demonstrate it is not duplicating the Building Regulations within its DPD. It should be noted that the Government has announced its proposals to revise the minimum statutory requirements for regulated energy consumption through revised Building Regulations in the latter half of 2010, with further changes proposed in 2013. The 2010 revisions will set a requirement for all residential and non-residential buildings to achieve a 25% improvement in energy efficiency compared with current standards set in 2006.

The Council may wish to consider setting its planning policies against a base defined by the prevailing Building Regulations. This will enable the Council to set targets for new development that require them to demonstrate they will achieve a lower energy demand and/or level of emissions than the 'base case' (i.e. the Building Regulations minimum). This could be achieved by the following individual measures, or a combination of both:

- Assessing development proposals on the basis of predicted total energy consumption (as above).
- Setting a minimum performance improvement over and above the Building Regulations (i.e. developments should secure at least 10% LZC energy production or carbon emissions reduction compared with the minimum standards set out in the current Building Regulations).

5.4.4 Removing the Size Threshold

SEP NRM 11 does not include minor planning applications for development proposals of 10 houses or less, or less than 1,000m^2 non-residential floorspace. In Rother, 511 minor applications were determined in the year ending June 2009. These schemes comprise a significant proportion of all development proposals within the District.

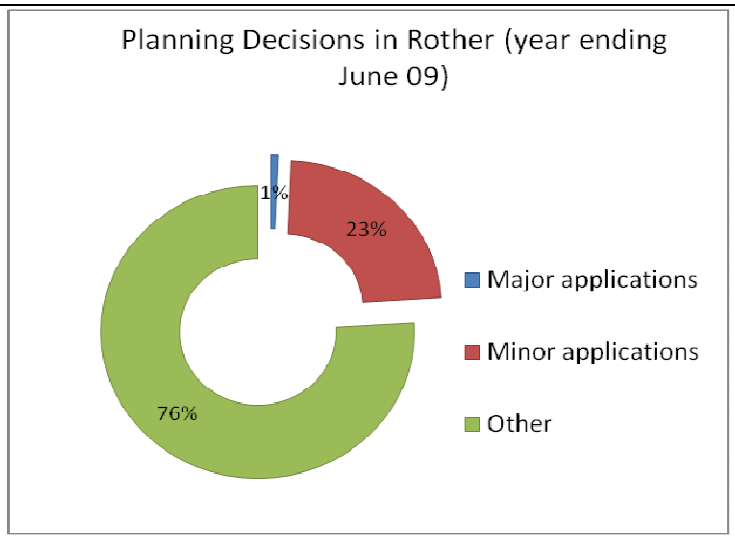


Figure 5.5: Planning Decisions in Rother District in 2009.

Adopting a policy that removes the size threshold currently set within SEP NRM11 would enable the Council to secure significant reductions in energy consumption and carbon emissions in smaller developments.

A further option is to consider applying the targets set out in the SEP policy on a phased basis, with an initial requirement for at least 10% of energy to be on-site generated LZC energy, to be replaced through the phased introduction of higher standards over time. This would enable the Council to bring development in line with the Government's planned introduction of milestones towards achievement of zero carbon homes by 2016 (and other buildings by 2019) as set out in Section 2.3.

5.4.5 Policies Seeking Aspirational Levels of Carbon Reduction

Some Planning Authorities have recognised that securing high or zero levels of carbon reduction in development prior to the introduction of national mandatory standards is either technically impractical or not financially viable for many developments. Their response has been to adopt policies that seek a minimum level of renewable energy (or carbon reductions) alongside an aspiration to secure significantly higher standards of carbon reductions. This aspiration is fulfilled by offering the option for developments to provide financial contributions to a carbon reduction fund that can be used to finance an equivalent level of carbon reduction elsewhere within the Local Authority area.

This approach was piloted by Milton Keynes in its Local Plan (adopted 2005), and is set out in its saved policy D4. It requires that all new development exceeding 5 dwellings or in excess of 1,000m^2 non-residential development include (among other things) carbon neutrality or financial contributions to a carbon offset fund to enable carbon emissions to be offset elsewhere. This takes the form of a one-off payment calculated at £200 per tonne of carbon dioxide and is secured through a Section 106 Agreement. This approach has been retained in the Council's emerging Core Strategy, which seeks a mandatory minimum of Code for Sustainable Homes Level 4, with the 'shortfall' of carbon emissions (up to zero carbon) met through payments into a fund.

More recently, Reigate and Banstead Borough Council in its Submission Core Strategy (March 2009) set out a requirement that development should be carbon neutral and any residual carbon emissions may be offset by financial contributions to the Borough's Carbon Reduction Fund to be spent on sustainable energy projects in the Borough.

5.5 Strategic Development Sites

The high-profile nature, scale and 'leading' position of strategic sites means that there is both additional pressure and also potential opportunity to set more challenging energy targets than might be appropriate for smaller development. There is a scalar difference between a site with 10 homes and a development area such as NE Bexhill where 1,100 homes are envisaged, which may allow the site to cross certain technology and economy of scale thresholds.

This section of the report addresses the site-specific potential of NE Bexhill, North Bexhill and West Bexhill to accommodate more stringent energy/ emissions reductions targets than might be envisaged for the wider District.

5.5.1 Methodology

Scott Wilson has conducted an outline assessment of the potential of the sites to meet different levels of the Code for Sustainable Homes (CSH) in order to inform the level of additional burden that might be placed on developers under different policy scenarios. The technologies considered include:

- Best and advanced practice energy efficiency measures
- Photovoltaic panels
- Solar thermal hot water collectors
- Biomass boilers
- Biomass CHP
- District heating
- Gas-fired CHP
- Large wind turbines
- Medium-scale wind turbines
- Ground source heat pumps
- Air source heat pumps

These broadly match the technology cost assessment that is outlined in Section 2.5. It should be noted that micro-wind is not included in this list, as the widespread deployment of this technology would cause significant visual and noise impact on larger development sites.

5.6 North East Bexhill

5.6.1 Proposed development

The development of North East Bexhill is a key focus for the strategic regeneration of the wider area. There are only limited areas within Rother and, indeed, Bexhill for development of this scale and, hence, this area is likely to become the 'flagship' of on-going growth for the District. The development is to encompass around 100 hectares of land and will include in excess of 1,100 homes and 48,000m^2 business spaces.

5.6.2 Physical context

The development area is at the junction of the existing outskirts of Bexhill and the open countryside extending to the north of the town. The landscape character is of a rolling and well-wooded countryside fringe, defined by a distinctive east-west ridge. The proposed Bexhill to Hastings link road will cut through the centre of the site, and it is suggested that the easterly side (BX2) will have a closer relation with the built-up area surrounding it, whilst the westerly stretch (BX3) will be more closely tied to the countryside.

5.6.3 Review of Literature & Studies

Two existing documents are of key relevance to the consideration of energy and emissions for this site. First, Savills and AEA Technology produced a report in October 2007 entitled "North-East Bexhill Master Plan – A Review of Potential Sustainable Energy Measures", a study that has informed the second document; the North East Bexhill Supplementary Planning Document published in June 2009[39]. This SPD forms part of the LDF for Rother District Council and hence the energy proposals for the Core Strategy contained within this document should compliment the SPD.

Taking these two documents in turn:

SAVILLS / AEA - "North-East Bexhill Master Plan – A Review of Potential Sustainable Energy Measures"

This document points to several factors that indicate that the site should be able to benefit from a number of LZC technologies. The fact that the site is undergoing a comprehensive planning process, the east-west axis of the site (e.g. good opportunity to implement passive solar strategies), the suitability of the site for large wind and the mix of uses envisaged (for a healthy DH system load profile) are listed. We agree with the overall sentiment of the document that there would appear to be considerable technical potential to implement a good mix of passive design measures and active LZC technologies to reduce the level of emissions from the development below the current level of regulatory requirement. However, this document does not take full account of the phasing of the construction programme. The NE Bexhill SPD anticipates construction starting in 2012 and continuing over an approximate eight-year period. Under a construction programme that spreads the domestic dwellings (1,100) across this timeframe the following CSH levels might apply (figures are approximate and indicative only).

[39] North East Bexhill Supplementary Planning Document, June 2009, Rother District Council

Date	Dwelling Count	Code Level
2012	210	3
2013-2016	412	4
Post-2016	492	6 (zero carbon)

Table 5.1: Assumed Dwelling Delivery Timetable in NE Bexhill

This indicates that, even under the current policy regime, i.e. compliance with Government standards, almost half of the domestic development will be required to be 'zero carbon'. The AEA / Savills study does not correlate the technology potential that is identified in their study with the targets that this build programme implies.

However, for the early stages of the study, we agree with the sentiment that for the first dwellings constructed, the imposition of a higher CSH Level would focus the attention on developers to maximise the potential of measures such as passive solar design.

North East Bexhill SPD

This document contains some of the key principles that are to be applied in the development of the land at NE Bexhill. Regarding the sustainable provision of energy, Section B[40] states the following:

- "5.14 A key principle is for the development to be an exemplar of sustainable design, construction and energy generation."
- "5.15 The SPD is not prescriptive in the measures to be employed, but specific consideration should be given to the range of potential energy efficiency and renewable energy generation options indicated below."

The measures listed include passive solar design, gas or renewable CHP, wind, and modern methods of construction.

5.6.4 Local Constraints & Opportunities

In terms of low and zero carbon technology energy potential, a number of factors are worth noting, many of which are also listed within the AEA Savills study.

Natural Environment

- The orientation and topography of the site appears to be generally favourable for the application of passive solar design techniques.
- There is a broad mix of dwelling sizes required by the development and it is anticipated that much will be relatively low-rise housing; therefore, comparatively large expanses of roof space should be available to support solar technologies.
- The topography of the site is likely to offer good locations for the installation of large wind turbines.

[40] NE Bexhill SPD, June 2009, page 18

- Whilst the existing road system is congested, the construction of the new link road could provide a convenient access route for fuel deliveries (e.g. local biomass).
- Whilst no site-specific ground condition/ hydro-geological data are available to our knowledge, the general geology of the wider area does not lend itself to ground source heat pump systems.

Built Environment

- The NE Bexhill SPD outlines indicative layouts, with details of housing densities in various areas, e.g. BX2[41], and the proposed mixes offer good configuration for centralised energy centres and district heating networks. As the viability of district heating is linked to the level of connected load and the length of pipework installation required, it is a DH-favourable design to have a mix of employment land and high/ medium density housing grouped together around the BX2 High Street area, for example.
- An illustrative energy centre location with good access to the road (for fuel deliveries, if required) where the cost of pipework runs can be kept to a minimum to access the higher heat demand density areas is shown on the plan below:

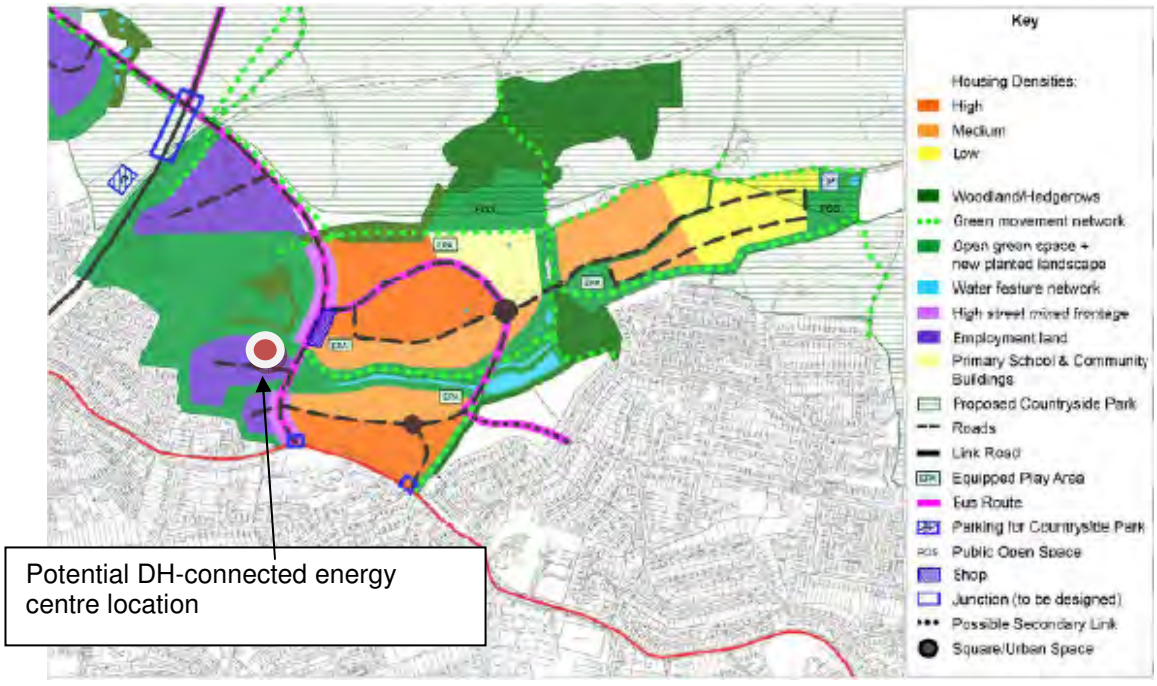


Figure 5.6: Notional DH Energy Centre Location

- The phasing of construction of the NE Bexhill development will also influence the viability of DH, and it is expected[42] that construction will take place over a period of eight years. In the context of commercial viability of DH schemes, this is a long period, and hence we recommend that the phasing of the development areas be discussed with potential ESCo

[41] NE Bexhill SPD, June 2009, Figure 8, page 28
[42] NE Bexhill SPD, June 2009, para 8.9, page 43

project partners, such that the viability of DH can be maximised through modular energy centre design and sensible phasing of loads.

- The BX3[43] indicative layout would appear to offer less potential for successful DH implementation, but actual viability will depend heavily on the nature of the businesses that occupy the commercial/ industrial spaces central to this area.

5.6.5 Energy Strategies for Code Levels

A distinction is proposed here in the choice of technologies that are likely to be adopted at the site between the following two area types:

District Heating Viable Areas and Non District Heating Viable Areas

As is illustrated below, the strategies for different Code levels can be similar for both area types when lower targets have to be achieved, but with the imposition of 'Zero-carbon' targets, options are limited.

CODE LEVEL 3	
DH Viable Areas	**Non DH Viable Areas**
Advanced Practice Energy Efficiency	Advanced Practice Energy Efficiency
Best Practice Energy Efficiency and Solar HW or PV	Best Practice Energy Efficiency and Solar HW or PV
Best Practice Energy Efficiency and Ground Source Heat Pumps	Best Practice Energy Efficiency and Ground Source Heat Pumps
Good Practice Energy Efficiency and Gas-fired CHP Heat	

CODE LEVEL 4	
DH Viable Areas	**Non DH Viable Areas**
Advanced Practice Energy Efficiency and SHW or PV	Advanced Practice Energy Efficiency and SHW or PV
Best Practice Energy Efficiency and Biomass Heating (DH)	Best Practice Energy Efficiency and Biomass Heating (individual)
Advanced Practice Energy Efficiency and Ground Source Heat Pumps	Advanced Practice Energy Efficiency and Ground Source Heat Pumps
Best Practice Energy Efficiency and Gas-fired CHP Heat	

[43] NE Bexhill SPD, June 2009, Figure 9, page 37

CODE LEVEL 5	
DH Viable Areas	**Non DH Viable Areas**
Advanced Practice Energy Efficiency and SHW or PV	Advanced Practice Energy Efficiency and SHW or PV
Best Practice Energy Efficiency and Biomass Heating (DH)	Best Practice Energy Efficiency and Biomass Heating (individual)
Advanced Practice Energy Efficiency and Ground Source Heat Pumps	Advanced Practice Energy Efficiency and Ground Source Heat Pumps
Best Practice Energy Efficiency and Large Wind	Best Practice Energy Efficiency and Large Wind
Best Practice Energy Efficiency and Gas-fired CHP Heat	

CODE LEVEL 6	
DH Viable Areas	**Non DH Viable Areas**
Best Practice Energy Efficiency, Gas-fired CHP Heat (DH) and PV	
Advanced Practice Energy Efficiency, Biomass Heating (DH) and PV	Advanced Practice Energy Efficiency, Biomass Heating (individual) and PV
Best Practice Energy Efficiency and Large Wind	Best Practice Energy Efficiency and Large Wind
Best Practice Energy Efficiency, Biomass CHP	

Table 5.2: Technologies for different Code Levels

The tables above illustrate that the delivery of Code levels 3 through 5, where targets are expressed as a reduction against target emissions rate (TER) from SAP or Part L1A compliance modelling would appear to be achievable by a number of technology combinations.

However, when Code Level 6 is required, a number of options remain open for those dwellings connected to a centralised heat supply system. However, for individual properties where access for biomass fuel deliveries is difficult, the only option would appear to be large wind.

The Cyril Sweett report on Code Level costs[44] for dwellings illustrates this issue in the uplift in costs between two modelled scenarios for Market Town development – one where wind is assumed to be utilised, and a second scenario assuming that no wind power is possible. The capital cost implications for the two different uplift scenarios on different house types is as shown below:

[44] DCLG, Cost Analysis of The Code for Sustainable Homes – Final Report, July 2008

Code 6 (Market Town Scenario)	Capital Cost Uplift	
	Wind Viable	No Wind
Detached House	£13,065	£32,752
End-terraced	£8,771	£24,822
Mid – terraced	£8,950	£24,696
Flat	£8,685	£18,996

Table 5.3: Code Level 6 Cost Uplifts with and without Wind Generation.

The same trend can be assumed to apply for commercial properties.

Depending on house type, this table illustrates cost uplifts between a wind and no-wind development scenario of between £10,000 and £20,000 per dwelling.

5.6.6 Policy Recommendations

Domestic

Given the site's potential to accommodate a broad range of technologies and the relatively minor uplift in developer costs anticipated with the uplift in requirements between Code levels 3 and 4, it is strongly recommended that the whole of the residential element of the development site be required to meet at least Code level 4.

The potential to bring forward the implementation of Code level 6 or to impose an interim Code level 5 requirement in 2014/ 2015 is, in our view, largely dependent upon the feasibility of a single large, or multiple medium-scale, wind turbine(s). If a large (e.g. 2MWe) wind turbine can be accommodated, then meeting the demands of an accelerated timetable is feasible without undue burden on the development. However, without large-scale wind, attaining the Government targets even within the current regulatory timetable is a considerable challenge. One of the few technologies that can make a very significant contribution to carbon reduction targets is a biomass-based CHP solution with district heating network distribution from a central energy centre. The viability of this technology from a technical perspective is not in doubt. However, it is the commercial viability of a scheme of this nature that is in question, and this depends upon a large number factors, some of which lie outside of developer control. The cost to a developer and the success of a scheme as a whole will likely depend upon the interaction between an Energy Service Company (ESCo) and the Developer. An ESCo may be willing to contribute to the additional up-front costs of DH infrastructure, energy centre, power network reinforcement, gas network extensions, but the Developer or another Party will also have to meet a portion of these costs, and the level of contribution required will fluctuate with:

- Market prices for fuels (both gas and renewable) and electricity;
- Government incentives for renewable or other energy generation technologies;
- Infrastructure costs (e.g. copper and steel market prices); and
- The availability of low-cost finance.

This demonstrates that the viability of one of the key technologies to allow a development to achieve Code level 6 also depends upon several market factors that are outside of Rother District Council's or the developer's control.

Given this situation, two policy approaches appear justified. First, in order to protect the affordability of housing in the NE Bexhill development, policies should encourage the development of large wind on the site as far as possible. Second, given the significant challenge and cost implication of meeting Code level 6 by 2016 in the current technological climate and without certainty that market conditions will improve sufficiently to make ESCo operation of biomass CHP schemes entirely self-funding, it does not seem appropriate to move the zero-carbon timeline forward.

Commercial

The timetable for nation-wide carbon reduction targets for non-residential premises are yet to be confirmed, but are widely believed to follow the revision timetable of Building Regulations (e.g. 25% in 2010, 44% in 2013). Without accurate knowledge of the nature of the commercial operations that might occupy the site, the cost implications of achieving zero-carbon status are very difficult to predict. However, for Code levels 3 to 5 which only address the regulated element of energy consumption (e.g. not process electricity) the cost implications can be estimated with somewhat more confidence.

The non-domestic element of NE Bexhill represents a significant proportion of the overall built-environment (approximately 40% in floor area terms). From this perspective, setting ambitious targets for emissions reductions seems as important as for the domestic sector. However, this must be weighed against the overriding need of the District to generate employment and for the site to attract business investment.

On the basis of the difficulty of setting specific targets for a wide variety of different potential non-domestic development types, it is recommended that the BREEAM rating mechanism (that incorporates a significant energy-related element via Energy Performance Certificates (EPCs) is used to ensure improved carbon performance of commercial premises. This sets minimum standards for energy to be achieved for different ratings. In the case of NE Bexhill, it is recommended that BREEAM 'Excellent' ratings be achieved by all non-domestic premises unless there is specific evidence provided by the developer demonstrating why this is not possible. This would ensure the mandatory EPC for BREEAM 'Excellent' was attained – an EPC of 40. Please refer to policy recommendations for further detail in Section 6.

5.7 North Bexhill

5.7.1 Introduction

North Bexhill is the second priority area that Scott Wilson and Rother District Council have identified for examination in the context of potentially increased environmental / energy targets in this study.

5.7.2 Proposed Development

Plans for development in North Bexhill are less well-defined than those for North-East Bexhill. Initial figures from Rother District Council are that development of 650 dwellings would be considered for this area. Scott Wilson is not aware of any further detailed information of the nature of proposals for this area.

5.7.3 Physical Context

In broad terms, the nature of the natural environment is similar to that of North East Bexhill – e.g. urban fringe with the A269 crossing through the potential development area.

5.7.4 Local Constraints and Opportunities

A number of factors can be highlighted for the North Bexhill site many of which are shared with the North East Bexhill development site -

Natural Environment

- The orientation and topography of the site appears to be generally favourable for the application of passive solar design techniques.
- The topography of the site is likely to offer good locations for the installation of large wind turbines.
- Whilst the existing road system is congested, the construction of the new link road could provide a convenient access route for fuel deliveries (e.g. local biomass).
- Whilst no site-specific ground condition/ hydro-geological data are available to our knowledge, the general geology of the wider area does not lend itself to ground source heat pump systems.

Built Environment

- There is insufficient detail on the planned level of development at North Bexhill to comment on local opportunities or constraints due to the built environment. However, if it is assumed that dwellings would be spread across the area that has been indicated for consideration (e.g. straddling the A269 between North of the brickworks quarry and the NE Bexhill development) then the dwelling density is likely to be fairly low, resulting in a low potential for financially viable district heating.

5.7.5 Energy Strategies for Code Levels

Depending on development density, the strategies envisaged for meeting different Code levels would be similar to that listed for NE Bexhill above, in Section 5.6.5.

5.7.6 Cost Implications of Code Levels

The North Bexhill development is currently envisaged to include around half the number of residential dwellings that are proposed for NE Bexhill, and no commercial space. On this basis, it can be seen that there will be a scalar difference between the two development areas. For North Bexhill, another factor that will impact cost of Code Levels will be the development density. In particular, higher costs are implied should a district heating solution be required for the scheme to

meet Code level 6. However, should a large-wind solution be viable, costs would be considerably less and comparable with NE Bexhill.

5.7.7 Development Viability & Delivery of Policy

In view of the current stage of development of plans for North Bexhill, it is thought that only a small portion, if any, of dwellings would be complete before the introduction of Code level 4 (in 2013). Hence, dwellings would be anticipated to meet standards requiring the 44% reduction in emissions related to regulated energy use. An accelerated timetable of further reductions to Code level 6 is not recommended for this site at this stage, given that the potential for large wind is uncertain, and given the uncertainties surrounding the nature of the development itself.

5.8 West Bexhill

5.8.1 Introduction

West Bexhill is the third priority area that Scott Wilson and Rother District Council have identified for examination in the context of potentially increased environmental/ energy targets in this study.

5.8.2 Proposed Development

Plans for development in West Bexhill are much less concrete than those for the North East Bexhill site, and indeed this area is not a favoured option in the current Core Strategy Preferred Options document. As this document states[45] "*The key issue for this whole area is the capacity of the A259. Highway assessment shows that to accommodate any scale of development would necessitate the construction of a new road linking the A259 to the A269 and hence to the Link Road. This may be a development road in large part, but not entirely because of the need to maintain open land, floodplains and woodland*". Rother District Council has advised that Scott Wilson should consider a development of 600 homes in this location. It has been assumed that the majority of these dwellings would be flats.

5.8.3 Physical Context

The area that has been identified for potential development lies to the north of the A259 on the western approach to Bexhill, and is behind the gardens of the existing detached houses that border the A259 and Willow Drive. The area is currently shielded by trees and is an established area of pleasant, pastoral countryside, with a patchwork of fields separated by small woods and strong hedge lines, similar to the High Weald to the north. Areas to the west are more exposed in the wider landscape.

5.8.4 Local Constraints & Opportunities

Given the pastoral and amenity nature of the existing landscape, it is anticipated that opposition to development would be particularly strong for emotive or 'nimby-ist' technologies such as large wind, and the same would also apply for other more 'industrial' installations (as can result from large, centralised energy centres) e.g. large flues/ functional rather than aesthetic buildings.

[45] Core Strategy Preferred Options, p42, Rother District Council, November 2008

Further constraints must also include the capacity of the A259. Technologies that require frequent fuel deliveries by large lorry would have a negative impact on traffic movements. However, as for all areas of Rother, the site will benefit from above-average levels of solar irradiation, and from a purely technical perspective, there is a reasonable wind resource in terms of annual average wind speeds.

A further opportunity is that the significant number of dwellings at the site would allow the operation of technologies such as CHP and biomass boilers to become viable if a decentralised heat distribution system were developed. As for North East Bexhill, this is of particular significance for achieving Code for Sustainable Homes level 6 by 2016. However, it is also worth noting that there do not appear to be non-domestic heat demand nodes of any significance in the area that could help to generate a more balanced heat demand profile on a daily and seasonal basis.

5.8.5 Energy Strategies for Code Levels

Given the wholly residential nature of the development, the core considerations for this site are whether accelerated implementation of the Code for Sustainable Homes energy standards are appropriate and justifiable, and whether a specific renewable energy target may be appropriate for the site.

The same technology options that are outlined above for the NE Bexhill site have also been considered for the West Bexhill development area. However, in terms of energy options, the road capacity issues that surround the adoption of this site have significant implications, particularly for Code Level 6. If it is assumed that large wind is not viable for the location, then the remaining viable options for achieving the required levels of emissions reductions at Code Level 6 include biomass. Under both a centralised (e.g. district heating network) or individual-house biomass solution, deliveries of biomass will be required. These goods vehicle movements would exacerbate road capacity issues. The significance of this will depend equally on other traffic-related measures that may alleviate congestion in the area.

The following tables replicate the technology options identified for NE Bexhill at different Code levels, but the biomass and wind options are highlighted in red to reflect the difficulties that are foreseen in their implementation:

CODE LEVEL 3	
DH Viable Areas	**Non DH Viable Areas**
Advanced Practice Energy Efficiency	Advanced Practice Energy Efficiency
Best Practice Energy Efficiency and Solar HW or PV	Best Practice Energy Efficiency and Solar HW or PV
Best Practice Energy Efficiency and Ground Source Heat Pumps	Best Practice Energy Efficiency and Ground Source Heat Pumps
Good Practice Energy Efficiency and Gas-fired CHP Heat	

CODE LEVEL 4	
DH Viable Areas	**Non DH Viable Areas**
Advanced Practice Energy Efficiency and SHW or PV	Advanced Practice Energy Efficiency and SHW or PV
Best Practice Energy Efficiency and Biomass Heating (DH)	Best Practice Energy Efficiency and Biomass Heating (individual)
Advanced Practice Energy Efficiency and Ground Source Heat Pumps	Advanced Practice Energy Efficiency and Ground Source Heat Pumps
Best Practice Energy Efficiency and Gas-fired CHP Heat	

CODE LEVEL 5	
DH Viable Areas	**Non DH Viable Areas**
Advanced Practice Energy Efficiency and SHW or PV	Advanced Practice Energy Efficiency and SHW or PV
Best Practice Energy Efficiency and Biomass Heating (DH)	Best Practice Energy Efficiency and Biomass Heating (individual)
Advanced Practice Energy Efficiency and Ground Source Heat Pumps	Advanced Practice Energy Efficiency and Ground Source Heat Pumps
Best Practice Energy Efficiency and Large Wind	Best Practice Energy Efficiency and Large Wind
Best Practice Energy Efficiency and Gas-fired CHP Heat	

CODE LEVEL 6	
DH Viable Areas	**Non DH Viable Areas**
Best Practice Energy Efficiency, Gas-fired CHP Heat (DH) and PV	
Advanced Practice Energy Efficiency, Biomass Heating (DH) and PV	Advanced Practice Energy Efficiency, Biomass Heating (individual) and PV
Best Practice Energy Efficiency and Large Wind	Best Practice Energy Efficiency and Large Wind Large Wind
Best Practice Energy Efficiency, Biomass CHP	

Table 5.4: West Bexhill likely technology options at different Code Levels

This table illustrates that at Code level 6, the only non-wind and non-biomass option for the West Bexhill site would appear to be a fully DH connected gas-fired CHP solution, supplemented by microgeneration such as PV, and / or medium-scale wind.

5.8.6 Cost Implications of Code Levels

The use of large-scale wind at West Bexhill is likely to be the most cost-efficient technology to achieve high levels of carbon emissions reductions.

The opportunities and restrictions on technology implementation at the site are not so significant as to warrant deviation from the guide prices developed for the DCLG and illustrated in Section 2.5. These figures[46] suggest that an average cost uplift from base build cost to Code level 3 would be in the region of 8%, and that the uplift from base build cost to Code level 4 would be around 12%. Achieving Code level 6 implies a cost uplift of around 30%.

5.8.7 Development Viability & Delivery of Policy

These uplifts on costs above reflect the current national timetable for the implementation of energy standards. More accelerated delivery would see slightly higher costs as the pathways and skills for technology delivery are less developed. Therefore, as a first test, the viability of development at these minimum costs should ideally be assessed both in terms of technology and timetable. However, in the absence of guidance on development density and other factors, it is not currently possible to give a reliable, site-specific assessment of viability.

The revision of Part L1A during the later half of 2010 will require a 25% reduction in carbon emissions below current Part L1A (2006), matching the energy-related requirements of Code level 3. The key policy decisions for West Bexhill for construction that starts in the later half of 2010 are a question of whether Code level 4 should be introduced early and whether explicit renewable energy targets should be pursued.

The introduction of Code level 4 would in itself effectively require the use of a low-carbon or renewable technology in addition to the passive measures (please refer to Table 5.4) and hence we would argue that in Rother, where development viability is of critical importance, the additional flexibility implicit in the Code level 4 energy target (expressed as carbon reduction rather than a direct requirement for renewables) represents a potentially more cost-efficient option for developers.

Only a small portion of the development of West Bexhill is likely to fall into the period before 2013 (e.g. before when under anticipated Building Regulation standards 25% reduction in carbon emissions below Building Regulations 2006 will be required). On this basis, the financial burden of a mandatory Code level 4 minimum standard is represented by the uplift on this portion of the development on the difference between Building Regulations 2010 (25% emissions reduction) and Code level 4 (44% emissions reduction). It is our view that the negative impact on viability in the context of the wider development phasing programme is likely to be small. Hence our recommendation for West Bexhill is that all of the dwellings developed in the West Bexhill area should achieve Code level 4, reflecting the 'leading' nature of the development and its potential ability to benefit from economies of scale and centralised technologies.

[46] Derived from Appendix B, Costs and Benefits of Alternative Definitions of Zero Carbon Homes, DCLG, February 2009

5.9 Development Viability

5.9.1 Introduction

To support the preparation of this study, Drivers Jonas prepared an analysis of the impact on development viability of meeting the Code for Sustainable Homes (CSH) Levels 3, 4, 5 and 6. The development viability report also considers ways in which development viability and, hence, the deliverability of sustainable building practices could be improved. The supporting study uses data derived from Cyril Sweett, on behalf of the DCLG who have produced an advisory note "Cost Analysis of the Code for Sustainable Homes" (July 2008). It should be noted that this element of the study addresses all elements of meeting Code levels outline specific costs for meting the mandatory energy targets as outlined in Section 2.1 but is limited to the current market conditions, which is in decline during the course of the study.

5.9.2 Summary of Conclusions

The Drivers Jonas supporting study concluded the following (the detail of which is included in **Appendix C)**:

- There is no industry consensus over the likely build costs required to meet CSH levels 3, 4, 5 and 6. Information from referenced sources provides a very wide range of potential costs. The availability of generic/ robust cost information is limited and actual comparables are limited.
- Cyril Sweett, on behalf of the DCLG, has produced an advisory note "Cost Analysis of the Code for Sustainable Homes" (July 2008). This advisory note represents the most up to date and industry-wide recognised analysis of the potential costs associated with compliance with the Code for Sustainable Homes.
- The impact of meeting CSH levels 4, 5 and 6 has a significant impact on land value, with meeting CSH level 6 producing a negative value.
- Ultimately, development viability is established by the property market and, with revenue and costs being held equal, is determined by expectations of land value and profit.
- The development viability of meeting CSH levels 4, 5 and 6 will be challenging to deliver across the District based on current market conditions.
- There are limited precedents of development being delivered meeting CSH levels 4, 5 or 6 (Brighton One, BedZED). Those projects that have been delivered occurred at/ near the peak of market values.
- There are various planning factors that could act to support the delivery of CSH levels 4, 5 and 6 in the future. Movements away from existing planning policy will require a pragmatic approach to development by Local Planning Authorities.
- Market/ economic factors suggest that future development could well support meeting higher/ the highest sustainability measures as costs fall and values rise. However, at present this is not certain and is based on sentiment and forecast data alone.
- There may need to be a fundamental shift in the manner in which housing is delivered by the development industry. This is likely to be via a change in landowners' and

housebuilders' expectations of financial returns and a change in the manner in which development has traditionally been delivered.

It should be noted that this evaluation is based on declining current market conditions and no consideration has been given to the potential premium for a Code level house (as there is currently no published information in the UK confirming that a premium would be attained). Additionally no consideration has been given to changes in energy, infrastructure and technology costs over time. Similarly, no assumptions have been made in terms of changes in land value over time. On this necessarily limited basis, the conclusions may limit the responses that can be derived from this evidence base, but do provide a worst case scenario for Rother District to base decisions on.

6 Recommendations for Local Development Framework Policies

6.1 Stakeholder Dialogue and Workshop

The project team held dialogue with a number of key stakeholders in order to obtain relevant data and an insight into local opinion. Stakeholders contacted are referenced in Appendix D.

Initial findings of the study were tested following a presentation and workshop with key stakeholders at Rother District Council Chambers on 17th November, 2009. The presentation covered the following areas:

- Local Context – Policy and physical characteristics.
- Constraints and opportunities for low carbon and renewable technologies.
- Policy considerations and recommendations.

Following the presentation, an interactive workshop was held with the stakeholders in order to obtain a response to the following questions:

- What are the stakeholders' experiences of zero carbon technologies and their application within Rother?
- What are the aspirations within the Council for low carbon and renewable technologies compared to other planning objectives, e.g. Affordable housing?
- How can carbon reduction be further derived from the existing stock through the planning system?
- What is possible for developers to deliver? Is zero carbon development in Rother achievable by 2016?
- What cross-border initiatives may facilitate the delivery of low carbon and renewable technologies?
- What skills or knowledge are required by the Council in order to deliver low carbon and renewable technologies in the District?

Stakeholders predominantly consisted of members of the Local Strategic Partnership, although the workshop was initially proposed to be in two sessions with the first focusing on LSP participants and the second on non-LSP-related stakeholders, such as developers and environmental organisations, including the EA. Due to participants' numbers, the workshops were combined with the following representatives in attendance:

Name	Organisation	Contact Details
Karl Walker	Scott Wilson	Email: karl.walker@scottwilson.com
Sean Rendall	Thameswey Energy (ECSC)	Email: sean.rendall@ecsc.uk.com
James Eland	Scott Wilson	Email: James.eland@scottwilson.com
Scott Lavocah	Rother District Council Policy & Performance	Email: scott.lavocah@rother.gov.uk
David Marlow	Rother District Council Planning	Email: david.marlow@rother.gov.uk
Dr Mike O'Shea	Environment Agency	Email: michael.oshea@environment-agency.gov.uk
Beccy Anderson	Rother District Council	Email: rebecca.anderson@rother.gov.uk
John Williams	Sea Space	Email: JohnWilliams@seeda.co.uk
Christopher Strangeways	Rother Environment Group	Email: christopher@bosneyfarm.co.uk
Steve Parker Area Manager, Hastings and Rother	Freedom Leisure	Summerfield Leisure Centre Bohiema Road, Hastings Email: steve.parker@freedom-leisure.co.uk Mob: 07500 861725
Sean Tovey Contracts Manager	John O'Connor Ltd	Unit 3, 40 Beeching Road Beeching Road Industrial Estate Bexhill-on-Sea, TN39 3LJ Tel: 01424 217636 Mobile: 07958 314085 Email: sean.towey@btconnect.com
Jenny Morris Behavioural Change Officer	Verdant Group	Verdant Group London Road Depot London Road, Bexhill-on-Sea TN39 4AB Tel: 01424 730334 Mobile: 07825 474 583 Jenny.Morris@verdant-group.co.uk
Martin Fisher	Rother Voluntary Action	martin.fisher@rothervoluntaryaction.org.uk
John Fowler	Farm Crisis Network	jsfowler@talktalk.net

Mike Slavin	Rother Environment Group	Tide House Rye Harbour E Sussex TN31 7TU Tel: 1797 224916 Mob: 07785 362201 Email: mikes@pobox.com
Simon Hickmott	ESCC	simon.hickmott@eastsussex.gov.uk
Fergus Cameron	Rother District Council Amenities	fergus.cameron@rother.gov.uk
Graham Burges	Rother District Council Regeneration	graham.burgess@rother.gov.uk
Richard Wilson	Rother District Council Planning	richard.wilson@rother.gov.uk
Andy Roland	Rother District Council Planning	andy.roland@rother.gov.uk

Table 6.1: Stakeholder Workshop Attendees

6.1.1 Summary of Key Outcomes

The following is a summary of key responses to the questions raised to the stakeholders. For further detail please refer to the '**mind map**' generated during the workshop in **Appendix D**.

Experiences in Rother District

Participants of the stakeholder workshop have had a number of experiences in relation to low carbon and renewable technologies.

- Wood-fired boilers at Crowborough Beacon 2 x 500kW.
- Large-scale, free-standing wind turbines outside the District: Hastings (2MW); and Little Cheyne Court's (26 turbines at 2.3MW each).
- 14 Photovoltaic panels at Echlin House.
- Current application for a 1MW turbine in Rother.
- Limited pre-application discussion and consultation for Northiam biomass facility.
- Biomass fuel to be used in Bexhill High School.
- Lack of consultation regarding a 15kW turbine at Harbourside - application declined due to threat to bats.
- 50,000 tonnes of biomass available locally - 50MW approximately.
- Heat use is being driven down in homes through fabric improvements and, therefore, electrical generation is most important. Wind energy is considered important as reduction in electrical demand in homes is unlikely in the future.

Aspirations

- Council activities and provision of a leadership role, identifying where resources will be allocated to reach its energy objectives.
- Rother District Council priority is for a long term strategy with policies, which are both applicable currently and in the future.
- LSP aspiring for leadership on issues of low and zero carbon energy.
- Aspire to obtain skills and knowledge in order to take agenda forward.

Carbon Reduction – Existing Stock

- Significance of existing stock and predominant ability to influence outside of planning system.
- Smart energy metering to be implemented by Council.
- Stigma associated with damp and cavity wall upgrade in refurbishment.
- Carbon market driven via taxes/ fiscal incentives.
- Affordable warmth strategy - income/ fuel cost and energy efficiency of homes.
- Warm Fronts grants for access to gas network and insulation.

Zero Carbon in Rother

- Strategy developed to ensure development continues to grow in Rother District Council.
- Requires encouragement of developers to take on new costs - negotiations specific to site?
- Limited application on commercial development currently in Rother.
- Difficult due to the disconnection with central Government.

Cross-Border Initiatives

- Good relationship with neighbouring Districts such as Hastings through the LSP.

Skills and Knowledge

- Council and LSP are lacking in skills needed to respond to the emerging need for the application of low and zero carbon technologies in the District.
- Links with Sussex Coast University.

6.2 Evaluation of Emerging Local Development Framework Policies

6.2.1 Introduction

The following section provides an evaluation of the emerging LDF policies presented in the Core Strategy and as summarised in Section 3.5 of this report. The emerging policies are for strategic

sites and major developments, and minor and individual applications. Consideration has been given of the local constraints and opportunities as outlined in the previous chapters.

6.2.2 Emerging LDF Policies

The following tables provide an evaluation of the two options for the emerging LDF policies as proposed by Rother District Council. Table 6.3 is a review of the policies related to strategic sites and major applications and Table 6.4 reviews minor and individual household applications policies.

Rother Council's **Policy Option 1** is based on the promotion and application of new Government targets and setting supportive criteria for both efficient use of resources and renewable energy production. **Policy Option 2** is based on extending beyond Government targets where appropriate, setting locally specific targets and criteria for the efficient use of resources and identifying opportunities for renewable energy production.

Please refer to the Legend for a summary of the policy application and its suitability within Rother District.

	LDF Emerging Policy	Commentary
Option 1	**Promote and encourage sustainable design and construction techniques, including energy efficiency and grey water systems* in development**	Policies should consider sustainable design and construction, much of which is addressed through Codes/BREEAM in line with national targets across the district. Energy efficiency will be addressed via Part L improvements, via mandatory energy targets within the Codes. Grey water should be excluded from the policy as is only applicable to Code level 5 &6 dwellings and therefore is not applicable untill national government standards require this.
	Develop supportive criteria for renewable energy production in line with the South East Plan policies as directed by PPS22 and for the efficient use of resources in line with PPS1 Supplement	It is essential that policies reflect local circumstances, that focuses on key criteria that can be appraised during the application process. For example local designations and environmental constraints need careful consideration. For Example North East Bexhill renewable options would need to consider impact on landscape including visual, cultural and historical character and attributes, as well as a range of other environmental impacts such as noise, dust, odour and traffic generation . We recommend the use of criteria based policies for stand alone technologies to ensure the application of these is ina ccordance with local environmental constraints.
	Set renewable energy production thresholds for strategic sites	Both North East Bexhill & West Bexhill are favourable in terms of renewables potential although renewable thresholds need to be determined in accordance with wider constraints relating to development viability and capital cost required to install renewable technology. Additionally the overall objective should be to reduce carbon and therefore setting thresholds over and above SE Plan NRM 11 should be of low priority. Policies which support NRM 11 and the target for 10% of energy from decentralised and renewable or low carbon sources should be encouraged.
	Promote the Government-led mandatory level of the Code for Sustainable Homes: Level 3 in 2010; Level 4 in 2013; Level 6 by 2016.	Whilst the study has identified the cost and viability of achieving government targets for the CSH will be challenging for developers in Rother we would anticipate that these standards would need to be accommodated n the strategic sites and flexibility be provided specific to wider objectives such as affordable housing and S106 contributions which would need to be negotiated at the pre-application stage.
Option 2	**Promote and encourage high standards of sustainable design and construction**	High standards of sustainable design and construction would be delivered to BREEAM Excellent and Outstanding for commercial and Codes 5 & 6 for domestic. Policies should encourage high standards of sustainable design for strategic sites and major applications, however consideration needs to be given to betterment over government targets and local designations due to environmental constraints which should be given given careful consideration. BREEAM Excellent should be considered for commercial buildings over 1000m2 on strategic sites. 2010 building regulations should set a baseline going forward in terms of energy e.g. 25% EE
	Set requirement for levels of the Code for Sustainable Homes to be met in advance of Government standards for identified development areas e.g. Level 3 now; Level 4 in 2010; Level 5 in 2013; Level 6 by 2015 (more research required)	Code standards could be increased in advance of national targets up to Level 4 based on this studies evaluation of cost and viability. An uplift on Code levels 5 & 6 is not currently recommended as there is too much uncertainty about deliverability in accordance with government targets and beyond this is unlikely to be deliverable based on current market evaluations. Delivering Code 6 in advance of targets may be possible the inclusion of large scale renewable energy technologies such as a free standing turbine in the order of 2MW.
	Set District wide and strategic site requirements for on-site renewable energy production – often set at 10% (Merton rule)	Additionally the overall objective is to reduce carbon and therefore setting thresholds over and above SE Plan NRM 11 should be low priority. Policies may be developed specific to applicable technologies for NE & W Bexhill, which would need to be subject to wider approval at planning. For example subject to the successful application of a large scale free standing wind turbine a minimum of 20% energy is likely to be achieved to be determined and negotiated at the applications stage. A phased approach incorporating higher % over time could be adopted correlated with standards up to and beyond 2016
	Identify areas suitable for strategic renewable and low-carbon energy generation and supporting infrastructure in line with PPS1 Supplement (this would be most appropriate on a sub-regional joint working basis).	General areas have been identified throughout this study which are more favourable for stand alone applications of renewable technology generation. such a s large scale wind. Rye Harbour and North East Bexhill, whilst suitable areas, designations and other constraints such as location within Flood Zone 3 need careful consideration throughout the application process. A detailed study to evaluate these suitable areas is recommended. In the meantime a criteria based policy approach as recommneded in PPS 22 could be applied to a assess proposals.

Table 6.2: Strategic Sites and Major Developments

	LDF Emerging Policy	Commentary
Option 1	**Promote and encourage sustainable design and construction techniques, including energy efficiency and grey water systems* in development**	Minor and individual applications should be encouraged to incorporate sustainable design and construction through Codes and BREEAM in accordance with government standards. Energy Efficiency should be encouraged with a minimum of 25% improvement in energy in accordance with mandatory requirements for Code 3 and proposed 2010 Building Regulations. With moderate cost uplift this provides a constructive level of carbon saving but also reduces operational cost for the occupant. Grey water systems should not be encouraged as stated in previous spreadsheet on strategic sites.
	Develop supportive criteria for renewable energy production in line with the South East Plan policies as directed by PPS22 and for the efficient use of resources in line with PPS1 Supplement	Policies must reflect local circumstances and the limited opportunities associated with small scale development proposals, focusing on key criteria that can be appraised during the application process. For example local designations and environmental constraints need careful consideration. Minor and individual applications are more likely to be in rural Rother within designated areas such as AONB where visual impact is key.
	Set renewable energy production thresholds for strategic sites	This policy is not applicable to minor or individual household applications unless located within a strategic site. Recommendations are as stated in previous spreadsheet on strategic sites
	Promote the Government-led mandatory level of the Code for Sustainable Homes: Level 3 in 2010; Level 4 in 2013; Level 6 by 2016.	Government standards in terms of CSH although challenging for individual households and minor developments should be encouraged.
Option 2	**Promote and encourage high standards of sustainable design and construction**	High standards of sustainable design and construction should be encouraged but the attainment of Code Level 5 & 6 and BREEAM Excellent and above is unlikely and therfore should not be imposed on minor and household applications due to the significant constraints associated in terms of cost, viability and environmental constraints. Levels above and beyond government standards are not encouraged.
	Set requirement for levels of the Code for Sustainable Homes to be met in advance of Government standards for identified development areas e.g. Level 3 now; Level 4 in 2010; Level 5 in 2013; Level 6 by 2015 (more research required)	As stated above levels in advance of government standards are not considered suitable on the grounds of cost, viability and local constraints.
	Set District wide and strategic site requirements for on-site renewable energy production – often set at 10% (Merton rule)	Application of on site renewable technologies is considered suitable for minor applications and individual households
	Identify areas suitable for strategic renewable and low-carbon energy generation and supporting infrastructure in line with PPS1 Supplement (this would be most appropriate on a sub-regional joint working basis).	Not applicable to minor and household applications

Table 6.3: Minor & Individual Household Applications

Legend: Suitability of Proposed Policies

	Not suitable
	Suitable with amendments to be considered
	Suitable

6.3 Recommended Policies and Supporting Text

6.3.1 Introduction

The recommended draft policies and supporting text in this section are in accordance with national policies and particularly the advice in Planning Policy Statement: Planning and Climate Change; Supplement to PPS1 (2007) and Planning Policy Statement 22: Renewable Energy.

Planning Policy Statement 22: Renewable Energy 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*."

This section builds upon the technical evidence in this study, input from key stakeholders and evaluation of emerging LDF policies. The recommended policies and supporting text are divided into three groups: District-wide policies; strategic sites; and existing stock. The section concludes with future policy considerations that Rother District Council may want to develop in order to future-proof and better support corporate objectives on carbon reduction, with a potential aim to set up a Council carbon fund.

The draft policies and text set out below are intended to provide the Council with some of the key issues that need to be addressed. It is recognised that the Council will have their own house-style of writing policies and further consideration will need to be given to which DPD they will best fit given varying levels of details (i.e. Site Allocation DPD and Development Management DPD). In order to ensure consistent interpretation, implementation and, ultimately, delivery of these policies on the ground, it is recommended that the Council consider developing more detailed guidance in Area Action Plans, if relevant, and Supplementary Planning Documents.

District-wide policies need to consider the wider constraints and opportunities as outlined in this study. The policies outlined below have been developed in accordance with the evidence base in this study and adaptations to Policy Option 1. It should be noted that, whilst this study focuses on energy targets, some of the policies outlined below cover wider sustainability targets where appropriate; for example, the costing and development viability analysis for policies referring to Code was based on figures, which refer to overall Code Levels, not just energy.

6.3.2 Proposed District-Wide Policies and Text

The following are recommended draft District-wide policies and supporting text.

CC Policy 1

Residential

a. **New developments will meet Code for Sustainable Homes level 3 and at least Code level 4 from 1 April 2013 and Code level 6 from 1 April 2016.**
b. **New developments of 10 or more dwellings should secure at least 10% of their total energy (regulated and non-regulated, but excluding transport-related fuel consumption) 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.**
c. **A comprehensive energy strategy is to be submitted to the Council as part of any planning application of more than 10 proposed dwellings.**
d. **Any application greater than 100 dwellings or 50 apartments must provide a comprehensive study of the potential for district heating and Combined Heat and Power (CHP).**
e. **Proposals for more than 10 dwellings or apartments within 200m of an existing district heat network should consider connection to that network.**

Non-residential development

f. **New non-residential buildings over 1,000m2 gross floorspace should meet BREEAM 'Very Good' standard. All new non-residential developments should also achieve an Energy Performance Certificate (EPC) rating of at least 50.**
g. **New developments 1,000m2 or more of non-residential floorspace should secure at least 10% of their total energy (regulated and non-regulated, but excluding transport-related fuel consumption) 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.**
h. **A comprehensive energy strategy is to be submitted to the Council as part of any planning application of 1000m2 or more of non-residential floorspace.**

Policy CC1a has been drafted in accordance with national Government targets as outlined by the Department of Communities and Local Government and will be considered on a case by case basis by Rother District Council, including viability at the point of the planning application.

Policies CC1b and 1g have been based on the South East Plan policy NRM 11; however, they have been amended to account for **total** energy, which includes both regulated and non-regulated emissions. Thresholds in respect to dwelling numbers and non-residential unit sizes have been tested on actual projects and based on the South East Plan.

Policies CC1c and 1h require that the applicant submit information in the form of a separate report that demonstrates the development's ability to meet Policies CC1a, 1b, 1d and 1e for residential development and Policies CC1f and 1g for non-residential development, as

applicable. The development threshold levels are as tested and derived from the South East Plan. The following should be contained within the study:

- A breakdown of energy demand based on appropriate standard benchmarks, such as the Government's Standard Assessment Procedure (SAP) for residential development or Simplified Building Energy Model (SBEM) for non-residential development, as appropriate.
- An appraisal of site-specific renewable energy technology opportunities and constraints, providing reasons for exclusion of specific technologies. The technologies considered should be in line with, but not necessarily limited to, Business, Enterprise and Regulatory Reform's (BERR's) Low Carbon Building Programme definition of renewable energy technologies.
- Details of the energy efficiency measures considered in the scheme and figures for the reduction against the baseline (notional) building.
- Figures for the estimated energy generation of each technology source per year.
- Figures for the indicative cost, payback and life cycle impact of technologies.
- A description of the preferred option for the development site and the reasoning behind that.
- A review of potential grants available.

For full planning applications the energy strategy should be based on the predicted energy demand as derived from building physics modelling, based on software approved under CIBSE AM11.

Policies CC1d and 1e thresholds have been developed in accordance with the minimum level of dwellings which may be sufficient to support the development of CHP and district heating networks respectively. In this instance the applicant will be required to prepare a comprehensive study in the format outlined above, which identifies opportunities for new development and synergies with existing development.

Policy CC1f refers to non-residential buildings over 1,000m^2; a floorspace criterion that has been tested and based on the South East Plan. The BREEAM 'Very Good' rating has been set as a minimum requirement to be applied across the District. The evidence identifies a moderate increase in capital cost for achieving this rating, which can be accommodated across the District. Under the BREEAM 2008 Update (the version applicable at the time of compiling the evidence base) there is no mandatory requirement for energy performance for a rating of 'Very Good'. Therefore, in order to ensure that an appropriate level of performance be attained across the District in accordance with the Council's objectives, a level has been set of performance via the Energy Performance Certificate standard for energy that is deliverable and appropriate as a minimum.

CC Policy 2

There will be a presumption in favour of proposals for standalone renewables and low carbon technologies, such as wind farms and biomass generators, which have given due regard to the following considerations:

- **visual impact;**
- **noise;**
- **impact on other local amenities;**
- **traffic generation; and**
- **designated areas such as AONB and SSSIs.**

Policy CC2 is to ensure the promotion of standalone low carbon and renewable technology applications in the District, which are in accordance with the Council's objectives. This is underpinned by the need to address the principle of sustainable development as a statutory requirement under Section 183, Parts 9 and 10 of the Town and Country Planning Act, 2008.

6.3.3 Proposed Policies and Text for Strategic Sites

There are three strategic sites in Rother: North East Bexhill; North Bexhill; and West Bexhill. The Low Carbon and Renewable Study demonstrated that wind speeds around Rother are favourable for energy generation, particularly around Bexhill. The Council will consider preparing future detailed guidance within an Area Action Plan or Supplementary Planning Documents for these sites. *Note to the Council* - it is appreciated that certain elements may need to be integrated into the overall policies for strategic sites.

CC Policy 3 - North East Bexhill

a. New residential development, including minor and individual applications, should meet: as a minimum Code for Sustainable Homes level 4 with immediate effect; as a minimum Code Level 5 from 1 April 2013; and Code Level 6 from 1 April 2016.
b. For all non-residential applications over 1,000m2 a minimum of BREEAM 'Excellent' will be required, including an Energy Performance Certificate (EPC) of 40.
c. Should the provision of a freestanding wind turbine(s) in the order of 2MW be feasible, then new residential development within North East Bexhill should achieve Code level 5 with immediate effect.

Policy CC3a for North East Bexhill has been developed to exceed the national Government targets, in line with the Council's objective to promote high levels of sustainable design and construction on strategic sites, and in conjunction with the opportunity to develop higher levels of energy performance within North East Bexhill. Contributions from renewable energy technologies off site ("allowable solutions", as defined by Government) would be acceptable for residential development applications beyond 2016, which target Code level 6. Should the target not be achievable due to site-specific constraints, clear evidence as to why the standard could not be achieved would need to be provided.

Policy CC3b for North East Bexhill refers to non-residential buildings over 1,000m^2; a floorspace criterion that has been tested and based on the South East Plan. The BREEAM 'Excellent' standard has been set as a minimum requirement for North East Bexhill. The evidence identifies a moderate increase in capital cost which could be accommodated within North East Bexhill, subject to viability at the point of application. Should the target not be achievable due to site-specific constraints, clear evidence as to why this standard cannot be achieved must be provided.

Policy CC3c for North East Bexhill has been drafted in response to the evidence, which identifies the cost-effective application of higher levels of the Code at North East Bexhill.

CC Policy 4 - North and West Bexhill

New residential development, including minor and individual applications, should meet: as a minimum Code for Sustainable Homes level 4 with immediate effect; as a minimum Code Level 5 from 1 April 2013; and Code Level 6 from 1 April 2016.

The current stage of consideration of the North Bexhill and West Bexhill sites in the Core Strategy suggests that construction is unlikely to start for a number of years. Given that completion of dwelling construction before 2013 is unlikely, a target of Code for Sustainable Homes Level 4 (in energy performance terms) is considered appropriate for immediate effect, given that in the anticipated phasing of construction, this means at worst an uplift for a small portion of the development from Building Regulations 2010 (which will demand a 25% reduction in regulated-energy related emissions) to a 44% carbon reduction target. The impact on viability of this policy measure is anticipated to be minor, and given anticipated market recovery over the next few years, within acceptable and realistic limits for developers.

6.3.4 Existing Stock

The Low Carbon and Renewable Study concluded that, in order for the Council to significantly reduce its carbon footprint, they would need to address the existing stock. Based on an evaluation of Rother District's carbon footprint of 623 thousand tonnes against the LDF energy policy options presented in the Core Strategy, Consultation on Strategy Directions, the figures for domestic and commercial emissions projections identify there is only a limited level of impact on overall building stock emissions that new-build policy can make. If the overall goal of policy design and implementation is to reduce global carbon emissions, then this analysis strongly points towards the need for policy measures that target the emissions of existing buildings as well as new construction.

CC Policy 5 – Extensions and conversions

Residential and non-residential extensions and conversions should incorporate energy efficiency measures that are designed to achieve no net increase in energy demand from the whole building.

Where it can be demonstrated by the applicant, with supporting evidence, that it would not be technically feasible or viable to fully meet Policy CC5 through measures within the area of the extension or conversion, then the Council will require energy efficiency improvements to be made to the existing fabric of the building or other carbon reduction measures.

Should it not be appropriate to include existing building policies in the Core Strategy due to the document's strategic nature, it may be deemed more suitable to deliver the above as a strategy encouraged through existing delivery vehicles such as the Local Strategic Partnership and integrated into the Council's Sustainable Community Strategy.

6.3.5 Further Policy Considerations

The Low Carbon and Renewable Study clearly showed that there is a serious issue with carbon associated with the existing building stock in Rother District, so consideration may need to be given to being more ambitious policies in addressing this problem through planning or other corporate initiatives. The Council may wish to consider the following further policies in order to support, future proof and better assist corporate objectives for wider carbon reductions, specifically to facilitate carbon reduction through retrofitting of the existing stock. However, the proposed draft policies may relate more to the implementation and delivery of the Council's objectives via the Sustainable Community Plan and relate to the role that the Local Strategic Partnership has to play within these matters.

1. *All development will be expected to be carbon neutral through the policy measures described in the Core Strategy. Subject to agreement with the Council, any residual carbon emissions associated with energy use may be offset by financial contributions to the District's Carbon Fund and will be used to achieve an equivalent level of carbon reduction from energy use from buildings elsewhere within the District.*

2. *For residential applications targeting Code level 5 or 6 and for zero carbon non-residential applications, a proportion of the cost associated with this reduction in emissions, which will be agreed with the Council, can be paid into the Council-owned Carbon Fund.*

The following policies considerations are proposed amendments in accordance with the findings of this study, outlined in Section 5.

3. *Supplementing Policy **CC1b** & **CC1g**. This will be increased to 20% **carbon** from 1 April 2013. Should the required percentage prove unfeasible of unviable then the highest percentage will be required.*

Consideration has been given to the need to ensure the above amended policies CC1b & g that take into account the incremental changes in energy performance, as required by the Government, in terms of a step change towards zero carbon homes and non-residential buildings. On this premise, a level of % **carbon** has been set in accordance with the convergence of Code Level 4 as a minimum by 2013. With reference to Section 5.4.2 this policies refers to carbon in place of energy.

4. *Size thresholds to be removed from the following policies CC1b, CC1c, CC1f, CC1g, CC1h and CC3b in accordance with Section*

7 Implementation and Conclusions

7.1 Measures to Support Implementation of Policies

7.1.1 Pre-application Discussions

Pre-application discussions and encouraging developers to engage with the Council as early as possible will be essential in order for Rother District Council to respond to the need to apply energy policies and standards.

For strategic sites, such as urban extensions to Bexhill, where developers will be required to respond to higher standards of sustainable design and construction, Rother Council may be required to take a more flexible approach in order to ensure development proceeds; flexibility may be required in terms of accommodating the increased capital cost imposed by higher standards and policies. On these specific sites, for example, affordable housing contributions may need to be reduced and S106 contributions agreed accordingly.

Please refer to Section 7.1.4, which provides an example of how this may be implemented through Planning Performance Agreements (PPAs).

7.1.2 Skills and Training

In order for Rother District Council to engage with developers and ensure the successful integration of their policies in development applications, they will require the necessary up-skilling and training on low carbon and renewable technologies, so that appropriate knowledge is available, which can be utilised during the application determination process.

A process for ensuring knowledge transfer and assimilation would be required both internally within the Council and the Local Strategic Partnership. This would likely involve a training program for selected planning officers and a simple process to ensure knowledge and skills were not lost if staff moved on. Therefore, it would be essential to ensure more than one officer were adequately trained at any one time, enabling the continual monitoring and measurement of applications, in accordance with energy policy and standards, as outlined further in Section 7.1.6.

Skills and training are important both within the Council and also for occupants of existing stock and developers, in order to provide an insight into the options available for carbon reduction. Leaflets providing information and training days run buy the Council may be required to further educate and disseminate information within Rother District and the Council. This may best be facilitated via cross-boarder initiatives, through reliance on the shared resources and knowledge of the Local Strategic Partnership.

7.1.3 Local Development Orders (LDOs)

The Planning and Climate Change Supplement to PPS1 encourages planning authorities to consider using LDOs as a means of helping secure low and zero carbon energy supplies. LDOs could form a suite of tools (including guidance and design codes) that can help stimulate investment in energy infrastructure. For example, by granting additional permitted development rights relating to the installation of community heat plant, some of the cost and uncertainty

associated with new low carbon energy infrastructure may be reduced, hence deeming developers less resistant to funding its provision. Other potential applications of an LDO include: broadening the range of 'permitted development rights', in some or all of a Local Authority area, to cover a wider range of householder micro-renewable energy installations; or providing a 'framework permission' for a decentralised energy network to serve a development and/ or existing buildings.

We are not aware of any LDOs having been adopted to date specifically to facilitate climate change and decentralised energy objectives and indeed their application has thus far been limited. However, an LDO is being piloted by the London Development Agency in respect of the implementation of a cross-boundary approach to the provision of a new district heating network in east London. Elements that may be included in the LDO are, for example: below-ground works, such as trenching and laying of pipes and other apparatus; above-ground apparatus and street furniture; associated small buildings; and building extensions. The LDO will enable staged roll-out of the heat energy network and extensions to the scheme without the need for numerous individual planning applications.

The pilot is still at a relatively early stage with adoption planned for summer 2010. However, if the pilot is successful, the use of LDOs may become more widespread as a means of reducing costs and risk of delays associated with the delivery of community-scale decentralised energy networks.

7.1.4 Planning Performance Agreements (PPAs)

A PPA is a mechanism for dealing with complex development proposals. PPAs bring together a developer, the Local Planning Authority and key stakeholders from an early stage to cooperate throughout all stages of the planning process. They are, essentially, a collaborative project management tool that provides greater certainty and transparency to the assessment of a planning application and decision-making process. PPAs require 'front-loading' of the planning process, ensuring planning applications are of a high standard when they are submitted and, through close collaboration with stakeholders, have addressed many of the key issues prior to submission.

On 1 December 2009, the Government announced the first of six PPAs that are designed to support low carbon and/ or renewable energy developments. The first one refers to an urban extension at Sowerby Gateway in Yorkshire where proposed development comprises over 900 new dwellings to be built by 2026 (of which 40 percent will be affordable). The development will further include offices and commercial space and will use a centralised Combined Heat and Power (CHP)/ district heating scheme and domestic scale solar photovoltaics (PV).

The use of PPAs is becoming more widespread since their introduction in 2008 and a number of Planning Authorities have found them to be a useful mechanism for agreeing with developers on a structured approach to addressing planning issues that may be of a complexity or scale that requires close collaboration with expert advisors, consultees and other stakeholders. The Council may, therefore, wish to consider the use of a PPA in order to secure the provision of low carbon energy infrastructure as part of the development of urban extension schemes.

7.1.5 Supplementary Planning Documents (SPDs)

Whilst Planning Authorities are expected to set out their requirements relating to decentralised energy supply or the environmental performance of developments in their DPDs, the use of SPDs is an effective mechanism for guiding developers on the more detailed aspects of a proposal, including matters relating to implementation and phasing. Rother District Council's Local Development Scheme (2009-2012) sets out its plans for the preparation of a number of SPDs, including a masterplan for North East Bexhill, which was adopted in June 2009. This SPD states the Council's expectations that this development should be an exemplar of sustainable design and energy generation.

The Council may wish to consider preparing further SPD guidance relating to the delivery or funding of new energy infrastructure elsewhere the District. For example, Chelmsford Borough Council's Planning Infrastructure SPD (adopted April 2009) defines a framework for commuted payments to be made in lieu of the provision of infrastructure on-site, and monetary contributions towards Strategic and Off-site Community Infrastructure. These contributions, based on a set of standard charges and/ or formulae, can be pooled to fund provision of large infrastructure. Chelmsford has defined Off-site Community Infrastructure as "*land/ development, works, or facilities necessitated by the combined and cumulative impact of a number of developments where, because of the nature, size and/ or scope of infrastructure, this cannot be provided as part of the development*."

A similar approach could be applied by Rother Council to a number of small- or medium-sized developments (for example below 50 house units) where the scale of development is inadequate, or their location inappropriate, for the use of community-scale renewable energy (such as a 0.25MW wind turbine). In such cases small- or medium-sized developments could pool their planning contributions to provide new renewable or low carbon energy infrastructure and hence meet a prescribed proportion of the developments' energy consumption or carbon emissions target.

7.1.6 Monitoring and Review of Policies

The Supplement to PPS1 emphasises the importance of effective monitoring of policies to ensure implementation is line with an Authority's strategy, and this should be incorporated into annual monitoring arrangements.[47] Monitoring should provide key data on outcomes to assess performance against a Council's policy objectives and Regional Spatial Strategy (RSS) targets.

Rother District Council must ensure it can demonstrate how its objectives and appropriate indicators of outcomes have been adequately identified and that measures have been put in place to adequately monitor their implementation. Targets relating to carbon reductions require consistent and transparent methodologies for assessing proposals, monitoring their implementation and reporting on outcomes. Tools such as the London Renewables Toolkit have established a methodology for expressing the contribution of low and zero carbon decentralised energy towards the energy demand of new developments. Furthermore, tools like 'C-Plan' have established a consistent format for gathering data so as to facilitate comparison between proposed carbon strategies and the Authority's required targets.

[47] See Paragraph 34 of the Supplement to PPS1 for details.

7.2 Conclusions

Global and national policy has gone through a transition, having caught up with the scientific certainty associated with our changing climate and the impact associated with development, which requires a response to mitigate the effects of climate change and global warming through a reduction in building-related carbon emissions.

The study sets out a clear evidence base which reviews a balance between policy drivers, local constraints and opportunities, including the implications of cost on development viability, with the key aim of developing sustainable communities within Rother District. These legally binding national policies require Rother to take incremental steps to reducing carbon by 80% by 2050 and ensure this be implemented in a way that reflects the local context and physical characteristics of the region.

The policy recommendations within this study have been developed to reflect national and regional Government targets. Specific policies have been tailored to the strategic sites of North East, North and West Bexhill. These policies improve upon national Government standards, but reflect the specific site constraints and opportunities of Rother District such land designations. Finally, policy for existing stock has been suggested although Rother District Council will need to determine the most suitable delivery mechanism should a specific policy on existing stock not be suitable fro incorporation within the Core Strategy.

Overall, the study showed that the District has good opportunities for low carbon and renewable technologies, particularly wind and biomass as outlined in Chapter 4. It is forecast that in the year 2021 there will be an annual production of around a million tonnes of biomass potentially available as wood fuel in the South East. In terms of wind potential, wind speeds around Rother are favourable for generation of energy, particularly around the Bexhill and Rye areas. There are a number of potential impacts and constraints which would need to be addressed by any future wind developments namely, protected areas, public rights of way, scattered settlements. The most appropriate wind energy developments may be single turbine or small clusters of up to 3 turbines, probably of 1.5-2MW capacity. Other technologies such as solar technologies and ground source heating are also suitable, but will need to be subject to more detailed analysis on a site by site basis.

The carbon footprint analysis of Rother District confirmed 623,000 tonnes of carbon per annum which can be compared to 432,727,000 for the UK. Based on an evaluation of this carbon footprint against the LDF energy policy options presented in the Core Strategy, Consultation on Strategy Directions, the figures for domestic and commercial emissions projections identify there is only a limited level of impact on overall building stock emissions that new-build policy can make. If the overall goal of policy design and implementation is to reduce global carbon emissions, then this analysis strongly points towards the need for policy measures that target the emissions of existing buildings as well as new construction.

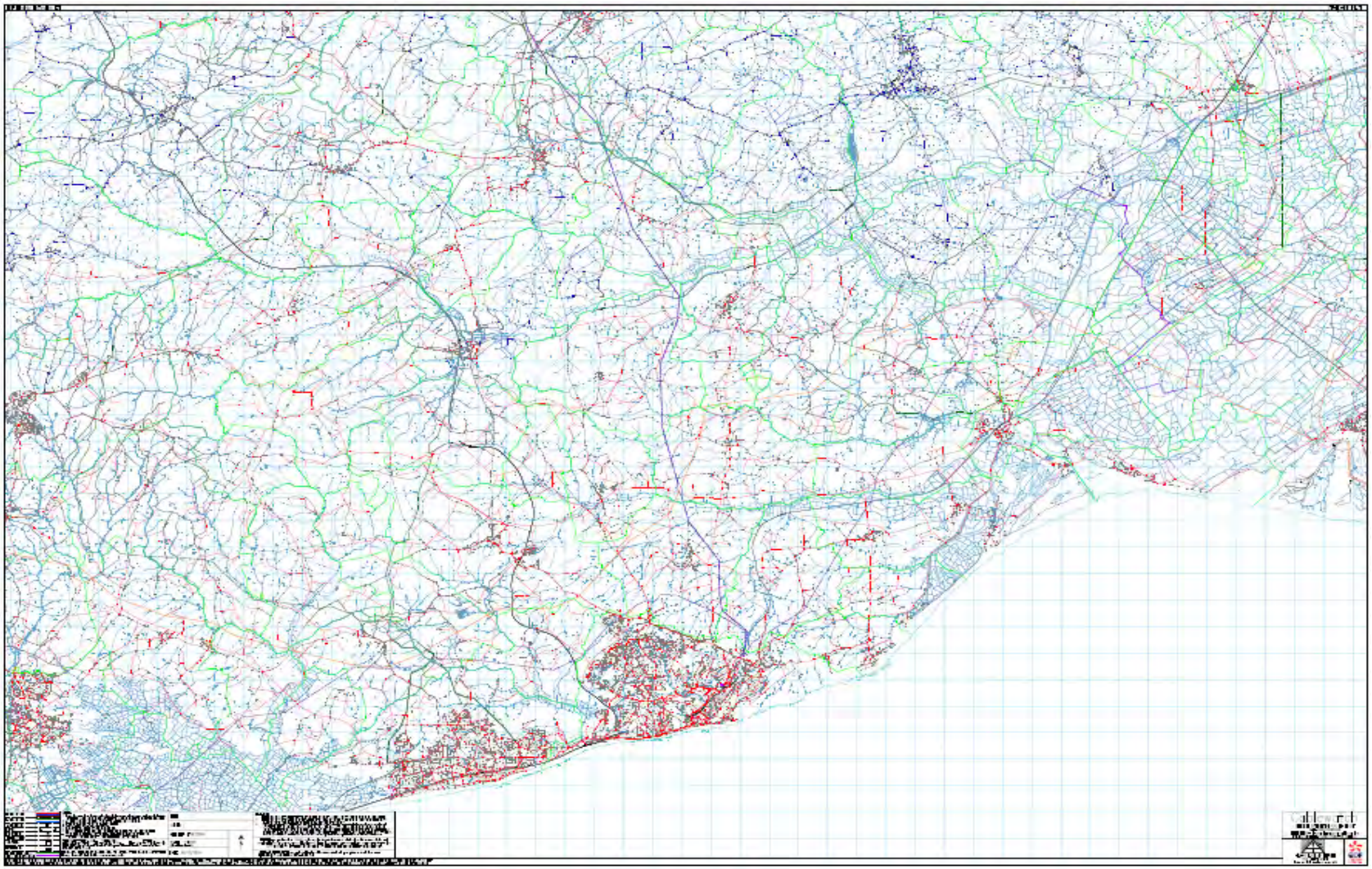
To deliver the policy targets and ensure developers can accommodate the infrastructure and technology required, Rother District Council will need to take an active role in the management and delivery of these policies, which may require additional training, up-skilling and greater flexibility in order to address most effectively its overall objectives, such as affordable housing and Section 106 Agreements.

Pre-application discussions and measures to implement the policies recommended in this study will be essential to facilitate their delivery. For example, skills and training for both Council representatives and householders will be required in order to ensure that, on the one hand, householders are aware of the carbon reduction options available to them to meet policy targets and, on the other hand, Council representatives have the ability to review applications in accordance with the policy targets set.

A partnership approach to strategic development sites with higher standards is likely to be required to ensure the Council can attract developers and support them to deliver increasingly challenging targets. Achieving higher targets may depend on infrastructure, which can only be delivered through joint initiatives, or via attracting an ESCo to ensure the financial delivery of the project.

The policy recommendations can also play an important role in supporting in the Council's corporate objectives in terms of National Indicators 185-188 and this in conjunction with proactive policies that both address strategic sites and existing stock. Rother District Council has an opportunity to take a leading role. This, supported by the opportunity to develop emerging markets locally for biomass and develop technological potential within the District, could set Rother up as an exemplar Council in the South East and potentially within the UK.

APPENDIX A: Electricity Networks within Rother District Council



APPENDIX B: Carbon Mapping within Rother District Council

Middle Layer Super Output Areas (MLSOAs)

A breakdown of energy use by sector and fuel is available at Middle Layer Super Output Area (MLSOA) level. This geography divides Rother District into 11 areas. The available data is incomplete in so far as some consumption figures are not allocated to specific MLSOAs. This is particularly relevant to the non-residential element of these data. A summary table showing the percentage of total consumption allocated to each MLSOA is included below:

	Electricity			Gas	
MLSOA Name	**Ordinary domestic**	**Economy7 domestic**	**Ind./Com.**	**Domestic**	**Ind./Com.**
Rother 001	9%	13%	6%	7%	2%
Rother 002	8%	11%	3%	4%	1%
Rother 003	9%	11%	4%	6%	0%
Rother 004	9%	11%	7%	9%	3%
Rother 005	11%	9%	3%	12%	7%
Rother 006	9%	9%	6%	7%	2%
Rother 007	8%	6%	2%	9%	2%
Rother 008	8%	6%	2%	9%	0%
Rother 003, 008 and Unallocated	0%	0%	0%	0%	60%
Rother 009	13%	8%	2%	17%	16%
Rother 010	9%	6%	2%	11%	2%
Rother 011	9%	0%	8%	10%	4%
Rother 011 and Unallocated	0%	10%	0%	0%	0%
Unallocated	0%	0%	0%	0%	0%
Industrial HH			55%		
	100%	**100%**	**100%**	**100%**	**100%**

Table B1: Breakdown of MLSOA data

This table illustrates that, in the industrial/ commercial gas consumption and the industrial half-hourly (HH) electrical consumption sectors, a very significant portion of total consumption is not allocated to MLSOAs. However, it is worth noting that when the total consumptions are compared with the District level data discussed in Section 3.3, a close correlation is seen. The totals by sector are displayed overleaf:

Emissions (Part L 2006) (tonnes CO_2 p.a.)			
MLSOA Name	**Domestic**	**Industrial**	**Total**
Rother 001	17,502	5,777	23,280
Rother 002	12,547	2,947	15,494
Rother 003	15,370	3,152	18,523
Rother 004	18,219	7,379	25,598
Rother 005	21,821	6,926	28,748
Rother 006	16,254	6,259	22,513
Rother 007	15,935	3,195	19,129
Rother 008	15,991	1,704	17,695
Rother 009	28,048	12,552	40,600
Rother 010	18,733	2,865	21,598
Rother 011	14,791	8,801	23,592
Sum of unallocated and Industrial HH electricity	4,677	83,739	88,416
Total	199,888	145,297	**345,185**

This total emissions figure for gas and electricity across the sum of the 11 MLSOAs and including unallocated emissions (345,185 tonnes CO_2 p.a.) compares with the District level figures for natural gas and electricity consumption in the building sector outlined in Section 3 (370 tonnes CO_2 p.a.). One reason for the discrepancy is the application of Part L2A (2006) emissions factors to the MLSOA data above and the use of measured generation mix figures in the DECC data in Section 3.

Parish Level

At Parish level, Rother District Council has provided a breakdown of domestic dwelling numbers, including updates for new constructions over the last years since census surveys were carried out. This level of detail, however, is not so readily available for commercial/ industrial/ other non-domestic properties.

A breakdown of emissions by Parish across the District has been carried out for the domestic sector on the basis of the dwelling figures supplied, and also including for a mix of fuel uses as might be expected both in the urban centres and in the more rural parts of the District. The following fuel mixes have been assumed:

	Gas	Domestic Heating Oil	Coal (manufactured smokeless fuel)	LPG	Biofuel	Wood
URBAN (Bexhill, Battle, Rye)	95.0%	4.3%	0.3%	0.0%	0.00%	0.5%
RURAL (others)	72.5%	23.8%	2.5%	0.5%	0.25%	0.5%
ROTHER DISTRICT COUNCIL (overall)	85.9%	12.1%	1.2%	0.2%	0.10%	0.5%

Table B2: Fuel Mix Assumptions Table

Whilst the fuel mixes assumed in the table above represent assumptions made in modelling, the figures assumed have been chosen such that the overall District-wide percentage breakdown matches the published figures within the 2006 DECC figures for "Total final energy consumption at regional and Local Authority level: 2006 in GWh", and the differing fuel types therein.

For this geography, a further breakdown by age and type of dwelling was also adopted, on the basis of Rother District Council information provided on a Parish level for 2001 by type, and on the basis of national average spread of age of dwelling from the publication 'Energy Use in Homes - A series of reports on domestic energy use in England - Fuel Consumption, BRE, 2005'.

This split for the District as a whole gives the following matrix of housing numbers by age and type:

Total No. of Houses	17,647	8,886	5,425	5,215	2,779	802	157
Age of building	Whole house or bungalow: detached	Whole house or bungalow: semi-detached	Whole house or bungalow: terraced (including end terrace)	Flat, maisonette or apartment: purpose-built block of flats or tenement	Flat, maisonette or apartment: part of a converted or shared house (including bed-sits)	Flat, maisonette or apartment: in commercial building	Caravan or other mobile or temporary structure
Post-2008	86	43	27	25	14	4	1
1965 - 2008	7051	3550	2167	2083	1110	321	63
1945-1964	3372	1698	1036	996	531	153	30
1919 to 1944	3038	1530	934	898	478	138	27
pre 1919	4101	2065	1260	1212	646	186	36

Table B3: Table of Dwellings in Rother by Age and Type

This type of breakdown has been created for each of the Parishes, and the matrix multiplied by domestic energy consumption benchmark figures derived from the 'Energy Use in Homes - A series of reports on domestic energy use in England - Fuel Consumption, BRE, 2005' report where possible, and factored to create a match between the overall District level statistics and the aggregate of the Parish level figures.

The results of the Parish level analysis are shown below:

	Total Households no.	Part L 2006 total domestic emissions p.a. tonnes CO2
Ashburnham & Penhurst	167	998
Battle	2853	15,479
Beckley	459	2,786
Bexhill	20374	108,842
Bodiam	150	871
Brede	767	4,639
Brightling	148	895
Burwash	1110	6,544
Camber	661	3,615
Catsfield	322	1,909
Crowhurst	340	2,012
Dallington	143	874
Etchingham	313	1,883
Ewhurst	466	2,808
Fairlight	812	5,014
Guestling	602	3,585
Hurst Green	573	3,341
Icklesham	1355	7,859
Iden	229	1,365
Mountfield	190	1,117
Northiam	943	5,652
Peasmarsh	517	3,064
Pett	380	2,310
Playden & East Guldeford	140	865
Rye	2094	10,659
Rye Foreign	176	1,008
Salehurst	1019	5,953

Sedlescombe	604	3,563
Ticehurst	1539	9,009
Udimore	172	1,049
Westfield	1134	6,691
Whatlington	159	948

Table B4: Parish Level Emissions

The total figure for domestic emissions for the District from this dataset is slightly higher than for the District level figures presented in Section 3.3, as this data set attempts to take into account the use of coal and other heating fuels (e.g. other than gas), which are not included within the DECC statistics reported in this section. The total District domestic emissions from this analysis are calculated to be 227,258 tonnes CO_2 p.a. It is interesting to note here that the Bexhill Parish contributes close to 50% of the total domestic emissions of the District as a whole.

Displayed graphically in domestic format, the following distribution is shown:

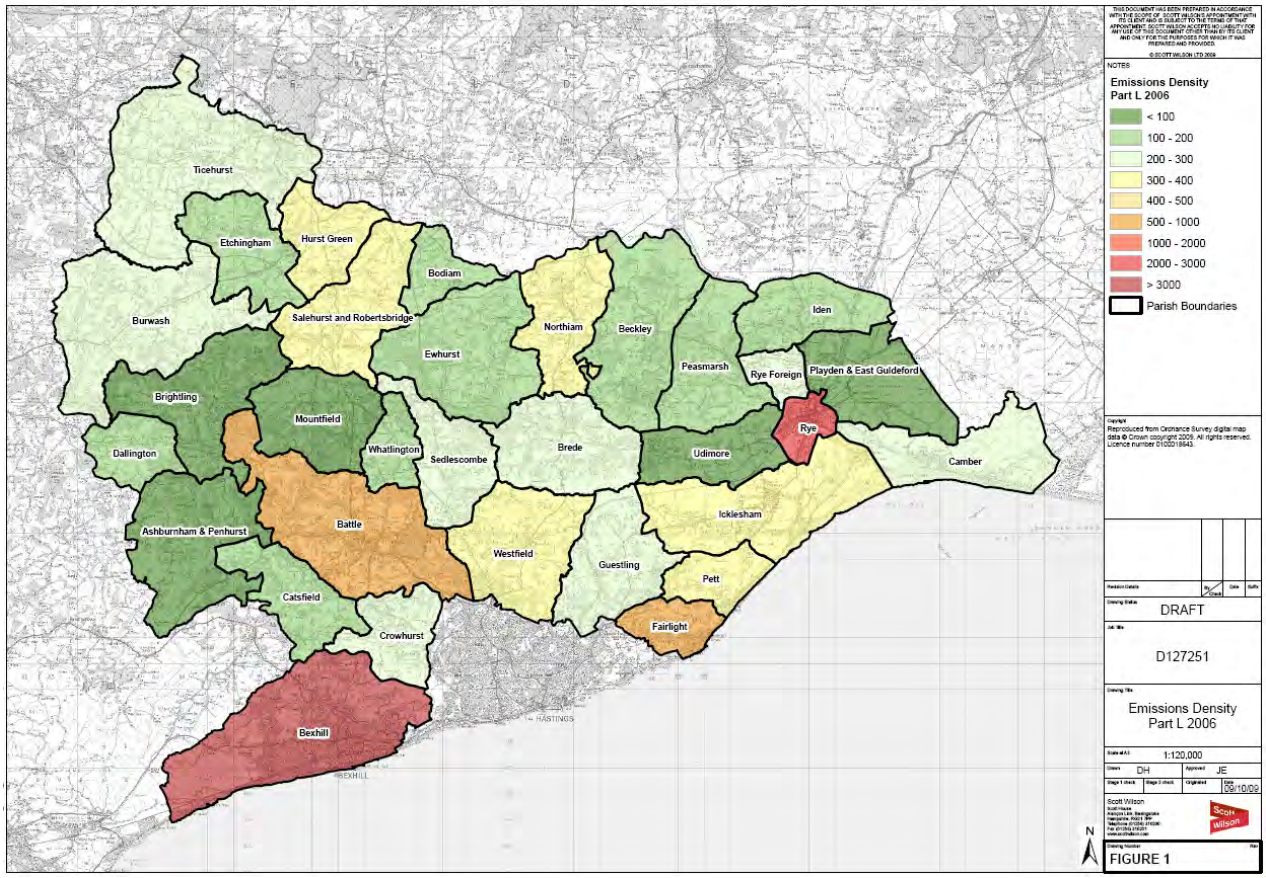


Figure B1: Parish Level Domestic Emission Density

Output Area Level

The same methodology as applied above to the Parish level has also been applied to Output Area level for Bexhill. This geography divides Bexhill Parish into 154 zones, each containing in the region of 130 dwellings. A full table of the resulting emissions are not presented here – the results of this analysis are displayed in graphical form only.

The basis of the breakdown of dwelling types for this analysis has been derived from National Statistics data of the 2001 Census.

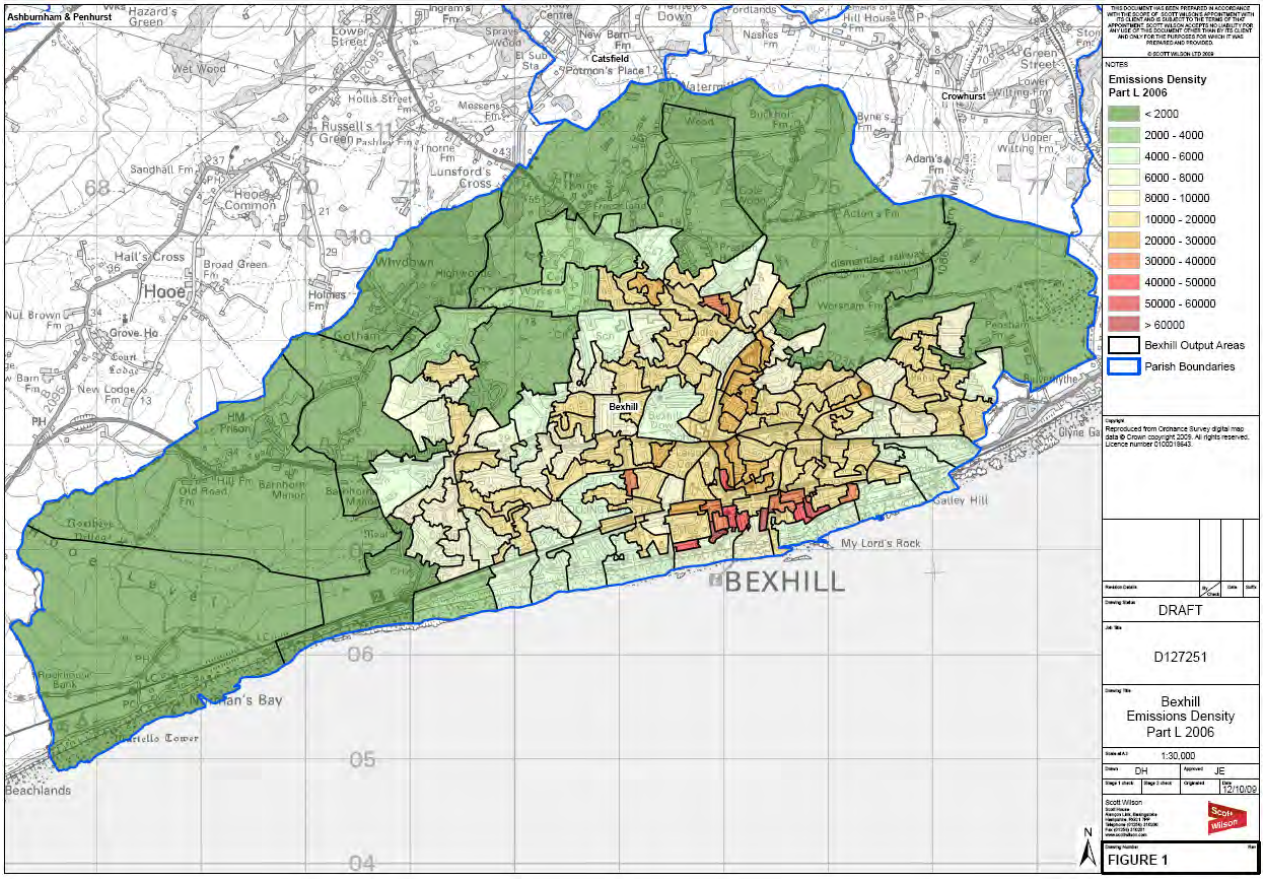


Figure B2: Bexhill Census Output Areas Emissions Density (Domestic)

Data Accuracy/ Reliability

We have relied on a number of different sources of data in order to generate the localised maps of emissions that are shown within this report. There are inevitably minor discrepancies between the data sets, both in terms of coverage (e.g. fuel types), dates (e.g. 2001 census, 2005 House Condition Surveys, 2008 House Condition Survey), and other factors. In some cases, Scott Wilson has been obliged to cross-reference datasets that are not strictly compatible (e.g. using 2001 housing type data and 2008 total dwelling numbers) in order to generate a working dataset at local level.

It is therefore important to note that these data should not be viewed as definite, highly accurate figures. Whilst every effort has been made to maintain as much detail as possible, the aim of this data gathering and analysis exercise has been to generate sufficiently clearly presented data to allow robust policy targets and decisions to be made and, for this purpose, it was considered that discrepancies in figures between datasets would not be of sufficient significance to alter the overall strategic recommendations made as part of the study.

Valuation Office Agency (VOA) Data

The following maps have been generated from the Valuation Office Agency data, energy consumption benchmarks and Part L2A (2006) emissions factors.

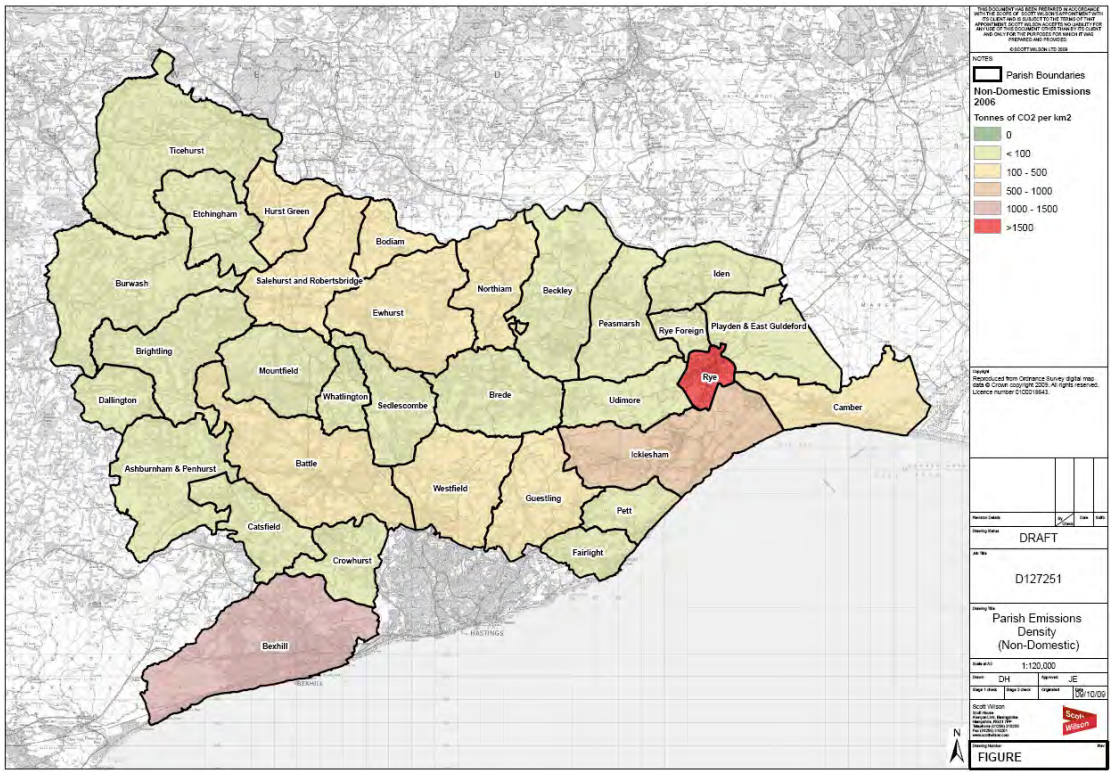


Figure B3: Parish level non-domestic emissions density

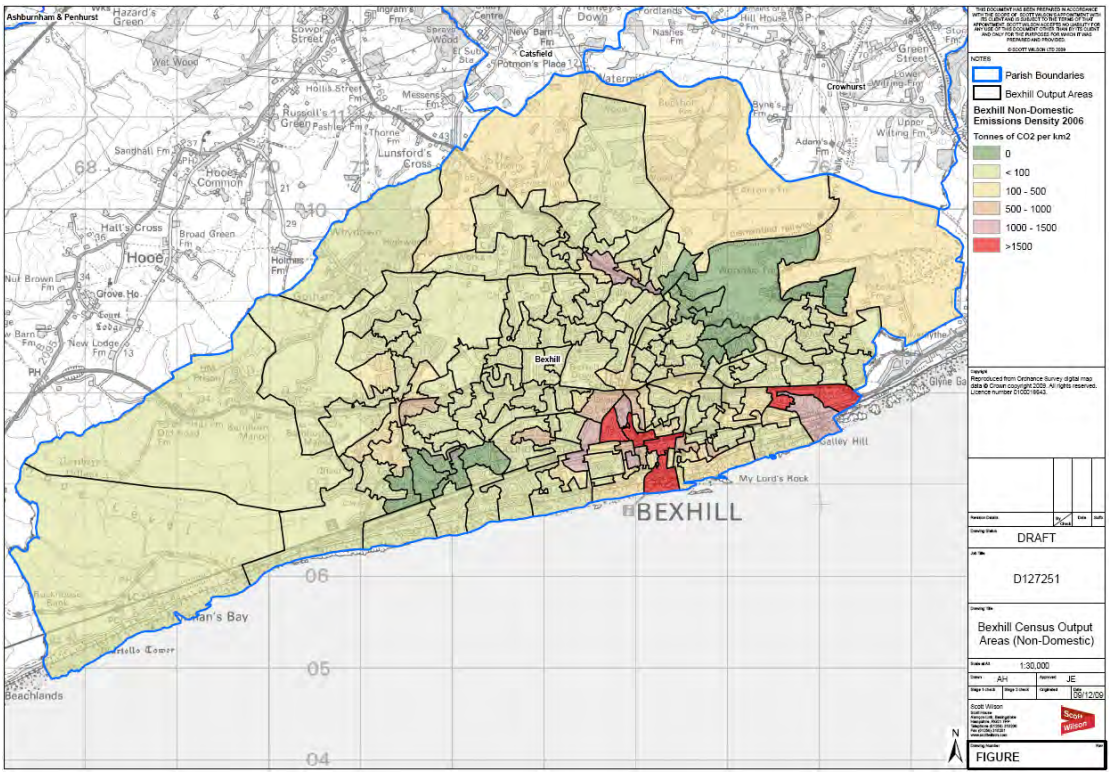


Figure B4: Bexhill census output area non-domestic emissions density

The energy benchmarking of VOA Business Rates data has been conducted primarily on the basis of CIBSE Guide F (2004) and CIBSE TM:46 (2008) figures. Where available, typical practice figures have been adopted in order to reflect the spectrum of ages of facilities represented by the Business Rates data.

The categorisation of facility types adopted in calculation is displayed below:

Property Description (VOA Database)	Benchmark Category (TM46 / CIBSE Guide F)
Advertising Right	General retail
Advertising Right And Premises	General retail
Advertising Rights	General retail
Amusement Arcade And Premises	General retail
Art And Craft Gallery	Cultural activities
Bank And Premises	High Street agency
Bar And Premises	Bar, Pub or Licensed club

Bar Cafe And Premises	Bar, Pub or Licensed club
Beach Chalet And Premises	Bar, Pub or Licensed club
Beach Hut And Premises	Bar, Pub or Licensed club
Betting Shop And Premises	High Street agency
Buildings, Garages And Premises	Workshop
Buildings, Garage And Premises	Workshop
Cafe And Premises	Restaurant
Cafe Wine Bar And Premises	Bar, Pub or Licensed club
Car Breakers Yard And Premises	Workshop
Car Display Land	Covered car park
Car Park	Covered car park
Car Park And Premises	Covered car park
Car Parking Space And Premises	Covered car park
Car Sales Area & Premises	General retail
Car Sales Site And Premises	General retail
Car Showroom And Premises	Large non food shop
Chiropody Surgery	Clinic
Clinic And Premises	Clinic
Club And Premises	Bar, Pub or Licensed club
Club House	Entertainment halls
Club House And Premises	Bar, Pub or Licensed club
Coach Park And Premises	Storage facility
Coastguard Station	Emergency services
Community Centre And Premises	Schools and seasonal public buildings
Dance School And Premises	Entertainment halls
Dance Studio	Entertainment halls
Day Nursery And Premises	Schools and seasonal public buildings
Dog Grooming Salon	General retail
Factory And Premises	General Manufacturing

Farm Shop	Small food store
Function Room And Premises	General Office
Garage	Workshop
Garage And Premises	Workshop
Garage And Store	Workshop
Garage, Offices And Premises	Workshop
Garden Centre & Premises	General retail
Garden Centre And Farm Shop	General retail
Garden Centre And Premises	General retail
Garden Centre/Nursery	General retail
Gymnasium And Premises	Fitness and health centre
Gymnasium, Fitness Suite & Premises	Fitness and health centre
Hairdressing Salon & Premises	General retail
Hairdressing Salon And Premises	General retail
Hall And Premises	Entertainment halls
Health Centre And Premises	Fitness and health centre
Health Club	Fitness and health centre
Hostel	Long term residential
Kiosk	General retail
Kiosk And Premises	General retail
Land Used For Motorcycle Training And Premises	
Land Used For Storage	
Land Used For Storage And Premises	Storage facility
Land Used For Vehicle Parking And Premises	
Launderette And Premises	General retail
Lorry Park	Storage facility
Lorry Parking Space	Storage facility
Masonic Lodge	Public buildings with light usage

Meeting Hall	Entertainment halls
Meeting Rooms	General Office
Micro Brewery	Bar, Pub or Licensed club
Moorings, Store And Premises	Storage facility
Moorings, Workshop And Premises	Workshop
Nursery	Schools and seasonal public buildings
Nursery And Premises	Schools and seasonal public buildings
Nursery And Premises	Schools and seasonal public buildings
Office	General Office
Office And Premises	General Office
Office, Storage Land And Premises	General Office
Offices	General Office
Offices & Premises	General Office
Offices And Premises	General Office
Offices Under Construction	General Office
Offices, Stores And Premises	General Office
Offices, Warehouse And Premises	General Office
Plant Retail Centre	General retail
Post Office And Premises	High Street agency
Post Office Sorting Centre And Premises	High Street agency
Recording Studio & Premises	Entertainment halls
Recording Studio And Premises	Entertainment halls
Recovery Depot / Scrap Yard And Premises	Workshop
Restaurant And Premises	Restaurant
Restaurant Guest House & Premises	Hotel
Retail Warehouse And Premises	Large non food shop
Sales Office	General Office
Salon And Premises	General retail
Scrap Yard, Workshops And Premises	Workshop

Shop	Small food store
Shop & Premises	Small food store
Shop And Premises	Small food store
Shop, Office And Premises	High Street agency
Shop, Offices And Premises	High Street agency
Shop, Store And Premises	Small food store
Showroom & Premises	General retail
Showroom And Premises	General retail
Showroom Petrol Filling Station & Premises	General retail
Showroom, Workshop & Premises	General retail
Showroom, Workshop And Premises	General retail
Sorting Centre And Premises	Storage facility
Storage Depot And Premises	Storage facility
Storage Depot, Office And Premises	Storage facility
Store	Small food store
Store And Premises	Small food store
Store Office And Premises	High Street agency
Store Offices Shop And Premises	Small food store
Store, Office And Premises	High Street agency
Store, Offices And Premises	High Street agency
Stores	Large food store
Stores And Premises	Large non food shop
Stores, Land Used For Storage And Premises	Large non food shop
Studio And Premises	Entertainment halls
Study Centre	Schools and seasonal public buildings
Supermarket And Premises	Large food store
Superstore And Premises	Large non food shop
Surgery	Clinic

Surgery And Premises	Clinic
Tea Rooms	Restaurant
Tea Rooms And Premises	Restaurant
Timber Yard, Garden Centre And Premises	Storage facility
Undertakers And Premises	High Street agency
Vehicle Repair Workshop	Workshop
Vehicle Repair Workshop And Premises	Workshop
Warehouse	Storage facility
Warehouse And Premises	Storage facility
Warehouse And Premises (Part Under Reconstruction)	Storage facility
Warehouse, Office And Premises	Storage facility
Warehouse, Store And Premises	Storage facility
Warehouse, Workshop And Premises	Storage facility
Wharfage, Storage Land And Premises	Storage facility
Wine Bar And Premises	Bar, Pub or Licensed club
Workshop	Workshop
Workshop And Premises	Workshop
Workshop, Office And Premises	General Office
Workshop, Offices And Premises	General Office
Workshop, Showroom And Premise	General retail
Workshop, Store And Premises	General retail
Workshops	Workshop
Workshops Petrol Filling Station And Premises	Workshop
Workshops, Office And Premises	General Office

The benchmark energy consumption figures adopted for each of these usage categories is displayed below:

Benchmark Category	Electricity (kWh / m^2)	Gas (kWh / m^2)
General Office	181	142
High Street agency	128	0
General retail	75	230
Large non food shop	128	154
Small food store	407	0
Large food store	513	131
Restaurant	730	1250
Bar, Pub or Licensed club	292	89
Hotel	120	360
Cultural activities	70	142
Entertainment halls	270	630
Swimming pool centre	258	1321
Fitness and health centre	194	449
Dry sports and leisure facility	105	343
Covered car park	15	0
Public buildings with light usage	45	194
Schools and seasonal public buildings	36	187
University campus	100	290
Clinic	70	270
Hospital (clinical and research)	108	510
Long term residential	75	390
General accommodation	79	417
Emergency services	70	460
Laboratory or operating theatre	160	160
Public waiting or circulation	30	120
Terminal	75	200
Workshop	49	252
Storage facility	67	175
Cold store	142	83
General Manufacturing	576	328

APPENDIX C: Supporting Viability Analysis

Introduction

Scott Wilson have been instructed by Rother District Council to complete a "Renewable and Low Carbon Development Study". This study will provide an assessment of the local potential for decentralised and renewable or low carbon generation and will form part of the evidence base for Rother District Council's Local Development Framework.

To support Scott Wilson's preparation of this study, the following section provides an analysis of the impact on development viability of meeting the Code for Sustainable Homes (CSH) Levels 3, 4, 5 and 6.

Furthermore, this section considers ways in which development viability and, hence, the deliverability of sustainable building practices could be improved.

Estimated costs of compliance

This section considers the costs that could be associated with meeting CSH Levels 3, 4, 5 and 6. Cyril Sweett, on behalf of the DCLG have produced an advisory note "Cost Analysis of the Code for Sustainable Homes" (July 2008). This advisory note represents the most up to date and industry-wide recognised benchmark analysis of the potential costs associated with compliance with the Code for Sustainable Homes.

It is important to note that no definitive industry wide database detailing the potential costs associated with compliance with the Code for Sustainable Homes exists. Quantifiable and comparable completed schemes are very limited. Hence, the costs outlined in the Cyril Sweett report prepared for the DCLG merely represent predictions/estimations about what costs could be. Until more developments are completed, hence establishing a robust quantifiable base cost position, the Cyril Sweett cost data is indicative only.

The majority of new residential development identified to come forward within Rother District Council will be delivered in the form of urban extensions to Bexhill. Based upon our experience of similar large-scale residential-led development projects, we have assumed that the majority of units that will be delivered in Bexhill will be houses.

As a baseline we have therefore adopted the DCLG / Cyril Sweett costs based on their 'End terrace / semi-detached house' development scenario. The relevant cost % increases produced by Cyril Sweett and adopted for the purposes of this analysis are set out in Table 1 below:

	Baseline Build costs	CSH Level 3	CSH Level 4	CSH Level 5	CSH Level 6
% increase over Baseline	-	+7%	+13%	+25%	+42%

Table C1: Construction cost % uplifts to achieve CSH Code Levels

NOTE: Baseline costs are assumed sufficient to meet current Building Regulations.

Viability Impact-Base Position

Based on research of comparable developments, local agents, developers and housebuilders, Drivers Jonas have undertaken an assessment of the current potential value of residential land. The following assumptions have been made:

- Planning permission for residential use.
- 40% affordable housing.
- Density of 35 dwellings per hectare.
- No abnormal costs, i.e., land is fully serviced.
- Baseline build-costs to meet current Building Regulations (2006).
- “Standard” budget for S106 costs.
- Allowance for developers’ profit at 17.5% of all costs.

Based on the assumptions set out above, we have run hypothetical residual appraisals for a “sample” one acre plot to establish a baseline land value.

Using a headline build cost of £100 per sq ft, i.e. the cost of complying with current Building Regulations (in accordance with Table 1 above), our appraisals generate a land value in the region of £500,000 to £600,000 per acre. This value range is consistent with what Drivers Jonas anticipates residential land values to be in Rother District Council.

A property market review is set out in the section below. It should be acknowledged, however, that there are still very few market transactions for residential development land and this assessment of value is based largely on market sentiment rather than direct comparable transactions.

Impact on Viability

To assess the impact on development viability associated with applying the build cost increase set out in Table 1, i.e. the additional cost of complying with CSH 3, 4, 5 and 6, residual appraisals have been undertaken for each cost scenario.

The majority of new development within the District is identified to come forward on greenfield land in the form of urban extensions at North East and West Bexhill. Hence, it is likely that development will be delivered at varying densities depending upon the location of development land.

To account for density variations, a range of residual appraisals have been run, testing the impact on development viability that could be associated with meeting CSH levels 3, 4, 5 and 6, if development is delivered at 35, 40 and 50 dwellings per hectare. This analysis is set out in Table C2 below:

Density	Baseline Build costs (Building Regulations)	CSH Level 3	CSH Level 4	CSH Level 5	CSH Level 6
35 DPH	£500,000	£410,000	£340,000	£200,000	-£70,000
40 DPH	£550,000	£450,000	£365,000	£195,000	-£135,000
50 DPH	£620,000	£495,000	£395,000	£175,000	-£141,000

Table C2: Comparison of land value per acre, density and meeting CSH level 3, 4, 5 and 6

The above table shows that the cost of complying with current Building Regulations produces a land value per acre broadly consistent with the estimated current value of residential development land. The impact of meeting CSH level 3 has a material impact on land value. The impact of meeting CSH levels 4, 5 and 6 has a significant impact on land value, and meeting CSH level 6 produces a negative value.

Ultimately, development viability is established by the property market and with revenues and costs being held equal, is determined by land value and developer profit expectations.

Based on the above analysis, the development viability of meeting CSH level 3 is likely to be marginally deliverable. The development viability of meeting CSH level 4, 5 or 6 is unlikely to be deliverable.

The graph (Figure C1) below shows the effect on land value of the rising build costs associated with meeting CSH 3, 4, 5 and 6.

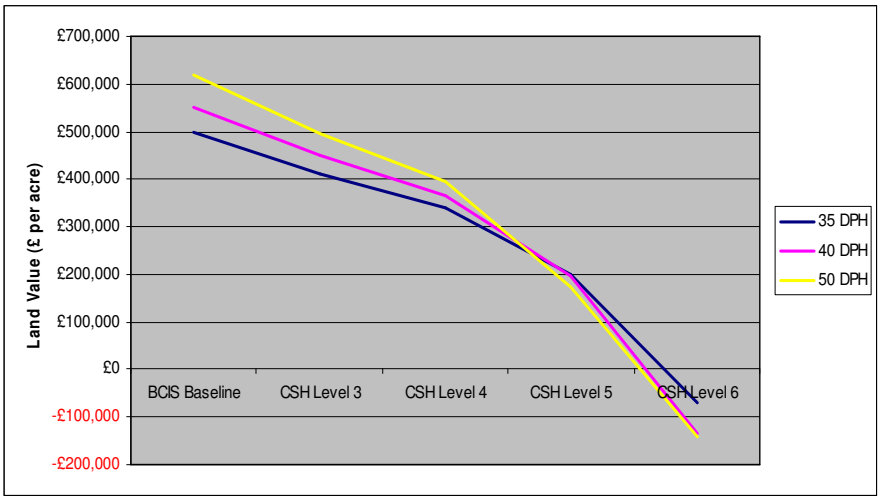


Figure C1: Effects of higher Code levels on land values based on current market conditions

It is noted that land values calculated using residual appraisals (as used to calculate the land values in Table C2) are sensitive to small changes in key variables. That is, small changes in the appraisal inputs can lead to large changes in land value. This is evident from the fact that as the cost of delivering CSH levels from 3 to 6 rises, land value per acre falls sharply.

This point is particularly evident for delivering CSH levels 5 and 6. As the cost of meeting these Code levels rises (25% for CSH level 5 and 42% for CSH level 6) the surplus between cost and revenue falls to the point where final land values (for CSH level 6) are less than zero. As the surplus between cost and revenue falls, and density levels rise, there is an increasing negative impact on land value i.e. building more loss-making floorspace per acre, hence increasing the deficit.

Potential Mitigation Measures

The analysis above suggests that delivering CSH above level 3, based on current residential values and current planning policy, is unlikely to be viable/ deliverable by the development market. That is, the impact on land value of meeting CSH 4, 5 and 6 is significant.

Development viability is a function of total potential revenue, less total costs of development. Set out below are ways in which costs and/ or revenue could be adjusted in order to offset or at least mitigate the impact of meeting CSH levels 3, 4, 5 and 6.

Planning Policy Measures

New residential development is required by the planning system to meet certain deliverables. These deliverables ultimately represent costs that new development must fund. Opportunities to reduce such costs, offers scope for meeting the costs associated with CSH 3, 4, 5 and 6.

Affordable Housing

Affordable Housing is delivered by developers generally as a % of total unit numbers or floorspace. If the % of affordable housing that a developer needs to deliver falls, development viability increases.

S106 Agreements

S106 Agreements are planning or financial agreements between Local Authorities and developers whereby a developer is obliged to meet certain costs/ commitments to mitigate the impact of development. If the "package" of S106 costs that a developer needs to deliver falls, development viability increases.

Infrastructure costs/requirements

New development typically funds the delivery of necessary infrastructure, e.g., major highways improvements. Delivery of this infrastructure is facilitated by the planning system. If the infrastructure costs /items that a developer needs to deliver falls, development viability increases.

By reducing any or all of the above planning policy requirements, or combinations thereof, development viability could be enhanced, allowing scope for meeting the costs associated with CSH 3, 4, 5 and 6.

Economic / Market led factors

- The base viability analysis above in this report been undertaken assuming current values and current costs. There is general consensus that we are currently at or near the bottom of the property market cycle. What we know for sure is that over the long term the cyclical nature of the property market will result in property values rising and as the economy moves out of recession, the property market will revert back towards trend. That is, it is likely that values will rise in the future.
- Hence, all other things being equal, as the property market recovers, so the viability of delivering CSH levels will improve materially.
- Considering the forecast indices of Experian (residential) and BCIS (cost), if the market recovers in line with these existing forecasts, there will be a material differential between cost and value by circa 2014-2015.

Reduction in costs

There is scope that in the future the costs associated with delivering CSH levels will fall. A number of reasons could support this:

- As greater certainty arises over the precise measures required to meet different CSH levels.
- As technology improves.
- As efficiencies are achieved through mass production.

- Some commentators anticipate that construction costs could fall over time and that by 2016 costs may well have reduced significantly, for example by up to 25% (see DCLG/ Cyril Sweett).
- If the actual cost of meeting CSH levels 3, 4 , 5 and 6 falls then development viability will improve, increasing the scope for deliverability.

Value Premium

In Drivers Jonas' opinion, there is currently no evidence that supports any value premium for units that are built to meet CSH levels 3, 4, 5 or 6.

Other factors

- To meet the costs of sustainability measures in the future, the development industry may need to recognise/accept a step change in the manner in which development profits are returned to landowners.
- This could involve the inclusion of landowners in the development process through Joint Ventures or other development partnering arrangements, or a reduction in both developers and landowners' expectations of returns/ profits.
- Traditionally, developers/ housebuilders have purchased sites/ development land from landowners prior to the commencement of development. This approach places considerable risk and financial burden on the developers' cashflow, increasing their expectations of profit.
- A shift from this approach, whereby for example value is returned to landowners throughout the development process, improves the developers' cashflow/ reduced profit expectations and could improve/ support viability. This approach could act to enhance viability in a manner that supports the increased cost of sustainability measures.

Conclusions

- There is no industry consensus over the likely build costs required to meet CSH levels 3, 4, 5 and 6. Information from referenced sources provides a very wide range of potential costs. The availability of generic/robust cost information is limited and actual comparables are limited.
- Cyril Sweett, on behalf of the DCLG have produced an advisory note "Cost Analysis of the Code for Sustainable Homes" (July 2008). This advisory note represents the most up to date and industry-wide recognised analysis of the potential costs associated with compliance with the Code for Sustainable Homes.
- The impact of meeting CSH levels 4, 5 and 6 has a significant impact on land value, with meeting CSH level 6 producing a negative value.
- Ultimately, development viability is established by the property market and with revenue and costs being held equal, is determined by expectations of land value and profit.
- The development viability of meeting CSH levels 4, 5 and 6 will be challenging to deliver across the District based on current market conditions.

- There are limited precedents of development being delivered meeting CSH levels 4, 5 or 6 (Brighton One, BedZED). Those projects that have been delivered occurred at/near the peak of market values.
- There are various planning factors that could act to support the delivery of CSH levels 4, 5 and 6 in the future. Movements away from existing planning policy will require a pragmatic approach to development by local planning authorities.
- Market/economic factors suggest that in the future development could well support meeting higher/the highest sustainability measures as costs fall and value rise. However, at present this is not certain / evidenced, and is based on sentiment and forecast data alone.
- There may therefore need to be a fundamental shift in the manner in which housing is delivered by the development industry. This is likely to be via a change in landowners and house builders expectations of profit/financial returns, and a change in the manner in which development has traditionally been delivered.

General

- The figures attached are set out in order to provide an illustrative view of potential viability.
- The figures contained within these appraisals are set out in order to assist with the strategic advice provided.
- They do not constitute formal valuations and are specifically outside the provisions of the RICS Valuation and Appraisal Manual and should not under any circumstances be relied upon as such.
- We have not taken account of any rights to light, daylighting and sunlighting claims in our calculations.
- We have not taken account of any contamination, abnormal ground conditions and/or soil surveys in producing our advice - unless stated.
- The figures provided are for the benefit of Scott Wilson and should not be relied upon by any third party. Consequently, no responsibility is accepted to any third party.
- Where stated we have relied upon information provided by third parties, so advise that the figures are totally dependent on the accuracy of the information supplied and/or assumptions made. Should these measurements/costs be inaccurate or incomplete, the accuracy of the results may be affected.

Appendices - Property Market Overview

Since the onset of the “credit crunch” and throughout the latter part of 2007 the residential property market has been in decline, with mortgage lenders reporting house prices falling by around 16% during 2008. Despite some stagnation in the early part of 2009, the downward trend has continued.

At 0.5%, base rates are currently at an all time low. However, banks are at present preferring to reduce their net lending to the residential market and as such are restricting access to mortgages by seeking much reduced loan-to-value ratios (commonly 25% to 40%). The resultant impact upon the residential market has been one that has seen in many cases an oversupply of unsold

new-build housing stock and significantly reduced delivery and completion rates. Falling house prices have seen a consequential fall in residential land values of between 30-50% from their mid 2007 high.

The South East

According to the Land Registry the average price of a house in the South East currently stands at £198,084, a fall of around 15% from the peak in January 2008 of £230,122. The Land Registry data suggests that the market reached a low in March 2009, with house prices having subsequently experienced a recent recovery of approximately 1% month-on-month.

Rother District Council

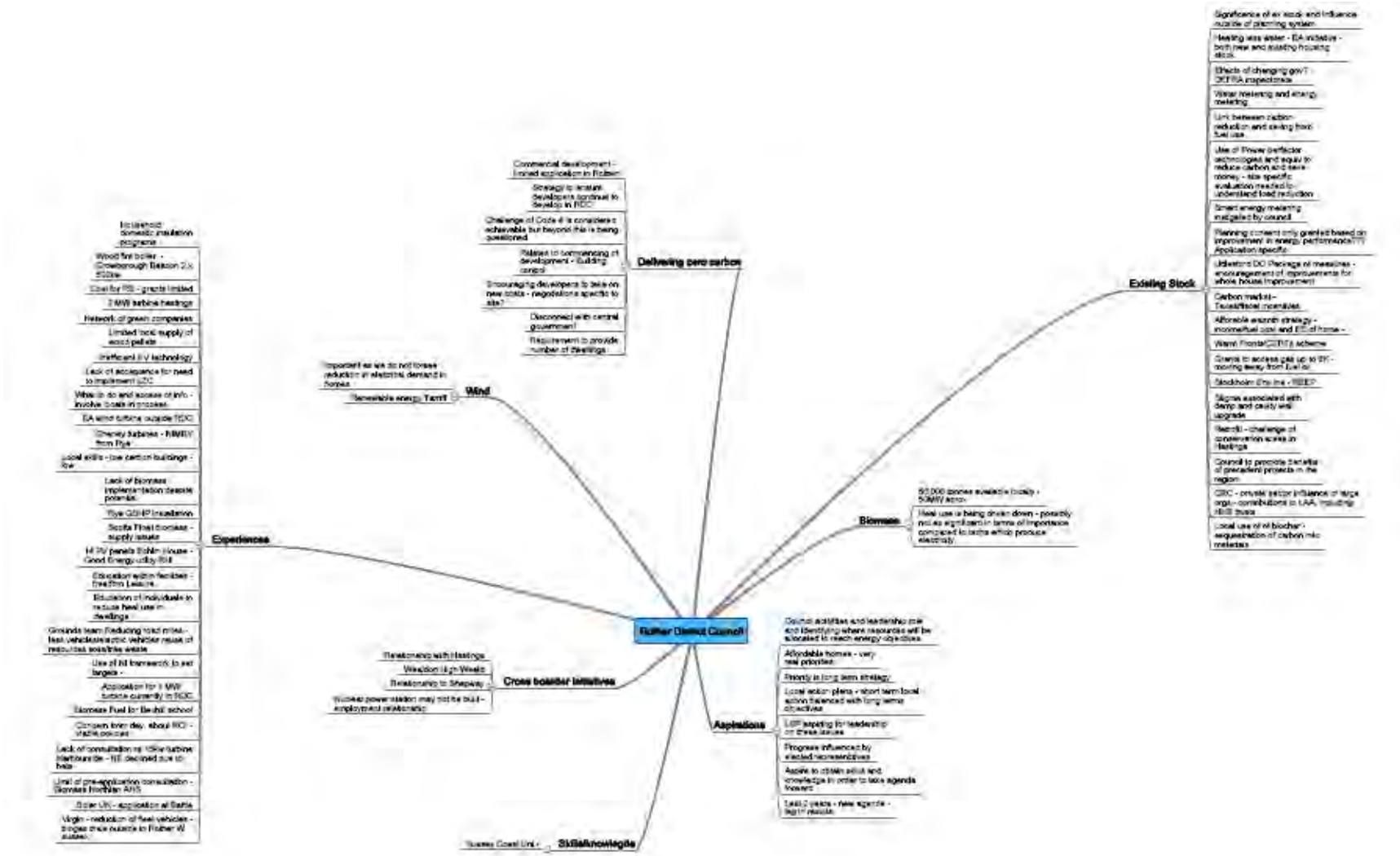
House prices in the Bexhill area have historically been significantly below those of the South East. Average house prices in the Rother area as of September 2009, as supplied by the Land Registry are as follows: Detached - £304,781, Semi-detached - £180,601, Terraced - £146,135, Maisonette / Flat - £93,897. The average price taking into account all property types stands at £168,978, representing a fall of around 18% from the peak in February 2008 of £205,251.Importantly however, in contrast to the South East as a whole, house prices within the Rother area have experienced a continual fall since February 2008.

Investigations of transactional evidence and discussions with local agents suggest that residential capital values across the District can vary quite significantly. Although not specifically within the Rother District, capital values within the locality are recognised as lowest within the Hastings area and that a general upwards trend exists moving west through St Leonards on Sea, Bexhill, and beyond towards Eastbourne. Local agents suggest that Battle and Rye would not as a rule achieve capital values above that of Bexhill, although some areas of both towns are considered desirable and able to command a premium. Similarly properties with sea views within Bexhill are also able to command a premium.

The number of new build residential schemes, with available units in the area is relatively scarce and as such there is a lack of transactional information. When coupled with the highly location-specific residential market that exists within the Rother area, it is at this time difficult to establish definitive values. However, current transactional evidence and market sentiment would suggest that average residential capital values in the region of £235 per sq.ft could be achieved.

It is important to note that Land Registry data over the last 6 months has shown a modest growth in house prices and a potential trend towards a recovery in prices. Whilst it is considered by many commentators that house prices are likely to recover over the longer term, the extent of that recovery and its timeframe is unknown.

APPENDIX D: Stakeholder Consultation Workshop



Key Stakeholders Contacted

Name	Organisation	Contact Details
David Marlow, Tondra Thom, Mark Randolph, Beccy Anderson	Rother District Council	David.marlow@rother.gov.uk Tundra.thom@rother.gov.uk Mark.randolph@rother.gov.uk rebecca.anderson@rother.gov.uk
David Williamson Alan Corson	Forestry Commission	0142023666
Julian Morgan Jones	South East Wood Fuels	07969597070
Ian Tubby, Matthew Woodcock, Jillian Alker	FC SE Regional Team (Statistics Unit)	matthew.woodcock@forestry.gsi.gov.uk
Geoff Hogan	Biomass Energy Centre	01420526197
John Lang	Bidwells	01603 229414
NA	Millwood Designer Homes	01732 770991
NA	Countryside Properties	01277260000
Sarah Broughton	East Sussex in Figures	01273 481 346
Sarah Worthing	East Sussex Energy Efficiency Partnership	
Morgan	EDF	01738 456 000
John Park	EDF	John.park@edfenergy.com
Stuart	National Grid	01926 655 274
Alison Mair	Southern Gas Networks	0141 418 4000
Goring	Valuation Office Agency	01892 796 700
Sophie Schon	Valuation Office Agency	01303 852 900

Carrol Burdon	Valuation Office Agency	03000 500 389
Jan Matthiesen	British Wind Energy Association	J.Matthiesen@bwea.com

APPENDIX E: UKCIP09 Projections

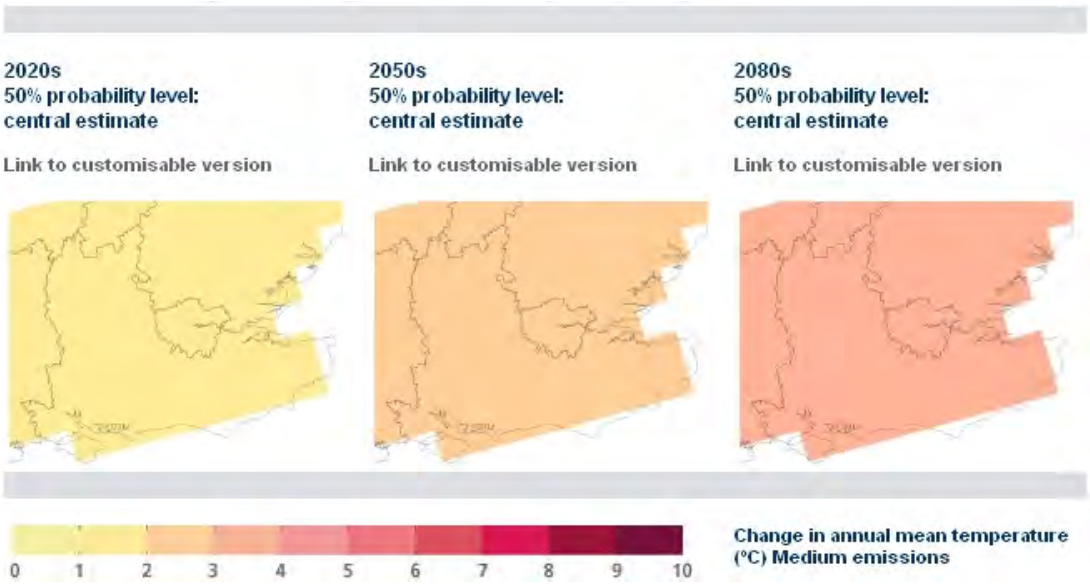


Figure E0-1: Annual mean temperature changes over differing time periods (50% probability level, medium emissions scenario)

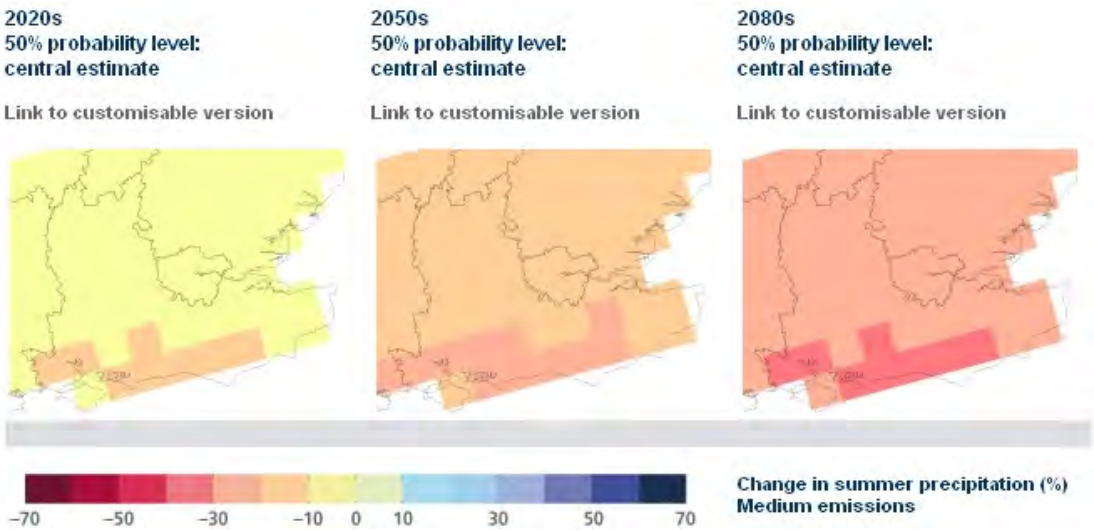


Figure E0-2: Summer precipitation changes over differing time periods (50% probability level, medium emissions scenario)

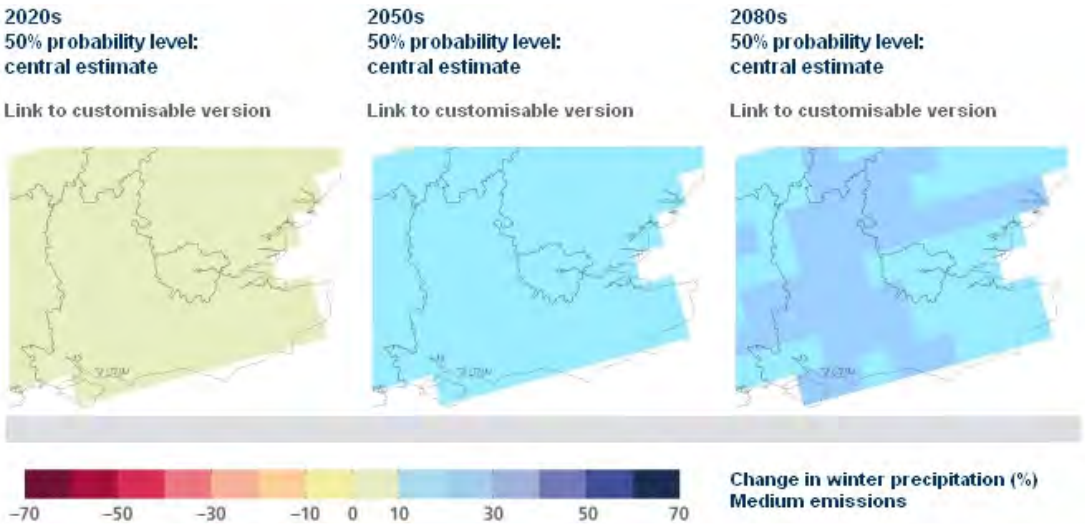


Figure E0-3: Winter precipitation changes over differing time periods (50% probability level, medium emissions scenario)

These maps highlight that under the medium emissions scenario, by 2080 Rother District Council may see particularly sharp redistribution of current precipitation patterns, such that there is at least 10% more rainfall during the winter and, even more strikingly, at least 30% less rainfall during the summer. The 3 degree C temperature rise prediction appears to be evenly distributed across the region.

If global emissions levels are successfully reduced such that a low emissions scenario applies, then the following changes are predicted:

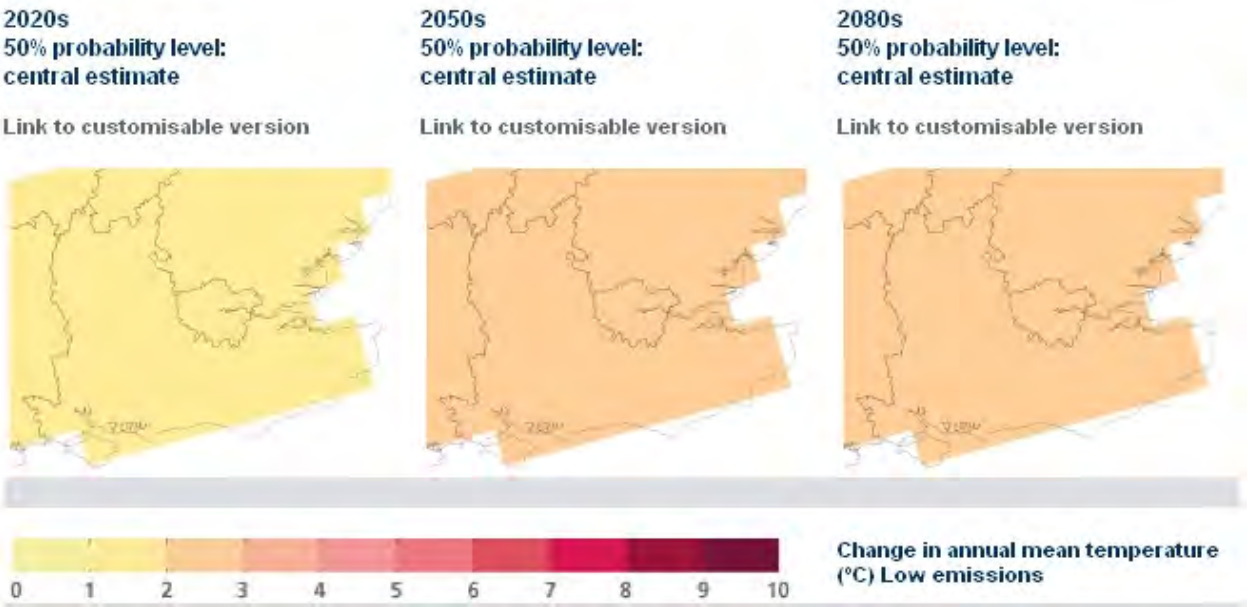


Figure E0-4: Annual mean temperature changes over differing time periods (50% probability level, low emissions scenario)

This illustrates that at this probability level, the estimated temperature rise by 2080 is reduced against the medium emissions scenario.

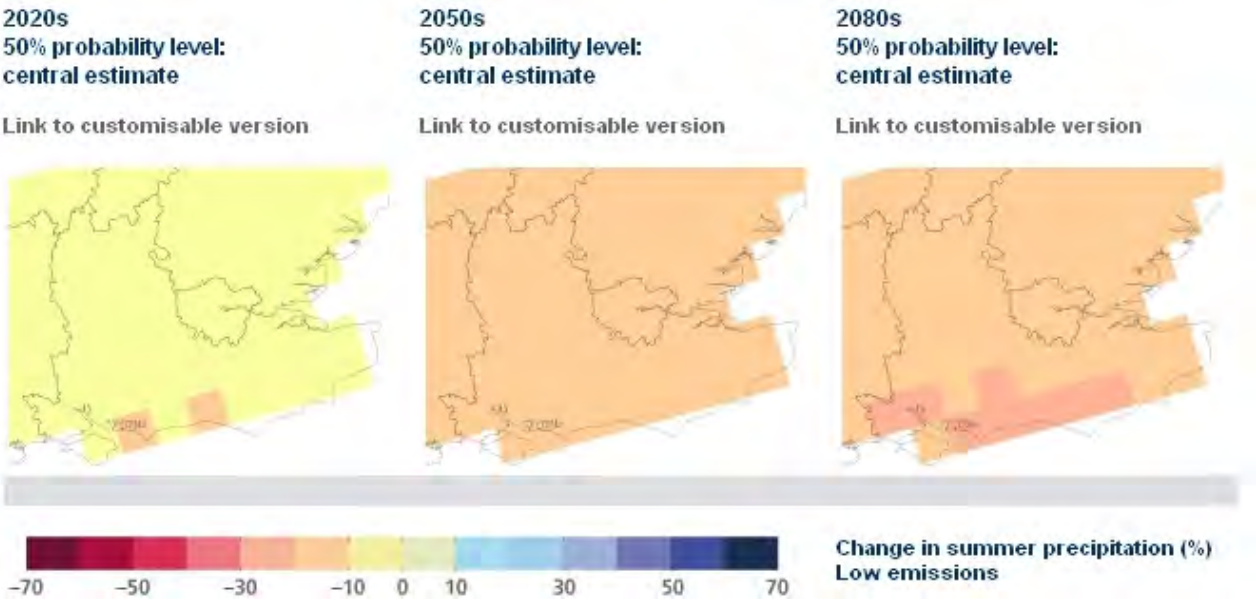


Figure E0-5: Summer precipitation changes over differing time periods (50% probability level, low emissions scenario)

At all projected time-periods, this figure illustrates that if a low emissions scenario is applied, the estimated level of change in summer precipitation is considerably reduced against a medium emission scenario.

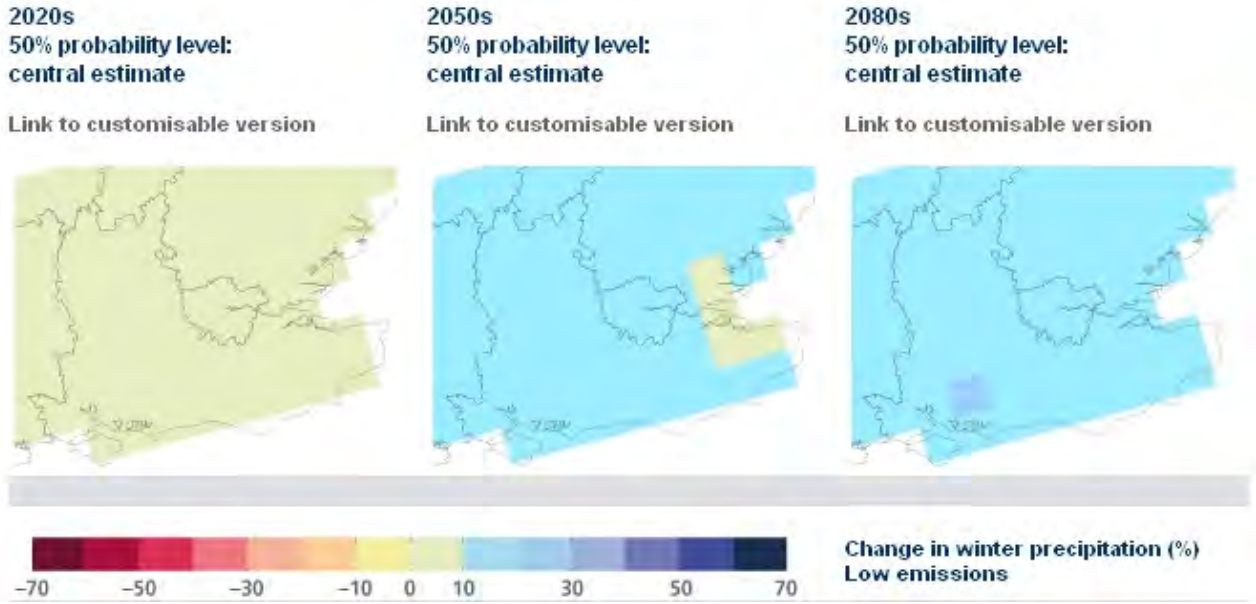


Figure E0-6: Winter precipitation changes over differing time periods (50% probability level, low emissions scenario)

This final figure, in comparison with the medium emissions scenario, shows that the expected level of change in winter rainfall would be slightly reduced under a low emissions scenario.

APPENDIX F: Hydro Potential Licence Issues

Abstraction License: If water is removed from a river and then returned to the flow, it is considered 'abstracted' and must be licensed. Projects below 5MW$_e$ are not charged on an annual basis but may still need to have a license.

Impoundment License: This is required when new structures are created (or, in some cases, when existing structures are altered) on a watercourse to protect water rights downstream.

Land Drainage Consent: This is for any structure in, on, under or within 8 metres of a river / stream to protect people and property.

Salmon and Freshwater Fisheries approval: This is to provide for the movement of migratory fish such as salmon and sea trout up and down the river. In a recent review of the fisheries legislation, it has been recommended that this provision be extended to all fish species.

The licenses and consents[48] above may have conditions attached to take account of protective measures required for the environment.

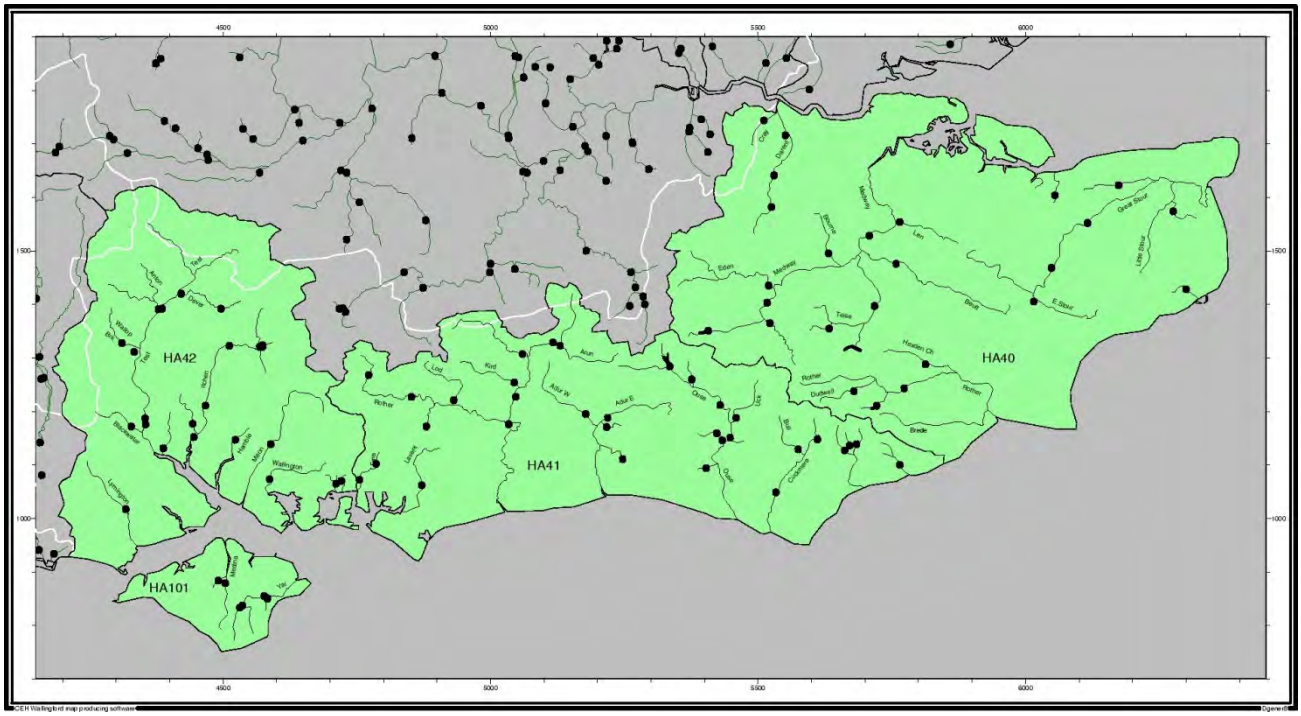


Figure F0-1: EA Southern Region showing Gauge Stations

[48] This summary is only to illustrate the requirements and it is required to clarify the applicable licenses with EA for each and every project.

Concise Register of Gauging Stations

Environment Agency - Southern

Click on the column headings to sort in alphabetical, numerical or north south order. An asterisk in the final column indicates a discontinued station; for some of these an operator code may not be given.

Number	River	Location	Grid Ref.	Operator	Cat. Area (km^2)	
41012	Adur E Branch	Sakeham	51 (TQ) 219 190	EA	93.3	
41010	Adur W Branch	Hatterell Bridge	51 (TQ) 178 197	EA	109.1	
42007	Alre	Drove Lane Alresford	41 (SU) 574 326	EA	57.0	
42012	Anton	Fullerton	41 (SU) 379 393	EA	185.0	
41007	Arun	Park Mound	51 (TQ) 033 200	EA	403.3	*
41014	Arun	Pallingham Quay	51 (TQ) 047 229	EA	379.0	
41019	Arun	Alfoldean	51 (TQ) 117 331	EA	139.0	
41002	Ash Bourne	Hammer Wood Bridge	51 (TQ) 684 141	EA	18.4	
40024	Bartley Mill St	Bartley Mill	51 (TQ) 633 357	EA	25.1	*
40005	Beult	Stile Bridge	51 (TQ) 758 478	EA	277.1	
41020	Bevern Stream	Clappers Bridge	51 (TQ) 423 161	EA	34.6	
42014	Blackwater	Ower	41 (SU) 328 174	EA	104.7	
40006	Bourne	Hadlow	51 (TQ) 632 497	EA	50.3	
40028	Boxley Stream	Boxley	51 (TQ) 752 583	EA	8.5	*
42021	Branch of Test	Nursling	41 (SU) 355 159	EA	1050.0	*
40025	Brede	Brede Pumping Station	51 (TQ) 813 177	EA	45.7	
41029	Bull	Lealands	51 (TQ) 575 131	EA	40.8	
42009	Candover Stream	Borough Bridge	41 (SU) 568 323	EA	71.2	
42008	Cheriton Stream	Sewards Bridge	41 (SU) 574 323	EA	75.1	
41028	Chess Stream	Chess Bridge	51 (TQ) 217 173	EA	24.0	
41021	Clayhill Stream	Old Ship	51 (TQ) 448 153	EA	7.1	
41026	Cockhaise Brook	Holywell	51 (TQ) 376 262	EA	36.1	
41017	Combe Haven	Crowhurst	51 (TQ) 765 102	EA	30.7	
41033	Costers Brook	Cocking	41 (SU) 880 174	EA	2.7	
40016	Cray	Crayford	51 (TQ) 511 746	EA	119.7	
41003	Cuckmere	Sherman Bridge	51 (TQ) 533 051	EA	134.7	
41016	Cuckmere	Cowbeech	51 (TQ) 611 150	EA	18.7	
40012	Darent	Hawley	51 (TQ) 551 718	EA	191.4	
40013	Darent	Otford	51 (TQ) 525 584	EA	100.5	
40018	Darent	Lullingstone	51 (TQ) 530 643	EA	118.4	
40002	Darwell	Darwell Reservoir	51 (TQ) 722 213	SW	9.6	*
42015	Dever	Weston Colley	41 (SU) 496 394	EA	52.7	*
42027	Dever	Bransbury	41 (SU) 422 422	EA	122.3	
40033	Dour	Crabble Mill	61 (TR) 300 430	EA	49.5	
40017	Dudwell	Burwash	51 (TQ) 679 240	EA	27.5	
40023	East Stour	South Willesborough	61 (TR) 015 407	EA	58.8	
101001	Eastern Yar	Alverstone Mill	40 (SZ) 577 857	EA	57.5	*
101004	Eastern Yar	Burnt House	40 (SZ) 583 853	EA	59.6	

101005	Eastern Yar	Budbridge	40 (SZ) 531 835	EA	22.5	
40010	Eden	Penshurst	51 (TQ) 520 437	EA	224.3	
41015	Ems	Westbourne	41 (SU) 755 074	EA	58.3	
41034	Ems	Walderton	41 (SU) 786 104	EA	41.5	*
40020	Eridge Stream	Hendal Bridge	51 (TQ) 522 367	EA	53.7	
41031	Fulking Stream	Fulking	51 (TQ) 247 113	EA	1.0	
40008	Great Stour	Wye	61 (TR) 049 470	EA	230.0	
40011	Great Stour	Horton	61 (TR) 116 554	EA	345.0	
40022	Great Stour	Chart Leacon	51 (TQ) 992 423	EA	72.5	
42011	Hamble	Frogmill	41 (SU) 523 149	EA	56.6	
42017	Hermitage	Havant	41 (SU) 711 067	EA	17.0	
40021	Hexden Channel	Hopemill Br Sandhurst	51 (TQ) 813 290	EA	32.4	
41013	Huggletts Stream	Henley Bridge	51 (TQ) 671 138	EA	14.2	
42010	Itchen	Highbridge+Allbrook	41 (SU) 467 213	EA	360.0	
42016	Itchen	Easton	41 (SU) 512 325	EA	236.8	
42023	Itchen	Riverside Park	41 (SU) 445 154	EA	415.0	
41018	Kird	Tanyards	51 (TQ) 044 256	EA	66.8	*
41023	Lavant	Graylingwell	41 (SU) 871 064	EA	87.2	
42025	Lavant Stream	Leigh Park	41 (SU) 721 072	EA	54.5	
40029	Len	Lenside	51 (TQ) 765 556	EA	69.7	
40031	Lesser Teise	Den Farm	51 (TQ) 722 475	EA	157.8	*
41022	Lod	Halfway Bridge	41 (SU) 931 223	EA	52.0	
41025	Loxwood Stream	Drungewick	51 (TQ) 060 309	EA	91.6	
101003	Lukely Brook	Newport	40 (SZ) 491 886	EA	16.2	
42003	Lymington	Brockenhurst	41 (SU) 318 019	EA	98.9	
101002	Medina	Upper Shide	40 (SZ) 504 881	EA	29.8	
40001	Medway	Weir Wood Reservoir	51 (TQ) 407 353	SW	26.9	*
40003	Medway	Teston	51 (TQ) 708 530	EA	1256.1	
40007	Medway	Chafford Weir	51 (TQ) 517 405	EA	255.1	
42006	Meon	Mislingford	41 (SU) 589 141	EA	72.8	
42018	Monks Brook	Stoneham Lane	41 (SU) 443 179	EA	43.3	
41036	Ninfield Stream	Kitchenham Road	51 (TQ) 679 124	EA	4.2	*
41035	North	Brookhurst	51 (TQ) 130 325	EA	53.9	
41001	Nunningham Stream	Tilley Bridge	51 (TQ) 662 129	EA	16.9	
41004	Ouse	Barcombe Mills	51 (TQ) 433 148	EA	395.7	
41005	Ouse	Gold Bridge	51 (TQ) 429 214	EA	180.9	
41030	Ouse	Ardingly	51 (TQ) 333 283	EA	37.2	
40004	Rother	Udiam	51 (TQ) 773 245	EA	206.0	
40026	Rother	Blackwall Bridge	51 (TQ) 886 258	EA	424.0	
40032	Rother	Crowhurst Bridge	51 (TQ) 683 263	EA	92.7	
41008	Rother	Fittleworth	51 (TQ) 010 182	EA	348.3	*
41009	Rother	Hardham	51 (TQ) 034 178	EA	345.8	*
41011	Rother	Iping Mill	41 (SU) 852 229	EA	154.0	
41027	Rother	Princes Marsh	41 (SU) 772 270	EA	37.2	
40027	Sarre Penn	Calcott	61 (TR) 174 625	EA	19.4	*

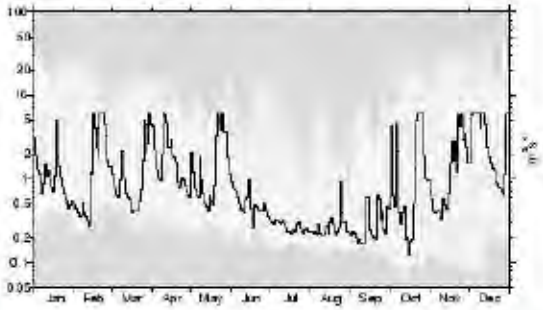
101007	Scotchells Brook	Burnt House	40 (SZ) 583 852	EA	9.2	*
41024	Shell Brook	Shell Brook	51 (TQ) 335 286	EA	22.6	
42020	Tadburn Lake	Romsey	41 (SU) 362 212	EA	19.0	
42019	Tanners Brook	Millbrook	41 (SU) 388 133	EA	16.0	
40009	Teise	Stone Bridge	51 (TQ) 718 399	EA	136.2	
42004	Test	Broadlands	41 (SU) 354 189	EA	1040.0	
42013	Test	Longbridge	41 (SU) 355 178	EA	1040.0	
42022	Test	Testwood	41 (SU) 352 151	EA	140.0	
42024	Test	Chilbolton (Total)	41 (SU) 386 394	EA	453.0	
41006	Uck	Isfield	51 (TQ) 459 190	EA	87.8	
42001	Wallington	North Fareham	41 (SU) 587 075	EA	111.0	
42005	Wallop Brook	Broughton	41 (SU) 311 330	EA	53.6	
42026	Wallop Brook	Bossington	41 (SU) 334 313	EA	61.1	
40015	White Drain	Fairbrook Farm	61 (TR) 055 606	EA	31.8	
40014	Wingham	Durlock	61 (TR) 276 576	EA	37.7	
41037	Winterbourne Stream	Lewes	51 (TQ) 403 096	EA	17.3	*
101006	Wroxall Stream	Waightshale	40 (SZ) 536 839	EA	15.8	*

40004 - Rother at Udiam

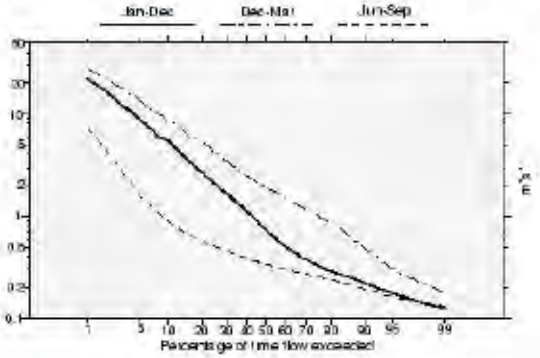
Grid Reference:	51 (TQ) 773 245
Operator:	EA
Local number:	556505001
Catchment Area:	206.0 km^2
Level of Station:	2.1 mOD
Max. Altitude:	197.0 mOD
Mean flow:	2.14 m^3s^{-1}
95% exceedance (Q95):	0.177 m^3s^{-1}
10% exceedance (Q10):	5.399 m^3s^{-1}
61-90 Av. Ann. Rainfall:	857 mm

Sample Hydrograph of Gauged Daily Flows

Max. and min. daily mean flows from 1962 to 2006 excluding those for the featured year (2006; mean flow: 1.39 m^3s^{-1})



Flow Duration Curve for Gauged Daily Flows



Station Description

Flat V weir with - since 12/2000 - multi-path ultrasonic to extend the range (calibration is ongoing). Cableway (65 cumecs gauged in 11/2000). 1992-2000 flows truncated at approx. 5.9 cumecs (d/s tidal sluice limited modularity of the Flat Vee); sig. underestimation of runoff - flows under review. Prior to 1992, broad-crested weir (crest deformation suspected, low flows may be overestimated). POR minimum should be considered indicative only; similar minimum in 1990. Flow confined (at Udiam) except in extreme floods. Responsive regime with evident artificial influences. Offtake for Darwell Res. (9.6 km2) u/s; other reservoirs and sewage effluent (some imported) also influence flow patterns (small net export of water). Robertsbridge flood alleviation scheme commissioned in 2003.

Catchment Description

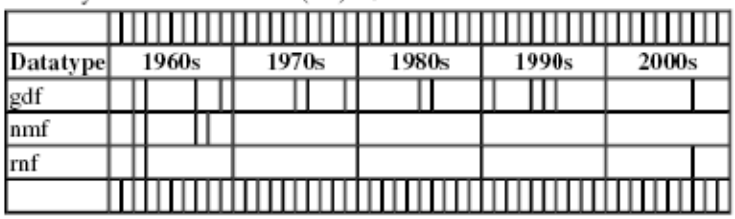
Catchment developed mainly on clays of Wadhurst series (very limited permeability), substantial tracts of Ashdown Sands also. Rural with sig. woodland and scattered settlements.

Factors Affecting Runoff

- Reservoir(s) in catchment affect runoff.
- Runoff influenced by groundwater abstraction/recharge.
- Runoff increased by effluent returns.

River Flow and Catchment Rainfall on the National River Flow Archive

Gauged Daily Flows (gdf): 1962 to 2006
Naturalised Monthly Flows (nmf): 1962 to 1967
Monthly Catchment Rainfall (rnf): 1962 to 2006



For many stations monthly peak flows are also archived. When daily flow data are not available monthly mean flows may be held on the National River Flow Archive. See Data Holdings for further information.

NRFA Home Page Station Summaries Regional Maps Data Holdings

Low head hydro in the South East

ANNEX 1 - LIST OF POTENTIAL HYDRO SITES VISITED

	Location name	County	OS Co-ord.	Waterway
1	Aldermarston Wharf	Berkshire	SU 601 671	Kennet & Avon Canal
2	Sandford Mill	Oxfordshire	SP 532 012	River Thames
3	Sandford Weirs	Oxfordshire	SP 530 015	River Thames
4	Sutton Courtney	Oxfordshire	SU 502 944	River Thames
5	Old Mill Hotel	Oxfordshire	SU 590 662	River Kennet
6	Allington	Kent	TQ 746 581	River Medway
7	Abingdon Weir	Oxfordshire	SU 505 972	River Thames
8	Sonning Mill	Oxfordshire	SU 753 758	River Thames
9	Osney Island Weir	Oxfordshire	SP 505 058	River Thames
10	Long Wittenham Weir	Oxfordshire	SU 541 941	River Thames
11	Back Water Weir (no.2)	Oxfordshire	SU 513 967	River Thames
12	Yalding	Kent	TQ 688 500	River Medway
13	Brimpton Mill	Berkshire	SU 554 657	River Kennet
14	Branbridges	Kent	TQ 670 479	River Medway
15	Chimney Weir	Oxfordshire	SP 362 007	River Thames
16	Newbury Town Centre 1	Berkshire	SU 469 671	Kennet & Avon Canal
17	Newbury Town Centre 2	Berkshire	SU 474 672	Kennet & Avon Canal
18	Hunton Mill	Kent	TQ 709 492	River Beult
19	Thatcham Sluices	Berkshire	SU 529 661	Kennet & Avon Canal
20	Colthorp Sluices	Berkshire	SU 539 663	Kennet & Avon Canal
21	Chartham	Kent	TR 097 555	Great Stour River
22	Congelow	Kent	TQ 610 496	River Medway
23	Swinford Weir	Oxfordshire	SP 444 088	River Thames
24	Weir, Farmoor	Oxfordshire	SP 440 071	River Thames
25	Weir, Appleton	Oxfordshire	SP 431 021	River Thames
26	Canterbury (Hookes Mill)	Kent	TR 146 578	Great Stour River
27	Chartham 1	Kent	TR 106 547	Great Stour River
28	Chartham 2	Kent	TR 097 554	Great Stour River
29	New Mill	Oxfordshire	SP 342 110	River Windrush
30	Shifford Lock Weir	Oxfordshire	SP 371 010	River Thames
31	Cogges Farm	Oxfordshire	SP 360 093	River Windrush
32	Woodford Mills	Oxfordshire	SP 357 102	River Windrush
33	Crawley Mill	Oxfordshire	SP 338 117	River Windrush
34	Minster Lovell Mill	Oxfordshire	SP 318 113	River Windrush
35	Kintbury 2	Berkshire	SU 385 671	Kennet & Avon Canal
36	Bagnor	Berkshire	SU 451 692	River Lambourn
37	Olantigh 2 weirs	Kent	TR 051 489	Great Stour River
38	Upper Reaches Hotel, Abingdon	Oxfordshire	SU 500 970	River Thames
39	Chilham Mill	Kent	TR 076 535	Great Stour River
40	New Cut Weir & Mill, Abingdon	Oxfordshire	SU 479 962	River Ock
41	Wye Weir	Kent	TR 049 470	Great Stour River

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131 of 139

Low head hydro in the South East

42	Marcham Mill	Oxfordshire	SU 457 953	River Ock
43	Garford Mill	Oxfordshire	SU 425 962	River Ock
44	Robertsbridge	East Sussex	TQ 736 241	River Rother
45	Swanton Mill, near Ashford	Kent	TR 039 388	East Stour River
46	Venn Mill	Oxfordshire	SU 430 949	Childrey Brook
47	East Hanney	Oxfordshire	SU 412 926	Letcombe Brook
48	Town Mill	Oxfordshire	SU 396 881	Letcombe Brook
49	Kintbury 1	Berkshire	SU 378 675	Kennet & Avon Canal
50	Slip Mill, Hawkhurst	Kent	TQ 753 314	Name unknown

APPENDIX G: Analysis for Micro- and Pico-hydro Potential in Rother District

Flow data within Rother

The Environment Agency measures the flow rate in most significant rivers and streams in UK, and data from around 1,300 gauging stations can be obtained from 'Centre for Ecology & Hydrology' (CEH) in Wallingford or from CEH's web pages[49]. Rother falls within the Environmental Agency Southern Region. A relevant gauge station map and summary of gauge stations are attached in the appendices of this report.

We have identified three gauge stations within Rother boundaries. However, of these three stations, the National Water Archive only provides daily measured long-term flow data and flow distribution curve (FDC) for the gauge station at Udiam[50]. The identified FDC of river Rother at Udiam is illustrated below.

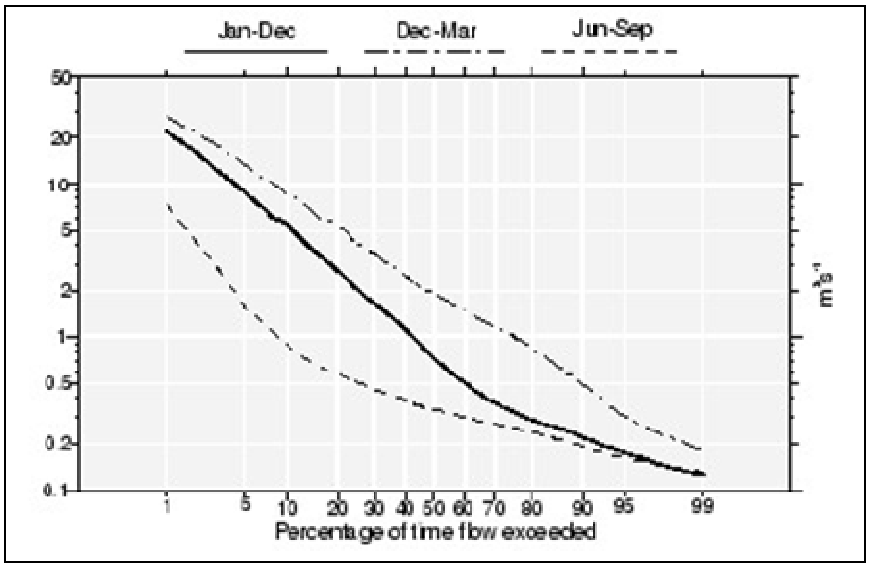

Figure G1: Flow Distribution Curve- River Rother at Udiam (Gauge Station 40004)

Compensation Flow

An uncontrolled abstraction of water from rivers and streams for power generation purposes may lead to sections of the rivers/ streams suffering from dry conditions. To avoid such conditions, a percentage of the river flow will need to by-pass the hydropower scheme. In abstraction schemes, where water is diverted from the main course of the river, this percentage flow is termed as compensation flow. Compensation flow is needed to maintain the ecology and

[49] Source Ref: http://www.ceh.ac.uk/data/nrfa/uk_gauging_station_network.html
[50] Refer Appendix F for the summary of this gauge station.

aesthetic appearance of the river/ stream in the depleted stretch. Compensation flow is also termed reserved flow, residual flow or minimum environmental flow, depending on the country and relevant authority. A guide to UK mini hydro developments suggests that the amount of compensation flow will depend on site-specific concerns, but a reasonable first estimate will lie between the Q_{90} and Q_{99} values of river flow. In the above example (Udiam gauge station), the compensation flow could be circa 0.2m^3/s (Q_{90} flow) however this should be agreed with the Environmental Agency.

Available flow

British hydropower association's guide to mini-hydro installation states that;

"It is unlikely that schemes using significantly more than the mean river flow (Q_{mean}) will be either environmentally acceptable or economically attractive. Therefore the turbine design flow for a run-of river scheme (a scheme operating with no appreciable water storage) will not normally be greater than Q_{mean}. The exception would be a scheme specifically designed to capture very high winter flows, which is very rare in mini-hydro applications."

In this model we assumed the mean flow at Udiam (2.14m^3/s) as the design flow and allowed Q_{90} as the compensation flow. Although the model discussed in this example can be used to illustrate the generic level of hydro power potential within Rother District Council, it should be also noted that different project locations will have different flow conditions based on several factors such as evaporation rate, soil conditions, catchment area, upstream water abductions and diversions, etc.

Head

One of the other factors determining the effectiveness of any hydro scheme is head. Head is the maximum available vertical drop in the water level between the water level at diversion and the turbine axis at the generation point.

A report by TV Energy on '*Low Head Hydro Power in the South-East of England - A Review of the Resource and Associated Technical, Environmental and Socio-Economic Issues'* states that;

"[…] In the flat South East of England it is difficult to find any hydro project sites with a head greater than 3m […]"

In this instance, considering the geography of Rother District, the maximum feasible head for a good low head site could be a gross head of 3 m. Turbines that are available in the hydropower industry often restrict the lower limit of head that is suitable for a feasible installation. Until recently it was thought that schemes with less than 3m head were not economically viable and any sites below 3m head were often called 'ultra low head'. However propeller and Kaplan type turbines now offer minimum head up to 1m[51].

Opportunities within Rother

It is our view that Rother could only offer potential for pico-hydro scale (domestic level) schemes.

[51] A sample turbine application chart applicable for 1m head is attached in appendix.

Approximate peak power **P** can be estimated from the design flow $\mathbf{Q}_0$ and head **H** as follows[52];

$$\mathbf{P}\ (kW) = 7 \times \mathbf{Q}_o\ (m^3/s) \times \mathbf{H}\ (m)$$

Taking the Udiam flow as an illustrative example; a potential installation with 1m head near to the gauge station would only provide a peak rated capacity of around 13kW. This does not include various other potential losses in transformers, head fluctuation, generators, turbines etc, and hence overall installed capacity would likely be in the pico hydro category – e.g. sub 10kWe. It should be also noted that after a combination of desktop research and site visits by TV Energy, no site was identified and found viable within Rother. The list of sites included in TV Energy's appraisal is attached in **Appendix E**.

Constraints

Non-technical issues such as land ownership, access to the site, financial arrangements, obtaining grants, environmental issues such as concerns related to fish, other fauna and flora, flood risk, environmentally protected zones will also limit the potential for installations. Some of the principal environmental issues for pico-scale hydro are listed below.

- Visual intrusion of the water intake, the weir, and the power house and turbine housing.
- The ecological impact on flora and fauna by diverting water flow and therefore need to maintain sufficient flow through normal river stream.
- Any impact to fish and other organisms passing through hydro turbines.
- The impact of a scheme's construction phase when temporary weir may be necessary; there is also a risk of disturbing the sediment on the river bed and/or depositing construction materials in the water.
- Any change in groundwater levels caused by the dam or weir.
- Licensing issues.

Some of the possible licensing issues are summarised in **Appendix F**[3].

[52] Source ref: Guide to British mini-hydro developments published by British Hydropower Association