Delivering Sustainable Energy in North Yorkshire

Recommended Guidance for Developing Energy Action Plans and Strategies

Produced by the National Energy Foundation and Land Use Consultants for a Partnership of North Yorkshire Local Authorities

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DELIVERING SUSTAINABLE ENERGY IN NORTH YORKSHIRE: RECOMMENDED GUIDANCE FOR DEVELOPING ENERGY ACTION PLANS AND STRATEGIES

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1 INTRODUCTION

"Energy is vital to a modern economy. We need energy to heat and light our homes, to help us to travel and to power our businesses. However our energy system faces new challenges. Climate change – largely caused by burning fossil fuels – threatens major consequences in the UK and worldwide. Our energy supplies will increasingly depend on imported gas and oil. At the same time, we need to keep energy affordable."

With these words, the Prime Minister introduced the White Paper on Energy in 2003. Since then, the Government has expected local authorities, county councils, regions and other bodies to work towards identifying ways of creating the conditions for the more sustainable use and generation of energy at a local and regional level.

Energy Action Plans are an essential tool to help local authorities deliver the multiple objectives placed on them by Government and local stakeholders. They should facilitate local authorities in delivering a range of objectives in terms of sustainable energy systems, the development of local renewable energy resources, seeking to combat climate change and the alleviation of fuel poverty.

In Spring 2005, Land Use Consultants and the National Energy Foundation were commissioned by a partnership of local authorities in North Yorkshire[1] to undertake a study with four main elements:

1. Review of the technical constraints and opportunities for renewable energy developments in North Yorkshire;
2. Preparation of Supplementary Planning Guidance on sustainable energy for local planning authorities;
3. Assessment of the sensitivity of the landscape to accommodate renewable energy developments;
4. Preparation of guidance for local authorities on delivering sustainable energy as part of their corporate strategies.

This document deals with fourth element of these deliverables. It is designed to assist local authorities in North Yorkshire in developing a local Energy Strategy and Energy Action Plan. Section 4 of this report also presents the findings of the review of the technical constraints and opportunities for renewable energy development in North Yorkshire (element 1).

This guidance is not intended to be prescriptive, as local authorities are best placed to decide themselves which features of an energy policy are most appropriate to meet local needs; however it does attempt to place local strategies and plans into a broader national context and to offer signposts to tools and examples of best practice that may be used in drawing up a local strategy and plan.

The remainder of this section considers the reasons why a local authority may wish to create an energy strategy and action plan.

Section 2 summarises the steps that may need to be taken by a local authority in designing, promoting and implementing an energy strategy and policy.

Sections 3 and 4 then look at the broader context in terms of the UK's national energy policies and regional policies for Yorkshire & the Humber and North Yorkshire.

Section 5 outlines an approach that may be used by local authorities in drawing up an energy strategy and action plan. The remaining three sections then look at some of the tools that may be used, including grants that may be available and sources of further information.

[1] Comprising North Yorkshire County Council, all District Councils, National Park Authorities, City of York Council, the Regional Assembly and the Government Office for Yorkshire and the Humber.

1.1 Why should local authorities be concerned with energy?

Local authorities will normally be concerned with energy for the following reasons:

- to help contribute to the limitation of Global Climate Change
- to minimise local environmental damage from energy use or generation
- to ensure local diversity of supply contributing to local competitiveness and sustainable economic growth
- as part of an anti-poverty strategy, with particular emphasis on the elimination of fuel poverty

These local concerns to a substantial extent mirror the goals of the national energy policy set out in the White Paper "*Our Energy Future – Creating a Low Carbon Economy*"[2] published in February 2003.

1.1.1 Global Climate Change

It is generally accepted that Global Climate Change is one of the principal challenges facing us in the 21st Century. This document is not the place to go into detail about the possible causes or effects of Global Climate Change, other than to note that there is strong scientific evidence that average global temperatures have risen by 0.9°C over the past century, with 9 of the 10 warmest years on record being in the last decade.

It is also generally accepted that the major contributory cause to global climate change is the man-made emissions of greenhouse gases[3], of which Carbon Dioxide (CO_2) associated with the burning of fossil fuels is by far the largest single contributor.

The immediate effects are likely to be greater instability in the weather, with an increased number of severe storms, flooding and periods of drought. North Yorkshire will not be insulated from these effects; and in the past few years there have been two cases of serious flooding (York, 2000 and Helmsley, 2005), the latter following on from severe storms. As well as the direct economic losses suffered as result of such events, there is a need to divert investment into new areas to limit damage from future events.

In the longer term, it is only possible to speculate on what the effects of unchecked climate change may be. Commonly anticipated effects include further storms and flooding, rising sea levels – with associated coastal erosion in Yorkshire, but the possible inundation of a significant proportion of the world's most productive agricultural land, seasonal droughts, and the spread of disease (including the reappearance in Britain of those once eradicated, such as malaria).

The Climate Change Action Plan for Yorkshire and the Humber[4] identifies both mitigation and adaptation opportunities by sectors, as well as offering a framework for implementation of necessary changes. The present document is intended to supplement and complement those policies in the specific area of reducing CO_2 emissions from energy. Carbon reductions can be effectively cut in four ways, in line with the energy hierarchy:

1. **Use less energy by avoiding waste (*Be Mean*)**
2. **Use energy efficiently (*Be Lean*)**
3. **Use energy generated from renewable resources (*Be Green*)**
4. **Use any remaining energy required from the least polluting sources of fossil fuels in the most efficient manner (*Be Clean*)**

[2] Energy White Paper, Cm 5761, The Stationery Office, February 2003
[3] The six main greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride (SF_6)
[4] Issued as a Consultation Draft in January 2005 by the Yorkshire & Humberside Assembly

The first of these steps is often referred to as energy conservation and combines good housekeeping with heightened awareness of energy. The final step is sometimes extended to include nuclear power generation; however in the absence of existing nuclear power stations it is unlikely that they will be introduced into North Yorkshire under current policies, and so they will not be considered further in this document. Clean coal technologies, while highly important for the large power station at Selby, also falls outside the remit of local authorities and so will be excluded from this document. In contrast, local authorities can have a major impact in the middle two elements – energy efficiency and renewables – and these will form the major focus of this document.

1.1.2 Local Environmental Damage

In addition to the local effects of global climate change, identified above, there are also local effects of energy generation and use. These include:

- smoke and particulates
- emission of gases leading to acid rain (mainly oxides of sulphur and nitrogen)
- visual impact (including high-voltage distribution, wind turbines and conventional power stations)

The first two of these are addressed by the need to burn fossil fuels as efficiently and cleanly as possible, and are largely outside the scope of a local authority to influence, except through the operation of the Clean Air Acts.

The third is however of great importance to setting an energy strategy and action plan. Many of the constraints, and some of the targets, are set out in the report for the Yorkshire and Humber Assembly: Energy and the Regional Spatial Strategy[5], and its various appendices. These are considered in greater detail in the section on Regional Energy Strategy below.

1.1.3 Diversity and security of supply

The key drivers behind seeking a diverse and secure supply of energy are to enable local competitive for industry and services, and the ability for citizens to meet their energy needs affordably. Although the existence of national grid distribution systems for electricity and gas means that it is not possible to view a district (or county or region) in isolation, local sources of energy, including those of liquid and solid biofuels, will contribute to local security, especially in districts where the capacity of the grid is restricted (or there are no mains gas connections).

The Energy and the Regional Spatial Strategy notes that diversity is increasingly being seen in terms of renewable energy resources, although energy efficiency also has an important role to play in terms of reducing the total energy demand. (It is also considerably easier to meet targets for renewable supply based on local consumption, if that consumption is reduced through energy conservation and efficiency measures prior to installing renewables.)

1.1.4 Elimination of Fuel Poverty

In planning for a truly sustainable energy system, environmental measures have to go hand-in-hand with social measures, ensuring that all residents have access to adequate and affordable supplies of energy. In the UK, there has historically been a problem that people on the lowest incomes often live in relatively poor quality housing, and so are unable to afford to heat their homes in winter to what is considered to be an acceptable standard. This is known as fuel poverty[6].

Several of the North Yorkshire local authorities have already addressed the issue of fuel poverty in their districts, through *inter alia*:

- Community Strategy (Health & Social Well-being)
- Housing Strategy (Housing Advice & Needs)
- Sustainable Development Strategy (Safe & Healthy)

[5] Energy and the Regional Spatial Strategy, Enviros Consulting Ltd, January 2005

[6] There are many definitions of Fuel Poverty, but the White Paper defines a fuel poor household as one needing to spend in excess of 10% of household income to achieve a satisfactory heating regime (21°C in the living room and 18°C in the other occupied rooms).

2 HOW TO DEVELOP A STRATEGY AND ACTION PLAN

The key stages in developing a sub-regional Energy Action Plan are:

1. Set and Agree a policy framework
    a. Identify and align with national energy policy (Section 3)
    b. Identify and align with regional energy policies (Section 4)
    c. Measure current energy supply and demand
    d. Set Energy Efficiency targets – domestic and non-domestic
    e. Set Renewable Energy targets – large scale and small scale

2. Provide Planning Guidance and establish local standards (Section 6)
    a. Energy efficiency standards – domestic
    b. Energy efficiency standards/guidance – non-domestic
    c. Renewable energy – National Parks/AONBs (RSS[7])
    d. Renewable energy – other areas (RSS)
    e. Spatial guidance for renewable energy (RSS)
        i. proximity to existing grid
        ii. traffic generation (construction and operation phases)
        iii. building integrated
        iv. combustion plant locations
        v. landscape character sensitivity and capacity

3. Develop Partnerships (Section 7)
    a. Building on the Local Strategic Partnerships (LSPs)
    b. Public sector partners, including education & health sector
    c. Private sector partners (commerce & industry)
    d. Individuals, including special interest groups

4. Promotion Phase (Section 8)
    a. Promotion of concepts – sustainability
    b. Promotion of Energy Conservation and Efficiency
    c. Promotion of Renewables

5. Support Activities
    a. Identification of grants and other funding routes (Section 9)
    b. Supporting toolkit (Section 10)

6. Feedback
    a. Establishing monitoring procedures to ensure that the plan is effective
    b. Linking the Plan to statutory reporting, including HECA

The cross-references above to sections in this guidance document are for convenience only; this is not intended to be an exact route plan telling local authorities the right way to go, but more of a road map allowing them to choose their own direction, in line with the wishes and expectations of local communities.

[7] RSS: To be drawn from the Regional Spatial Strategy, adapted for local requirements.

3 GOVERNMENT ENERGY POLICY

The UK Government's Energy Policy is set out in the White Paper, Our Energy Future – Creating a Low Carbon Economy, published in February 2003. The Government sums up its attitude in the simple strapline: "Cleaner, Smarter Energy: Policies for a Low Carbon Future."

3.1 Rationale for an Energy Policy

Introducing the White Paper, the Prime Minister notes: "*Our energy system faces new challenges. Energy can no longer be thought of as a short-term domestic issue. Climate change - largely caused by burning fossil fuels - threatens major consequences in the UK and worldwide, most seriously for the poorest countries who are least able to cope. Our energy supplies will increasingly depend on imported gas and oil from Europe and beyond. At the same time, we need competitive markets to keep down costs and keep energy affordable for our businesses, industries, and households.*"

These three challenges are then expanded:
The first challenge is **environmental**. "Climate change is real," the White Paper summary states, adding that "The 1990s were the warmest decade since records began. Without action to reduce greenhouse gas emissions, the earth's temperature is likely to rise faster than at any time in the last 10,000 years or more. In the UK, risks of droughts and flooding are likely to increase. Sea levels will rise, so extreme high water levels could be 10 to 20 times more frequent at some parts of the east coast by the end of the century. But the worst effects of climate change can be avoided if greenhouse gases in the atmosphere are stabilised instead of being allowed to increase."

The second challenge is the **decline of the UK's indigenous energy supplies** - oil, gas, nuclear and coal. The White Paper notes that much of the UK's economically viable deep mined coal will be exhausted within 10 years and that the country will also become a net importer of gas and oil by around 2010. Ten years later, it could be dependent on imported energy for three quarters of primary energy needs, especially with the closing of most of the existing nuclear power stations. As Britain becomes a net importer, it may be more vulnerable to price fluctuations and interruptions to supply, including ones caused by political instability in other parts of the world.

The third challenge is the need to **update much of the UK's energy infrastructure** over the next two decades. During the 1990s there was significant new investment in generating capacity, especially gas-fired plant. More recently, some traditional generating capacity has been mothballed and interest in building new plant, other than renewables, has declined.

3.2 The Four Goals of the UK's Energy Policy

In order to address these three challenges, the Government set four goals for its energy policy:

1. to embark on a path to cut the UK's CO_2 emissions by some 60% by 2050, with real progress by 2020;
2. to maintain the reliability of energy supplies;
3. to promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and improve productivity; and
4. to ensure that every home is adequately and affordably heated.

The Government believes all four goals can be achieved together, using the market framework and policy instruments where practicable. Energy efficiency is likely to be the cheapest, safest way of meeting all four objectives. Renewable energy is also seen to also play an important part in reducing

carbon emissions, while strengthening energy security and improving industrial competitiveness through cleaner products and processes.

3.2.1 Energy Supply

In helping to meet the goals, the Government recognises that specific measures will be needed to stimulate the growth in renewable energy so that it can achieve the necessary economies of scale and maturity to reduce costs significantly. The White Paper cites as evidence of this approach the Renewables Obligation introduced in April 2000 and the exemption of renewables from the climate change levy together worth around £1 billion a year for the renewables industry by 2010. It repeated the targets for renewables to supply 10% of UK electricity in 2010, subject to the costs being acceptable to the consumer and set the ambition (not a formal target) of doubling renewables' share of electricity generation in the decade after that.

Turning to conventional forms of electricity generation, it made no specific proposals for building new nuclear power stations, but noted that coal fired generation could help widen energy diversity provided ways can be found to reduce its carbon emissions. Consequently the Government will continue to support research projects to develop options for cleaner coal technologies and for carbon capture and storage.

3.2.2 Energy Demand

The Government aims to reduce carbon emissions by continuing to decouple economic growth from energy use and pollution. Since 1970 overall energy consumption in the UK has increased by around 10%, while the size of the economy has doubled and it is intended to accelerate this trend.

Carbon emissions trading will be central to the future market and policy framework. From 2005 electricity generators, oil refineries and other industry sectors have become part of a much larger EU-wide scheme, and the Government will press for its extension to further industrial sectors, including the aviation industry.

However the White Paper notes that for consumers there will need to be additional measures, for example to stimulate greater energy efficiency in business, the public sector and households. Policies to raise the energy efficiency of products and buildings will have an important role. The present energy efficiency commitment, which requires electricity and gas suppliers to encourage their domestic customers to invest in measures such as cavity wall insulation, will be developed. Building Regulations will be used to raise standards for energy efficiency in new buildings and refurbishments. The UK Government will push in Europe for higher energy efficiency standards in tradable goods such as fridges and personal computers. It will also encourage improvements in vehicle efficiency and lower carbon fuels in transport. The public sector will set an example by improving energy efficiency in buildings and procurement. And finally, the Government will provide further encouragement for renewable energy and infrastructure investment through measures such as capital grants and a more supportive approach to planning.

3.2 The three non-environmental goals

The White Paper defines the second goal as being to **maintain the reliability of Britain's energy supplies**. This requires the right infrastructure and regulatory system at home and liberalised EU energy markets. It also recognises that the UK must pursue closer international relationships to promote regional stability and economic reform to facilitate the conditions for further investment in the world's key gas and oil regions.

Thirdly, the Government is determined to promote **competitive energy markets** in the UK and beyond. This will help to raise sustainable rates of economic growth and support competitiveness through reliable and affordable energy.

Its final goal is to **ensure that every home is adequately and affordably heated**. In 1996, 5.5 million households needed to spend more than 10% of their income on heating their homes adequately. Although falling prices and higher social security benefits have helped reduce this number

the Government has set an aim that nobody in Britain should be living in fuel poverty by 2016-18. Grant schemes and the energy efficiency commitment will continue to improve homes through better insulation, more efficient heating systems and minimising draughts.

3.3.1 Innovation is fundamental

To support these goals, the Government will support research, development and innovation to encourage longer-term options such as the hydrogen economy, and where necessary to enable emerging technologies, such as renewables and new energy efficiency technologies.

3.3 Approach to creating Sustainable Energy Systems

The Government's approach is based on a number of key principles:

- energy investments are generally long-term;
- the cheapest, cleanest and safest way of meeting all our goals is to use less energy, so the UK must improve energy efficiency far more in the next 20 years than in the last twenty;
- a well-designed, transparent and open energy market is the best way of achieving efficient outcomes, so the Government will use market instruments where possible and focus on emissions trading;
- trading and other market-based measures will also be needed to reduce carbon and drive up energy efficiency in homes, products and transport;
- electricity grids, metering systems and regulatory arrangements that were created for a world of large-scale, centralised power stations will need restructuring over the next 20 years to support the emergence of far more renewables and small-scale, distributed electricity generation;
- the future energy system will require greater involvement from Devolved Administrations, English regions and local communities, complemented by a planning system that is more helpful to investment in infrastructure and new electricity generation, particularly renewables;
- diversity is the best way of protecting the country against interruptions of supply, sudden price rises, terrorism or other threats to security of supply. As the UK becomes a net energy importer it will need many sources, suppliers and routes leading to a growing importance of international relations to achieving its energy aims;
- the Government will seek to influence outcomes in line with the principles of better regulation, maximising use of market-based and/or voluntary mechanisms and will try to minimise regulatory impact on SMEs; and
- energy policies will be developed in line with the overall approach to sustainable development.

3.5 Implementing the White Paper

The Government has followed up the White Paper with three main sets of documents[8]:

- an Energy Efficiency Implementation Plan, 2004
- Regional Annexes (April 2004 and July 2005)
- Annual Reports (April 2004 and July 2005)

Key elements of the Regional Reports relating to Yorkshire/Humberside are listed below under Regional Energy Policy. Renewable Energy has not had a specific document in response to the White Paper, although there is currently (until

[8] Energy Efficiency: The Government's Plan for Action, Cm 6168, April 2004; Sustainable Energy Policy Network First Annual Report Progress on Regional Implementation of the Energy White Paper, April 2004; CREATING A LOW CARBON ECONOMY: Progress on Regional Implementation of the Energy White Paper, URN 05/1419, July 2005; CREATING A LOW CARBON ECONOMY: Second annual report on the implementation of the Energy White Paper URN 05/1376, July 2005.

September 2005) a consultation exercise taking place on the strategy for Microgeneration, including the design of a new grant scheme.

3.5.1 Energy Efficiency Implementation Plan

The plan, described as *The Government's Plan for Action* was designed to show how the UK could save some 12 million tonnes of carbon by 2010 relative to the baseline. This exceeded the original 10 million tonne target in the White Paper for energy efficiency savings, and was intended to set the UK onto a path for doubling those savings by 2020. The Plan noted that the key barriers to action are behavioural and organisational, with lack of awareness or access to capital aggravated by a weak energy price incentive.

It identifies ways of overcoming these barriers through a mix of regulatory mechanisms, fiscal incentives, Government leadership coupled with market-facing support programmes from bodies such as the Energy Saving Trust and Carbon Trust:

- In households, savings will be made by doubling activity levels for the Energy Efficiency Commitment (EEC) and extending it to 2011. The Decent Homes programme will be used to improve the energy standards in social housing, with existing fuel poverty programmes tackling heating and insulation in low income households.
- The revision to Part L of the Building Regulations in 2005 will raise standards for new and refurbished buildings. Implementation of the Energy Performance of Buildings Directive, will require energy certification and labelling of buildings.
- The launch of the EU emissions trading scheme will initially cover around 50% of UK CO_2 emissions and help raise the profile of energy efficiency in companies. With the Climate Change Agreements, Climate Change Levy and other targeted tax allowances, it will ensure that energy intensive industries and the power generation sector have strong incentives to reduce their emissions in cost-effective ways.
- Strong leadership in the public sector will mean cutting carbon emissions by 29% between 1990 and 2011. In procurement the Government will only rent or build top quartile energy performance buildings.
- Product standards will be raised through the Market Transformation Programme working alongside the EU.
- Local authorities, regional assemblies and Regional Development Agencies will be expected to support innovative local and regional approaches to energy efficiency and to select Beacon Councils on Sustainable Energy in 2005-6.
- Continuing to inform, advise and support individuals, businesses and the public sector through the activities of the Carbon Trust and the Energy Saving Trust with a wider awareness campaign about climate change.
- Despite a short term focus on increasing the take-up of existing products, the Government will also continue to support innovation in low carbon technologies and will ensure that new technologies allow buildings with low or zero carbon emissions. Emphasis will also be on retrofitting difficult to tackle homes such as those with solid walls, and to introducing low-energy products such as Light Emitting Diode (LED) lighting by supporting research, design, demonstration and commercialisation of new technologies in the most cost-effective way.

3.5.2 Other Implementation Measures

The annual reports on progress towards the implementation of the White Paper are required as part of the obligations in the *Sustainable Energy Act, 2003*, which was also initially introduced into parliament as a Private Members' Bill, piloted by Brian White MP. Among the key measures identified as flowing, at least in part from the White Paper, the Government lists:

- Defra published the Government's **Strategy for Combined Heat and Power to 2010** in April 2004. The Strategy incorporates the full range of support measures to support the growth of CHP capacity needed to meet its target to achieve at least 10,000 MWe of installed Good Quality CHP capacity by 2010, and to lay the foundation for long-term growth in CHP.

In addition, the Government has also recently set a target to source at least 15% of electricity for use on the Government Estate from Good Quality CHP by 2010.

- In July 2004 The Government published a transport white paper **The Future of Transport: a network for 2030** with important implications for energy use in transport and the meeting of its targets for renewable transport fuels under the EU Bio-fuels Directive.
- The **Renewables Obligation Order 2005** came into force on 1 April 2005. The changes to the Obligation include an increase in the level of the Obligation to 15.4% by 2015/16; this will provide investors with additional confidence.
- The **British Electricity Trading and Transmission Arrangements** (BETTA) went live in April 2005. BETTA provides a common set of trading rules so that electricity can be traded freely across Britain and a common set of rules for access to and charging for the transmission network.
- The **Carbon Abatement Technologies strategy** was released in June 2005. This sets out the work programme needed to support the development of sustainable fossil fuel technologies mainly using coal and natural gas. The Strategy recognises that fossil fuels will continue to be a major source of energy for decades to come so that improved combustion efficiency and, later, Carbon Capture and Storage are seen as the key technologies for controlling CO_2 emissions.

This is not the end of the developing process of Government policies and strategy. Among the ongoing work, there is:

- The **UK Climate Change Programme Review** which commenced in September 2004. It is looking at how existing policies to reduce greenhouse gas emissions are performing. The Energy Efficiency Review and the feasibility study looking into a Renewable Transport Fuel Obligation are due to be considered in the context of the Climate Change Programme, and will be published by end-2005.
- The Government's **Strategy for the Promotion of Microgeneration** will be completed by April 2006. The strategy will aim to identify the most appropriate and cost effective ways of promoting small-scale generation of heat and electricity from low carbon sources. The strategy will also look at the issues around Building Regulations and planning policy, technical matters relating to connection to the distribution network, metering and the Low Carbon Buildings Programme.
- The Government is currently gathering evidence on the Phase II (2008-2012) **National Allocation Plan** as part of the UK's participation in the EU Emissions Trading Scheme.

3.6 The International Context

As its names implies, Global Climate Change cannot be solved by the UK working alone. The main policy drivers relate to compliance with the Kyoto Protocols and legislation emanating from the European Union.

3.6.1 Kyoto

The Kyoto Protocol came into force on 16 February 2005 – the first international treaty to set binding emissions reduction targets on developed countries; so far 150 countries have ratified it[9]. The Protocol aims to reduce greenhouse gases by an average of 5.2 percent on 1990 levels by 2008-2012. Under the treaty the UK is committed to an overall 12.5 percent reduction in CO_2 while the Government's domestic goal is a twenty percent cut in CO_2 emissions (from 1990 base levels) by 2010.

The UK government has also stated its intention to push for new emissions limits following on from Kyoto towards 2020, in line with its domestic energy policy.

[9] Russia's ratification of the protocol led to it finally coming into force. Of the major industrialised nations, the USA and Australia have stated that they will not ratify the Agreement. For a full list of signatories to the Agreement and their CO_2 emissions, see www.nef.org.uk/energyadvice/documents/kyoto-sigs.pdf

3.6.2 European Union

The main EU initiatives include:

- the Emissions Trading Scheme and associated National Allocation Plans, which provide limits for large energy users on CO_2 emissions;
- the Energy Performance of Buildings Directive, which will require an energy report to be given at the time any property changes ownership or occupant. This has been implemented in the domestic sector as part of the requirement for new Home Improvement Packs under the Housing Act 2005.
- energy labelling and minimum standards on certain appliances (mainly white goods) being introduced through the Market Transformation Programme.

The European Commission issued a draft energy efficiency Green Paper in summer 2005, setting out its proposed strategy.

3.7 The longer term vision

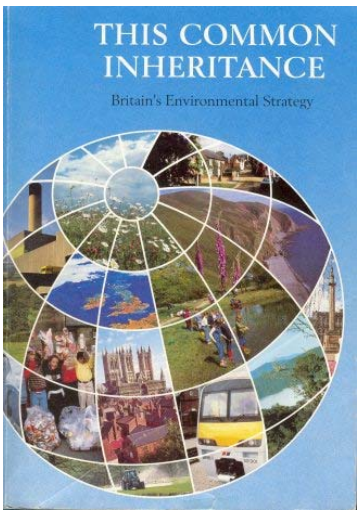
The White Paper looked ahead to 2050 to set the overall context because energy requires very long-term investment. Technological innovation will have an important contribution to make over this period and the White Paper offered an intermediate view for energy systems in 2020.

A possible scenario for the energy system in 2020...

- The energy system in 2020 will be **more diverse** than today. At its heart will be a much greater mix of energy, especially electricity sources and technologies, affecting both the **means of supply** and the **control and management of demand**. For example:
- Much of our energy will be **imported**, either from or through a single European market embracing more than 25 countries.
- The backbone of the electricity system will still be a market-based **grid**, balancing the supply of large power stations. But some of those large power stations will be **offshore marine** plants, including **wave, tidal** and **windfarms**. Generally smaller **onshore windfarms** will also be generating. The **market** will need to be able to handle intermittent generation by using **backup capacity** when weather conditions reduce or cut off these sources.
- There will be much more **local** generation, in part from medium to small local/**community** power plant, fuelled by locally grown **biomass**, from locally generated **waste**, from local **wind sources**, or possibly from local **wave and tidal** generators. These will feed local **distributed networks**, which can **sell excess capacity** into the grid. Plant will also increasingly generate **heat** for local use.
- There will be much more **micro-generation**, for example from **CHP** plant, **fuel cells** in buildings, or **photovoltaics**. This will also generate excess capacity from time to time, which will be sold back into the local distributed network.
- **Energy efficiency** improvements will reduce demand overall, despite **new demand** for electricity for example as homes move to digital television and as computers further penetrate the domestic market. Air conditioning may become more widespread.
- New homes will be designed to need very little energy and will perhaps even achieve zero **carbon emissions**. The existing building stock will increasingly adopt energy efficiency measures. Many buildings will have the capacity at least to **reduce their demand** on the grid, for example by using **solar** heating systems to provide some of their water heating needs, if not to generate electricity to sell back into the local network.
- **Gas** will form a large part of the energy mix as the savings from more efficient boiler technologies are offset by demand for gas for CHP (which in turn displaces electricity demand).
- **Coal fired generation** will either play a smaller part than today in the energy mix or be linked to **CO2 capture and storage** (if that proves technically, environmentally and economically feasible).
- The existing fleet of **nuclear** power stations will almost all have reached the end of their working lives. If new nuclear power plant is needed to help meet the UK's carbon aims, this will be subject to later decision.
- **Fuel cells** will be playing a greater part in the economy, initially in static form in industry or as a means of storing energy, for example to back up intermittent renewables, but increasingly in transport. The **hydrogen** will be generated primarily by non-carbon electricity.
- In **transport**, hybrid (internal combustion) vehicles will be commonplace in the car and light goods sectors, delivering significant efficiency savings. There will be substantial and increasing use of **low carbon biofuels**. Hydrogen will be increasingly fuelling the public service vehicle fleet (for example buses) and utility vehicles. It could also be breaking into the car market.
- **Nuclear fusion** will be at an advanced stage of research and development.
- People generally will be much more aware of the **challenge of climate change** and of the part they can play in **reducing carbon emissions**. Carbon content will increasingly become a commercial differentiator as the cost of carbon is reflected in prices and people choose lower carbon options.

Source: DTI White Paper: Summary - Our Energy Future - Creating a Low Carbon Economy

3.7 Where has UK Energy Policy come from?

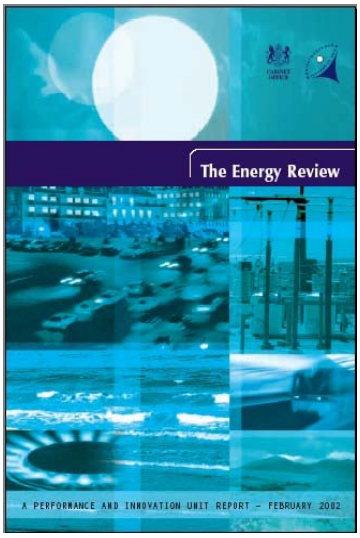


Prior to the publication of the White Paper in early 2003, it was often said that the UK lacked a formal energy policy. Whilst this was true at one level, in practice the Government had been pursuing a generally consistent strategy for over a decade.

Although energy policy had risen to the fore in the 1970s, after the oil price shocks in 1973 and 1979 led to the SAVE IT! campaign, in the 1980s energy had rather taken a back seat until the Government published a White Paper for Britain's Environmental Strategy *Our Common Inheritance* in 1990. Chapter 5 focused for the first time on Global Warming and Annex C explained Energy Efficiency and Renewable Sources of Energy. At much the same time, the Government introduced the Home Energy Efficiency Scheme targeted at low income families and a direct precursor of WarmFront, as a means of alleviating fuel poverty.

In the 1990s the main focus was on privatisation and regulation with the establishment of Ofgas and Offer (later to be merged into the single energy regulator, Ofgem). Coupled with the so-called "dash for gas" (building new, more efficient combined cycle gas turbine power stations) this kept energy prices historically low and allowed Britain to reduce its CO_2 emissions from 1990 levels (as required under the Kyoto protocols) without really trying.

However there were more positive measures, including the Home Energy Conservation Act, 1995. Although initially a private member's bill (Diana Maddock), it was picked up enthusiastically by Government and was the first attempt to shift responsibilities (burden?) of combating climate change onto local authorities. Its main drawback was that although it set requirements for reporting energy efficiency (including an important baseline report for 1995) the targets were relegated to a guidance note and there was no central finance for improvements.



The UK Government had taken an active role in the two main international environmental conferences at Rio in 1992 and Kyoto in 1996. The former led to LA21, creating partnerships between local authorities and residents to try and make global environmental improvements starting at a grass roots level. But it was the latter that placed global climate change and the need to make substantial reductions in carbon emissions on the agenda, with most of the large industrialised nations agreeing targets for CO_2 emissions cuts to be made by the 2008-12 period.

Despite the acceptance of the Kyoto Protocol, there was still no "Energy Policy" as such. The scientific framework necessary was provided by the Royal Commission of Environmental Pollution's (RCEP) 22nd report in 2000: *Energy – The Changing Climate*. This introduced the long-term aim of making 60% CO_2 savings by 2050 and setting a maximum atmospheric CO_2 concentration of 550ppm. It tacitly accepted the concept of "contraction and convergence", whereby industrialised countries emissions should be reduced to a common level with those of developing countries. This was followed by the Treasury's Performance & Innovation Unit Report 2002, which examined the economic case for more sustainable energy systems. At last the building blocks were in place.

4 REGIONAL ENERGY POLICY – YORKSHIRE & HUMBERSIDE

4.1 Regional Energy Policy Statements

As would be expected, the Yorkshire and Humberside Regional Assembly (YHA) has already taken steps to set the region onto a path to achieve, or better, the national targets contained in the White Paper and associated national documents. At the highest level, the vision for the region (*Advancing Together*) recognises the need for the region to advance sustainably which translates, in the Regional Sustainable Development Framework into the need to formulate a regional Climate Change Action Plan that will identify how to reduce CO_2 and other greenhouse gas emissions up to 2020.

The key regional documents that need to be considered by local authorities drawing up an Energy Strategy are:

- Draft Regional Climate Change Action Plan (YHA, 2004)
- Energy and the Regional Spatial Strategy (RSS) (Enviros)
    - Appendices - Energy & the RSS (Enviros)
- Development of a Renewable Energy Assessment & Targets for YH (AEAT July 2002)
    - Annexes - Renewable Energy Assessment & Targets for YH (AEAT July 2002)
- Planning for Renewable Energy Targets in Y&H (AEAT - Dec 2004 – 3 volumes)

4.2 Setting a Baseline: Measuring Energy Consumption Data

Before a local authority can set an energy policy, it needs to know its existing energy demand. Although data covering all fuel sources in not available, Tables 1 and 2 estimate total energy consumption for 2003 within York and North Yorkshire, with a more detailed breakdown for metered electricity and gas consumption by local authority district as reported by Ofgem using the relatively newly available data from Transco. (The data uses Ofgem's revised figures for 2003, and so is in some cases significantly different from that in the AEAT report, which used Ofgem's initial data set.) If broad estimates[10] of delivered fuels (mainly derived from oil or coal) are added to the Ofgem data, this shows total energy consumption of:

Table 1: York & North Yorkshire	GWh	TJ	Tonnes CO_2
Ofgem data:			
Electricity	3,841	13,800	1,650,000
Gas	10,821	39,000	2,050,000
	14,663	52,800	3,700,000
Estimated figures for:			
Fuel Oil/Coal	3,000	10,800	1,000,000
Transport Fuels	8,000	28,800	2,000,000
	25,500	92,400	6,700,000

As the data above relates only to energy delivered through a meter point, renewable electricity generated and used onsite (micro-generation) is not shown. Renewable heat is negligible at present. The Ofgem data is by local authority district; similar estimates could be used for delivered fuels, taking some account of the level of industry and the proportion of properties not connected to the gas main.

The following data shows a break down the Ofgem data by local authority district, and also between domestic and industrial/commercial consumers. The number of consumers is, strictly speaking, the number of distinct meter points, so may slightly underestimate domestic customers by treating Houses in Multiple Occupation as single consumers, yet overestimate the non-domestic numbers,

[10] Estimates are based on transport fuels representing 30% of total demand. Ecotec report regional non-power station sales of coal-derived fuels in Y&H of 3,267GWh in 2003. Ecotec's fuel oil estimates are 13,295GWh for the region (of which 3,359 is domestic heating oil and 9,936 used in industry & commerce). North Yorkshire will have lower than average consumption of heavy fuel oil owing to little heavy industry, but greater than average consumption of kerosene (heating oil). Ecotec's regional transport fuels figure is 39,000GWh: retail sales of road fuels will be slightly above average due to low population densities, but commercial transport below average. Totals are rounded.

where a single site might have a number of distinct meter points. Domestic consumption numbers should be reliable, although non-domestic may be a slight underestimate due to self-generation, for example through CHP. Additional data on CHP is given in Section 4.2.2 below.

Table 2: Ofgem Data on Electricity and Gas supplies to Yorkshire, 2003

	Domestic consumers		Commercial and industrial consumers		All consumers		
	Sales 2003 - GWh	Number of consumers (thousands)	Sales 2003 - GWh	Number of consumers (thousands)	Sales 2003 - GWh	Number of consumers (thousands)	CO_2 emissions (tonnes)
Electric Data							
Craven	124	24.9	138	3.6	262	28.5	114,000
Hambleton	196	37.7	259	5.2	454	42.9	195,000
Harrogate	335	67.8	409	8.0	744	75.8	320,000
Richmondshire	115	21.8	107	3.0	222	24.7	95,000
Ryedale	125	23.3	165	3.9	290	27.2	125,000
Scarborough	252	54.3	316	6.5	568	60.9	244,000
Selby	166	32.7	332	2.9	498	35.6	214,000
York	354	83.3	448	6.9	802	90.1	345,000
TOTAL NORTH YORKSHIRE	**1,667**	**345.7**	**2,174**	**40.0**	**3,841**	**385.7**	**1,652,000**
	Sales 2003 - GWh	Number of consumers (thousands)	Sales 2003 - GWh	Number of consumers (thousands)	Sales 2003 - GWh	Number of consumers (thousands)	CO_2 emissions (tonnes)
Gas Data							
Craven	343	16.14	174	0.47	517	16.61	98,000
Hambleton	581	27.79	334	0.51	915	28.30	174,000
Harrogate	1,269	56.78	716	1.63	1,985	58.41	377,000
Richmondshire	233	10.84	187	0.29	419	11.13	80,000
Ryedale	333	16.48	400	0.37	733	16.86	139,000
Scarborough	745	38.17	619	0.89	1,364	39.06	259,000
Selby	534	26.78	1,445	0.40	1,979	27.18	376,000
York	1,437	73.36	1,471	1.50	2,908	74.86	553,000
TOTAL NORTH YORKSHIRE	**5,476**	**266.34**	**5,346**	**6.06**	**10,821**	**272.40**	**2,056,000**
	Sales 2003 - GWh	Number of consumers (thousands)	Sales 2003 - GWh	Number of consumers (thousands)	Sales 2003 - GWh	Number of consumers (thousands)	CO_2 emissions (tonnes)
Combined gas + electric							
Craven	466	24.9	312	3.6	779	28.5	212,000
Hambleton	777	37.7	593	5.2	1,370	42.9	369,000
Harrogate	1,604	67.8	1,125	8.0	2,729	75.8	697,000
Richmondshire	348	21.8	293	3.0	641	24.7	175,000
Ryedale	459	23.3	565	3.9	1,023	27.2	264,000
Scarborough	997	54.3	935	6.5	1,932	60.9	503,000
Selby	700	32.7	1,777	2.9	2,478	35.6	590,000
York	1,791	83.3	1,920	6.9	3,710	90.1	898,000
TOTAL NORTH YORKSHIRE	**7,142**	**345.70**	**7,520**	**39.95**	**14,663**	**385.7**	**3,708,000**

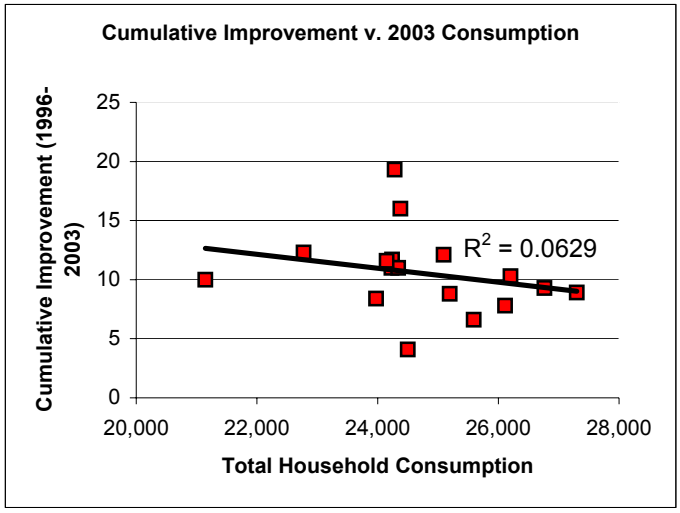
4.2.1 Domestic energy efficiency (HECA Reporting)

The statutory duties imposed on local authorities (in their role as Energy Conservation Authorities - ECAs) are principally in connection with the Home Energy Conservation Act 1995. ECAs must report improvements in energy efficiency against a target set by Defra of 30% over the fifteen year period to 2010. The next table in this section takes the domestic energy data from the preceding table, and shows how York and North Yorkshire councils are performing relative to each other and to the other authorities in the Yorkshire & Humberside Region.

All data of this nature requires a degree of caution in interpretation and use. The Energy Efficiency Advice Centre, which has been responsible for preparing HECA reporting data for most of the North Yorkshire councils, believes that there is a reasonable degree of methodological consistency between those authorities; it may or may not apply between them and others in the region.

However two factors appear to stand out:

- at current rates of activity, the York/North Yorkshire local authorities are most unlikely to meet the Government's 30% improvement target for domestic energy efficiency;
- the same authorities tend to be characterised by above average domestic energy consumption (even before looking at oil , coal and LPG use), and there is a weak correlation between high current consumption and low reported savings since 1996.



Only three Yorkshire authorities are currently reported as being on target to meet their 30% target under HECA (Kirklees, Sheffield and Rotherham). Kirklees has benefited from having an active EU energy agency (KES) developing programmes in its area. KES has begun to roll out some of its projects across the rest of Yorkshire, and there may be opportunities for future collaboration.

Under the Sustainable Energy Act, the Government can require under-performing ECAs to take additional measures to improve domestic energy efficiency, but to date no such orders have been made.

Domestic CHP is not separately measured and as yet installed in only insignificant numbers across the UK. Local authorities should consider encouraging developments with such micro-CHP at the planning stage.

Yorkshire & Humberside: Home Energy Consumption

	Reported Percentage Improvements in Domestic Energy Efficiency				Energy Consumption, 2003 calendar year (kWh)				
(from 1st April 1996 to 31st March each year)	2001	2002	2003	Year on Year 2003/2002	Domestic Electricity kWh	No. of Electric Customers	Domestic Gas kWh	No. of Gas Customers	% Homes with Gas
Barnsley	8.6	9.8	11.7	1.9	3,650	97,460	20,590	77,517	79.5%
Bradford	7.1	8.5	8.8	0.3	4,302	198,972	20,893	176,070	88.5%
Calderdale	6.495	11.2	12.1	0.9	4,372	87,461	20,723	83,998	96.0%
Craven	**4.57**	**7.8**	**10.3**	**2.5**	**4,964**	**24,919**	**21,238**	**16,139**	64.8%
Doncaster	7.49	9.5	11	1.5	3,896	126,312	20,333	118,318	93.7%
East Riding of Yorkshire	0.968	2.1	4.1	2	4,601	142,837	19,903	123,562	86.5%
Hambleton	**8.21**	**7.8**	**7.8**	**0**	**5,198**	**37,657**	**20,915**	**27,790**	73.8%
Harrogate	**2.71**	**3.1**	**8.9**	**5.8**	**4,948**	**67,805**	**22,350**	**56,778**	83.7%
Kingston upon Hull, City of	6.1	8	10	2	3,987	118,977	17,158	89,042	74.8%
Kirklees	*12.57*	*16.8*	*19.3*	2.5	4,228	170,445	20,054	154,136	90.4%
Leeds	5.68	6.9	8.4	1.5	4,403	323,377	19,575	275,868	85.3%
North East Lincolnshire	9.2	10.8	12.3	1.5	4,117	69,598	18,655	64,099	92.1%
North Lincolnshire	8.04	9.7	11	1.3	4,184	68,308	20,159	54,593	79.9%
Richmondshire	**7.6**	**7.6**	**9.3**	**1.7**	**5,291**	**21,755**	**21,474**	**10,841**	49.8%
Rotherham	8.5	*12.5*	*16*	3.5	3,805	108,267	20,573	96,830	89.4%
Ryedale	**0.77**	**1.3**	**6.6**	**5.3**	**5,366**	**23,333**	**20,226**	**16,481**	70.6%
Scarborough	**7.97**	**8.5**	**11.6**	**3.1**	**4,632**	**54,331**	**19,521**	**38,171**	70.3%
Selby	**3.9**	**4.8**	**7.9**	**3.1**	**5,093**	**32,650**	**19,939**	**26,783**	82.0%
Sheffield	*12.75*	*12*	*15.6*	3.6	3,771	229,660	20,398	205,412	89.4%
Wakefield	8.8	8.2	10.7	2.5	4,025	139,758	19,851	127,484	91.2%
York	**4.59**	**6.2**	**9.3**	**3.1**	**4,248**	**83,254**	**19,592**	**73,359**	88.1%
Average (21 authorities)	6.8	8.2	10.6	2.4	4,432	106,054	20,196	91,108	81.9%

Notes: York/North Yorkshire in bold

Assuming linear improvement, those meeting HECA target of 30% savings by 2010 are in italics.

Assessment methods can vary between authorities, and so are not directly comparable.

Although due with Defra on 30 September 2004, data for 31 March 2004 is unlikely to be available before mid 2005.

Source: HECA Savings - Association for the Conservation of Energy, using Defra published data

Domestic gas consumption is per household to which gas is supplied. However, a similar amount of oil may be used at oil c/h homes.

Percentage of homes with gas assumes all domestic premises have one meter point administration number (MPAN).

Source: Per Household energy consumption - DTI NUTS4 dataset

4.2.2 Non-domestic use of energy

Commercial and industrial energy consumption of gas and electricity is revealed by the Ofgem data to be 5.3% above that of domestic consumers in North Yorkshire, with only Selby being significantly below this level. As such it is important that local authorities seek to address the non-domestic sector as well as energy consumed in homes. To date, most local authorities have failed to produce any policies specifically aimed at this sector.

Average electricity consumption per non-domestic consumer is calculated to be 54,350GWh/annum, compared to 77,709GWh/annum nationally (some 30% lower). While this is not unexpected owing to the lack of heavy industry and predominance of small service based industries, such as tourism, it does create an issue for local authorities in seeking to set favourable conditions for cutting energy use. SMEs are generally unreceptive to initiatives designed to cut energy use; they see energy costs as being relatively unimportant and not worthy of much management time. Nonetheless, SMEs can be influenced and the work by the York and North Yorkshire Business Environmental Forum, for example, listed in Section 8 below, is worthy of mention. Local authorities should aim to support these activities, as well as encouraging larger companies to use energy more efficiently through supply chain initiatives.

Local authorities can have a role to play in ensuring that companies are provided with energy efficiency premises, through their enforcement of Building Regulations. Part L2, which like its domestic counterpart is due for revision at the end of 2005, is introducing much stricter standards.

Councils are also substantial property holders themselves, and should seek to lead by example. All public buildings will need to display an energy label under the forthcoming EC Energy Performance of Buildings Directive, and authorities should implement this as soon as technically practicable (approved software to compute the label is still under development).

4.2.2.1 CHP

The UK Government is strongly supportive of CHP, despite a major slowdown in the commissioning of new schemes over the past few years, as higher gas prices have made new investments relatively uneconomic. The Government has committed itself through the **Strategy for Combined Heat and Power to 2010** (April 2004) to a target of sourcing at least 15% of electricity for use on the Government Estate from Good Quality CHP by 2010. Although there are no equivalent targets at a regional or district level, local authorities should continue to consider suitable applications for CHP, especially where they own or operate leisure centres and swimming pools.

The last comprehensive survey by Ofgem identified some 19 operational CHP schemes in York & North Yorkshire with a total installed capacity of 33 MWe, although the AEAT report suggests that there are a number of gaps in the list. Almost 80% of the capacity is in the City of York, where there are some large industrial schemes – councils could seek to include in their LDF measures that would encourage more small or medium scale CHP, including CHP from biomass, as opposed to gas.

Table 4: CHP in York & North Yorkshire – Source: Ofgem (April 2003 data)

Ref No.	Last Survey Year	Company Name	Scheme Location	Type	Commissioning Date	Industrial Sector	Sector	Size	Generating Capacity Kwe	Chp Capacity Kwe	Max Heat Output Kwt	Chp Type	Site Address2	Site Postcode
129	1997	Giggleswick School	Giggleswick School	Chp	01/01/89	Education	Public	Small	90	90	81	I C Engine	Settle	Bd24 0du
660	1993	St George Swallow Hotel	St George Swallow Hotel	Chp	04/06/93	Hotels	Comm	Small	95	95	150	I C Engine	Harrogate	Hg1 2sy
937	1997	The Whitehart Training & Conference Centre	The Whitehart Training & Conference Centre	Chp	01/11/94	Health	Public	Small	38	38	70	I C Engine	Harrogate	Hg2 0nf
897	2000	Harrogate Health Care Nhs Trust	Harrogate District Hospital	Chp	06/04/95	Health	Public	Small	304	304	445	I C Engine	Harrogate	Hg2 7sx
425	1993	Yorkshire Water Services Ltd	Harrogate South Sewage Treatment Works	Chp	01/08/91	Water/ Sewage	Indust.	Small	36	36	65	I C Engine	Spofforth	Hg5 8nd
54	2000	Tadcaster Swimming Pool	Tadcaster Swimming Pool	Chp	04/12/94	Leisure	Comm	Small	56	56	103	I C Engine	Tadcaster	Ls24 9ab
284	1997	Forte (UK) Ltd	Forte Posthouse Selby Fork	Chp	14/04/92	Hotels	Comm	Small	77	77	130	I C Engine	South Milford	Ls25 5lp
789	1997	Forte (UK) Ltd	Forte Posthouse York	Chp	26/05/94	Hotels	Comm	Small	75	75	130	I C Engine	York	Y02 2qf
292	1993	British Sugar Plc	York Sugar Factory	Chp	01/01/73	Food, Drink & Tobacco	Indust.	Large	10000	10000	91000	Heat Recovery Steam Cycle	York	Yo1 1xf

Ref No.	Last Survey Year	Company Name	Scheme Location	Type	Commissioning Date	Industrial Sector	Sector	Size	Generating Capacity Kwe	Chp Capacity Kwe	Max Heat Output Kwt	Chp Type	Site Address2	Site Postcode
155	1997	Bp Energy	Nestle Rowntree	Chp	01/11/94	Food, Drink & Tobacco	Indust.	Large	9600	9600	0	Gas Turbine Simple Cycle	York	Yo1 1xy
928	2000	University Of York	University Of York	Chp	01/02/95	Higher Education	Public	Small	987	987	1485	I C Engine	Heslington	Yo1 5dd
807	1997	Malton Bacon Factory	Malton Bacon Factory	Chp	01/03/90	Food, Drink & Tobacco	Indust.	Large	1000	1000	1346	I C Engine	Norton	Yo17 9hg
402	1997	Scarborough Health Authority	Whitby Hospital	Chp	29/11/89	Health	Public	Small	75	75	130	I C Engine	Spring Hill	Yo21 1dp
899	2000	York Health Services Nhs Trust	York District Hospital	Chp	28/06/95	Health	Public	Small	600	600	445	I C Engine	Yorkshire	Yo3 7he
512	2000	Stockton Hall Hospital	Stockton Hall Hospital	Chp	15/03/93	Health	Public	Small	54	54	97	I C Engine	Stockton On The Forest	Yo3 9un
468	1997	Hambleton District Council	Thirsk Swimming Pool	Chp	11/06/92	Leisure	Comm	Small	38	38	70	I C Engine	Thirsk	Yo7 1lt
184	2000	Rigid Paper Ltd	Rigid Paper Ltd	Chp	01/09/86	Paper And Printing	Indust.	Large	4579	4579	0	Gas Turbine Combined Cycle	Selby	Yo8 8db
78	1997	Haarmann And Reimer	Haarmann And Reimer	Chp	01/11/88	Chemicals	Indust.	Large	5400	5400	2065	Gas Turbine Simple Cycle	York	Yo8 8ef
663	1997	Swallow Hotel York	Swallow Hotel York	Chp	30/06/93	Hotels	Comm	Small	95	95	150	I C Engine	Dringhouse	York
									33199	**33199**	**97962**			

4.3 Renewable Energy

4.3.1 Existing Indicative Targets for 2010 and 2021

The Government Office for Yorkshire and Humber and the Yorkshire and Humber Assembly commissioned a series of studies and reports on the potential for renewable energy production in the Region. These include a study by AEAT in 2002[11] which suggested a target of 674MW renewable energy generating capacity by 2010 producing 2,344GWh/annum with 183MW of this located in North Yorkshire. The regional target for 2021 suggested in the same report is 1,850MW of generating capacity producing 5,597GWh/annum, with no division between local authority districts. These regional targets have been adopted in the Regional Spatial Strategy.

At this stage, AEAT also identified around 11MW of existing renewable energy in York & North Yorkshire (mainly hydro), which added to the 183MW target suggested that there could be a base of 194MW capacity in place by 2010. The 2002 report did not provide a sub-regional split for 2021.

Table 4: RE Electricity targets provided in the AEAT 2002 report by technology

	2010		2021		2010 North Yorkshire
	MW	GWh	MW	GWh	MW
Wind - Onshore	305	796	740	1,927	131.0
Wind - Offshore	160	490	400	1,226	0
Biomass Co-firing	50	288	-	-	0
Biomass Power Stations	129	683	347	1,996	40.0
Biomass CHP	10	58	40	230	5.0
Anaerobic Digestion	1	8	10	85	.5
Hydro	3	9	5	16	2.2
PV	16	12	155	117	2.0
Wave	-	-	153	?	0
Total	**674**	**2,344**	**1,849**	**5,597**	**180.7**

A follow on study by AEAT in 2004[12] re-examined these targets and showed how they could potentially be met in each of the sub regions. The 2004 report also indicated the potential by 2010 was actually higher at 708MW for the region and 209MW for North Yorkshire. The potential by 2021 remained 1,850MW with 361MW located in North Yorkshire, although when split between sub-regions this was rounded down to 350MW. The main technologies identified in the AEAT studies are onshore and offshore wind, biomass including co-firing at the major coal-fired stations, hydro and PV, on the basis that each of these technologies can make a significant contribution to the sub-regional electricity target.

In the 2002 report, 50MW of **co-firing biomass** with coal in conventional power stations was expected in South and West Yorkshire. The 2004 report increased the total and allocated 75MW to North Yorkshire in 2010, by assuming that 1.3% of the maximum capacity from the main coal-fired stations at Eggborough (26MW) and Drax (49MW) would come from co-firing. This co-firing was assumed to absorb most of the regional potential for biomass, so replaced the earlier figures for potential 100% biomass power stations of 45MW, which had provisionally been described by AEAT in 2002 as being one large straw (20MW), one large wood (20MW) and one small biomass CHP (5MW). Our view is that in the light of recent developments, the 2004 analysis is more likely to occur: there will be some co-firing in the large power stations in the South of the county, and it will be too soon for 100% biomass stations to have come on stream. By 2021, AEAT assumed that licences to co-fire will have expired and not been replaced, so that there will be limited additional capacity for biomass power. We agree with this assumption, and will not refer elsewhere to co-firing.

[11] Development of a Renewable Energy Assessment & Targets for YH, AEAT July 2002

[12] Planning for Renewable Energy Targets in Yorkshire and Humber, Final Report Volumes 1 to 3 for Government Office for Yorkshire and Humber, and the Yorkshire and Humber Assembly, AEAT December 2004

Table 5: Breakdown of potential contribution by District for 2010 (MW)

MW	Wind onshore	Biomass	Co-firing	Hydro	PV	Total
Craven	17			0.46	0.12	**17.6**
Hambleton	40				0.17	**40.2**
Harrogate	16			0.9	0.31	**17.2**
Richmondshire	17			0.78	0.12	**17.9**
Ryedale	10				0.11	**10.1**
Scarborough	5				0.24	**5.2**
Selby	14			0.27	0.15	**14.4**
York	10			0.9	0.32	**11.2**
Total	**129**		**75**	**3.32**	**1.5**	**208.9**

Table 6: Potential contribution for 2021 (MW)

MW	Wind onshore	Biomass wood	Biomass other	Hydro	PV	Total
Craven	43	0.7	2.2	0.46	1.5	**47.8**
Hambleton	90	1.1	3.7		2.6	**97.4**
Harrogate	56	2.0	6.4	0.9	4.6	**69.9**
Richmondshire	34	0.7	2.1	0.78	1.5	**39.1**
Ryedale	15	0.6	2.0		1.3	**19.0**
Scarborough	15	1.4	4.5		3.1	**24.0**
Selby	26	0.9	3.0	0.27	2.2	**32.4**
York	15	2.2	7.2	0.9	5.9	**31.3**
Total	**294**	**9.6**	**31.1**	**3.32**	**22.8**	**360.8**

Note the totals for 2010 in the 2004 report are higher than in the 2002 report. In the 2004 report the total installed target for the region is 708 MW. This is slightly higher than the total target of 674 MW derived in the 2002 study and quoted within the Regional Spatial Strategy (RSS). AEAT explain that this increase is due to the higher indicative potentials for wind (both onshore and offshore) and biomass co-firing but partly offset by lower potentials from other biomass-sourced generation.

The AEAT study took into account physical resource (e.g. wind speeds, biomass production, solar energy), planning constraints (like local environmental impacts) and economics. The potential contributions from each District identified by AEAT by 2010 and 2021 are only a small fraction of the actual resource technically available.

It is clear that the main potential in each district comes from wind energy. This is no surprise as wind currently represents the most cost effective large-scale renewable energy option for generating electricity.

During the consultation process in 2005**,** some local authorities expressed concern about the limitations placed on wind power by airfields, both civilian and military in their districts. PPS22 is clear that it is not the responsibility of local authorities to determine which areas may be affected but to rely on developers making their own enquiries and assessments. The full text of the statement in this matter reads "*Regional spatial strategies should not include specific policies relating to the impact of wind turbines on airport operation, radar and aircraft, and neither they nor local development documents should include policies in relation to separation distances from power lines, roads, and railways. It is the responsibility of developers to address any potential impacts, taking account of Civil Aviation Authority, Ministry of Defence and Department for Transport guidance in relation to radar and aviation, and the legislative requirements on separation distances, before planning applications are submitted. Local Planning Authorities should satisfy themselves that such issues have been addressed before considering planning applications.*" Although this may provide some additional constraints on Hambleton, for example, it should not be seen as an insurmountable barrier to wind. With advances in radar, other European countries appear to be capable of safely placing turbines much closer to airfields than has historically been done in the UK, and this is likely to be reflected in UK practice well before 2021.

Biomass could also make a very significant contribution to the sub-regional target if the economics of biomass power generation improve (through technical developments or further Government support), as well as through becoming more price competitive as the cost of fuel oil, in particular, rises. Hydro has limited potential as it is confined to particular locations on the rivers in North Yorkshire and the technical resource is not high. PV and other microgeneration technologies (covered below) have reasonable potential in the long term.

After a more detailed examination of the indicative split of renewable energy by district, and the underlying assumptions, the National Energy Foundation can see no reason for making substantive deviations from those provided by AEAT in their 2004 report.

The AEAT numbers were designed primarily to indicate how the sub-regional targets might be equitably distributed between the various local authority districts, based on capacity, and taking into account National Park and AONB areas. As such they should not be seen as firm targets, but rather as indicators of a likely distribution. In particular, it may be that if commercial developers of wind or other renewable resources decide that they wish to install a renewable energy resource in one district that would enable it to exceed the AEAT indicator, then that district should not be thought to have "achieved its target" and so be absolved from the need to consider further applications of renewable energy.

As a specific example of this, in Summer 2005 it appeared that an application would be made for a large wind farm in Selby District that would exceed the 2010 figure shown (and almost equal the 2021 one). If this were to be approved it would not mean that Selby should not expect to receive further applications for wind; indeed it is likely to show that the economics of wind in the district have perhaps improved due to advances in technology, higher than previously thought wind speeds, or a more positive view on long term electricity prices. Consequently Selby might expect to have a higher wind resource than shown in Tables 5 & 6. However as the figures are only indicative, rather than firm targets, neither Selby nor other local authorities should be expected to adjust their Action Plans or Strategies if a large scale development like this is constructed.

4.3.2 Microgeneration from Renewables

The AEAT report focused on large-scale electricity generation and did not consider microgeneration of either electricity or heat, except for including PV figures[13]. A review of the potential for micro-generation in North Yorkshire was therefore undertaken.

Microgeneration (including heat) technologies can help local communities utilise and develop new skills, creating local investment and employment. Using local energy for local needs, helps safeguard against price rises and empowers local people to take responsibility for the future of their community. Essentially, there are five small renewable energy technologies associated with buildings that will make a contribution to the electricity targets (micro wind and PV – two right columns in tables below) and also to overall CO_2 targets (heating technologies such as solar thermal, Ground Source Heat Pumps and small scale wood heating – three left columns in tables below).

The tables in Technical Annex A detail the number of domestic and non-domestic properties in each District and the proportion on and off the gas grid and an estimate of the new build rates. This is then related to the estimated market penetration of each technology by 2010 and 2021. Owing to the influence of new Building Regulations, penetration of micro-renewables will be significantly in the new build market: from April 2004 all new properties will be able to use the energy contributions from so-called low and zero carbon technologies to reduce the target emissions rate (TER) required to meet the regulations. This is expected to act as a major spur to microgeneration, leading to lower costs and an exponential growth in the uptake of key technologies such as solar water heating and ground source heat pumps. On-site renewables will also be taken up more quickly where there are no gas mains, as the alternative fossil fuels such as oil and LPG tend to be more expensive.

[13] In our review of the AEAT assumptions, we have not found a reason to change the earlier assumptions of installed PV capacity.

By 2010, over half the installed capacity will be in connection with wood heating, with most of the rest attributable to Solar Water Heating and Ground Source Heat Pumps:

Table 8: Capacity MW (domestic and non domestic combined) – 2010

2010	SWH	GSHP	Wood Heat	PV	Micro Wind
	Heat	*Heat*	*Heat*	*Electricity*	*Electricity*
Craven	0.98	0.85	2.58	0.13	0.06
Hambleton	1.37	1.30	3.67	0.18	0.08
Harrogate	2.06	2.23	6.13	0.36	0.16
Richmondshire	0.95	0.78	2.22	0.10	0.04
Ryedale	0.83	0.71	2.12	0.11	0.05
Scarborough	1.88	1.64	4.90	0.25	0.11
Selby	1.07	1.02	2.80	0.14	0.06
York	2.32	2.37	6.47	0.37	0.16
N Yorkshire	**11.25**	**10.48**	**28.76**	**1.55**	**0.66**

In output terms, the useful energy generated will be concentrated even more on the two main renewable heating options:

Table 9: Output GWh (domestic and non domestic combined) – 2010

2010	SWH	GSHP	Wood Heat	PV	Micro Wind
	Heat	*Heat*	*Heat*	*Electricity*	*Electricity*
Craven	0.49	2.13	5.16	0.10	0.15
Hambleton	0.68	3.25	7.35	0.14	0.19
Harrogate	1.03	5.59	12.26	0.27	0.39
Richmondshire	0.48	1.95	4.44	0.08	0.10
Ryedale	0.42	1.77	4.24	0.08	0.12
Scarborough	0.94	4.11	9.81	0.19	0.28
Selby	0.53	2.56	5.60	0.11	0.14
York	1.16	5.92	12.93	0.28	0.38
N Yorkshire	**5.62**	**26.21**	**57.51**	**1.16**	**1.58**

Looking forward to 2021 Solar Water Heating will remain the most widespread technology in terms of simple numbers of installations for the domestic sector, although it is likely to be overtaken by the main space heating technologies in the non-domestic sector. Ground Source Heat Pumps are expected to make the greatest proportionate increase of the main technologies, as their benefits become more widely recognised. Total installed capacity is likely to reach almost 375MW but two-thirds will still be attributable to the two main space heating technologies, although direct electricity generation (PV and wind) may be approaching 10% for the first time.

Table 10: Capacity MW (domestic and non domestic combined) – 2021

2021	SWH	GSHP	Wood Heat	PV	Micro Wind
	Heat	*Heat*	*Heat*	*Electricity*	*Electricity*
Craven	7.03	7.45	15.34	1.81	0.62
Hambleton	10.48	11.11	20.89	2.67	0.91
Harrogate	16.70	18.94	33.33	5.17	1.72
Richmondshire	6.97	6.99	13.89	1.50	0.51
Ryedale	5.94	6.17	12.39	1.52	0.53
Scarborough	13.56	14.27	28.44	3.55	1.24
Selby	8.37	8.74	15.50	2.15	0.74
York	18.47	20.09	34.42	5.45	1.87
N Yorkshire	**86.88**	**91.20**	**163.50**	**22.97**	**7.81**

The greater utilisation of heating systems will however mean that output will remain dominated by the two heating technologies, together providing an estimated 550GWh of useful energy for North Yorkshire.

Table 11: Output GWh (domestic and non domestic combined) – 2021

2021	SWH	GSHP	Wood Heat	PV	Micro Wind
	Heat	*Heat*	*Heat*	*Electricity*	*Electricity*
Craven	3.51	18.62	30.68	1.36	1.39
Hambleton	5.24	27.77	41.78	2.00	1.98
Harrogate	8.35	47.36	66.65	3.88	3.82
Richmondshire	3.49	17.48	27.77	1.13	1.10
Ryedale	2.97	15.44	24.78	1.14	1.17
Scarborough	6.78	35.67	56.87	2.66	2.74
Selby	4.18	21.86	31.00	1.61	1.58
York	9.24	50.21	68.84	4.09	4.08
N Yorkshire	**43.44**	**228.00**	**327.00**	**17.23**	**17.00**

4.3.3 Biomass

The preceding section on micro-generation referred to the provision of heat delivered from wood. This section reviews the potential for local production of biomass to provide sufficient wood-derived fuels, and also looks at the division between National Park/AONB and non-NP areas.

Biomass can come from local or imported sources. Less processed biomass (typically wood chip, sawn logs or other forms of wood) tends to be bulky and so expensive to distribute; it makes most economic sense if there is a local resource. Highly processed biomass (pellets) is more likely to produced from outside North Yorkshire, such as a pellet mill in Co. Durham, or imported from Scandinavia or even China. Obviously, there is a CO_2 element associated with biomass that tends to increase the further it is transported, although this may be justified by the greater controllability of pellet fuel systems.

Table 12: Distribution of existing woodland between National Park, AONB and elsewhere

	Total Woodland Area	Outside NP & AONB	Woodland in National Parks	Woodland in AONB
	ha	ha	ha	ha
Craven	2,886	328	2,558	139
Hambleton	4,554	1,323	3,230	497
Harrogate	3,229	3,229	-	2,360
Richmondshire	1,712	787	925	93
Ryedale	16,511	2,589	13,922	1,440
Scarborough	8,374	120	8,253	-
Selby	1,192	1,192	-	-
City of York	502	502	-	-

An average value for the potential productivity of existing woodland would be around one tonne of wood fuel per annum ($1 Tha^{-1}yr^{-1}$), with a higher figure of $10 Tha^{-1}yr^{-1}$ used for commercial woodlands grown for wood fuel or coppice specifically grown for biomass, as might be planted by 2021. In practice average tonnage may range from:

0	in growing managed forests (with no thinning)
1	in managed woodlands, with thinnings collected for biomass use
ca10	in woodlands managed specifically for biomass production (average figure over three-year rotation for coppice)

From this it is possible to calculate how much biomass power generation capacity or wood heating capacity the existing woodland can supply.

As an example Hambleton has 4,500ha of woodland, which could produce 4,500 tonnes/annum of dry wood - enough to fuel a 1MW power generator. Two thirds of this capacity is in the National Park. Alternatively the same quantity of wood would provide fuel for over 8 MW_{th} of wood heating applications, which compares to 3.67MW_{th} projected for 2010 in Table 9. On this basis the existing woodland could easily provide the necessary fuel for the suggested wood heat potential for 2010. The largest resource is in Ryedale and it would be necessary to "export" some biomass from that district into at least Selby and York. Further development of productive woodland would be required to meet the projections for 2021 including the development of short rotation coppices or the felling of conifer plantations for fuel.

Traditionally, Forest Enterprise's plantations have been grown mainly for feedstock for chipboard, but recent falls in the demand for this product (due to various drivers including increased chipboard supply from Eastern Europe, and lower home demand with a greater use of MDF and, at the top end, "real" wood) had reduced the demand for UK-produced chipboard. This could be diverted to develop the wood chip or pellet for fuel industry.

The wood capacity table has excluded production from designated bioenergy crops, such as short rotation willow coppice. Although there were 1,100ha originally planted for the Arbre project, this is now being trialled for co-firing in Drax, and so is unlikely to be available for smaller scale heat or power applications over the period to 2010. It is unlikely that any additional resource will be planted by 2008, and with a minimum of three years before first harvesting, the contribution from short rotation coppice other than via co-firing will be negligible by 2010. This could be significantly different in 2021, although this may depend on as much on the tax regime and the effects of the Common Agricultural Policy towards set aside land as to local demand for wood fuels.

Annual crops grown for biofuels production (most commonly oilseed rape) will be unlikely to make a significant impact on heat or electricity generation in North Yorkshire prior to 2021. Liquid biofuels are most likely to be cultivated for road transport, which is outside the scope of this guidance, although they could be blended with kerosene (or used straight) as a substitute for domestic heating oil. Just to the North of the county, Petroplus is constructing a large biodiesel conversion plant at Seal Sands on Teesside, but the higher taxation on road fuels means that at present the entire output is expected to be used for road biodiesel.

4.3.4 Geothermal Energy

The AEAT report did not identify a Geothermal energy potential based on either deep aquifers or hot dry rocks. In 1994, the Government commissioned a short report[14] on the potential for capturing energy from geothermal aquifers. This referred to earlier research (1976) that had suggested that there might be a significant resource of low temperature (40°-60°C) aquifers that could be used for space heating, but not for electricity (steam) generation. A number of test 300m deep boreholes were subsequently drilled that identified a Mesozoic basin under East Yorkshire and Lincolnshire that could potentially contain such an aquifer running from Scarborough down to the Wash. This could potentially provide up to 26GWh of low grade heat (suitable, for example for a district heating system in towns along the line of the aquifer), with a minimum cost of 3.5p/kWh$_{th}$ in 1994 prices. However the cost excluded any elements associated with drilling dry boreholes, or ones that failed to tap into a suitable aquifer, or costs of creating new district heating systems. For this reason, it was concluded that as geothermal aquifer systems were likely to cost at least 2.5 times as much per unit of useful heat as competing systems, their development should not be progressed.

Energy from "Hot dry rocks" relies on finding rocks with a temperature in excess of 200°C at an economically accessible depth (typically no more than 3,500m). Water can injected into the rocks and then recaptured as steam, used to drive turbines for electricity generation. According to Institution of Electrical Engineers, in a 2002 report, these conditions are only likely to occur in the UK in Cornwall.

4.3.5 Comparison of Local Contribution and Consumption

The figures for local electricity consumption allow a comparison to be made between the renewable energy targets and the contribution of renewable electricity to consumption in each District. Although this was not taken into account when AEAT calculated the indicative district targets, Table 7 shows that if these indicative targets are met then the region will provide 10% of its own electricity needs from its own renewable energy resources by 2010 (assuming electricity consumption does not increase). Note the potential described in MW (capacity or size of installations) has been converted into GWh (energy, 1 GWh equals 1 Million kWh). At the sub regional level then the contribution is 20% of the electricity coming from local renewable energy resources and in Hambleton it will be as high as 23%. In contrast Scarborough will only be able to source 2% of its electricity from local renewable energy resources. By 2021 Hambleton, Craven and Richmondshire will be generating around half of their own electricity needs from local renewables, and all other Districts will be finding at least 13% of their electricity locally.

[14] Technology Status Report 016 Geothermal Aquifers, ETSU, October 1994

Table 7: Electricity Consumption and Renewable Energy Targets for 2010 and 2021 as percentage of Consumption in each District

District	Electricity consum-ption	RE Potential 2010	Renewable Energy Output	Potential/ Consum-ption	RE Potential 2021	Renewable Energy Output	Potential/ Consum-ption
	GWh/ annum	MW	GWh/ annum	%	MW	GWh/ annum	%
Craven	262	17.6	46	17%	17.6	131	50%
Hambleton	454	40.2	104	23%	40.2	264	58%
Harrogate	744	17.2	45	6%	17.2	200	27%
Richmondshire	222	17.9	47	21%	17.9	108	49%
Ryedale	290	10.1	26	9%	10.1	55	19%
Scarborough	568	5.2	13	2%	5.2	75	13%
Selby	498	14.4	37	7%	14.4	93	19%
York	802	11.2	29	4%	11.2	100	13%
N Yorkshire	**3,841**	**208.9**	**779**	**20%**	**360.8**	**1,027**	**27%**
Yorkshire and Humber Region	22,925	708.0	2,298	10%	1188	4,194	18%

Notes
Assumes that electricity consumption is constant at 2003 levels up to 2010 and 2021

The potential targets for individual Districts in North Yorkshire are above the regional and national average. The sub-regional target itself for 2010 at 20% is double that suggested for the region and nationally which are both 10%. Another way of looking at this is that North Yorkshire is being asked to contribute 779 GWh/annum to the Regional target of 2,298 GWh/annum for 2010. This is 34% of the renewable electricity for the region. This may seem a high percentage for a sub-region containing only 15% of the population of the region. However North Yorkshire covers 55% of the regional land area. As open spaces away from housing are required for wind, the main technology projected to provide the electricity by 2010, then it is understandable that the potential identified is higher in North Yorkshire. By 2021 the proportional contribution from North Yorkshire drops slightly as more off shore resource is predicted.

4.4 The Contribution from National Parks and AONBs

The National Park Authorities (NPAs) have expressed a desire to integrate sustainable development into all of their activities and are seeking opportunities to support demonstration projects and community scale renewable energy projects. The North York Moors NPA have in their local plan a policy to encourage small scale renewable energy electricity generation provided the development is to meet local need. The policy in the new Yorkshire Dales NPA local plan also looks favourably on small scale generation. Small scale is defined in this plan as: "Domestic or commercial power schemes within the capacity of the local environment, without causing lasting damage or eroding the special qualities of the area".

The main contribution the National Parks and AONBs can make towards the targets is likely to be the production of biomass, the installation of hydro schemes where appropriate and the implementation of small scale or buildings related renewables.

Table 13: Land area occupied by the National Parks and the AONBs

District	District Total Area (ha)	NPs - % Coverage	AONBs - % Coverage	NP Area (ha)	AONB Area (ha)
Craven	117,870	68%	6%	80,461	7,518
Hambleton	131,064	17%	3%	21,781	4,506
Harrogate	131,181	0%	45%	34	58,927
Richmondshire	131,836	57%	1%	74,557	1,323
Ryedale	150,830	37%	11%	55,741	15,860
Scarborough	82,402	72%	0%	59,614	-
Selby	60,217	0%	0%	-	-
City of York	27,209	0%	0%	-	-

4.4.1 Wind

The installation of commercial wind farms and large scale biomass plants is likely to be problematic within designated areas such as National Parks and AONBs. The findings of the landscape sensitivity study undertaken by Land Use Consultants[15] conclude that the majority of landscapes within the National Parks and AONBs are of high or medium-high sensitivity to wind energy developments. The implications of these findings are that although these areas may a high technical wind energy resource potential, such development would be inappropriate due to the sensitivity and value placed on these landscapes.

As a result of the constraints for developing large scale wind within designated areas, the opportunity for siting medium or large wind farms for some districts is reduced to less than half their total area (for Craven 74% of the area is National Park or AONB). The figures provided by AEAT in their 2004 study were however just indicators of how the sub-regional targets might be met and only took into account the potential for wind energy development in non-NP areas. PPS22 does not however presume against development in locally designated areas, and local authorities may wish to consider the effect of this in drawing up a local energy action plan or strategy. PPS22 also warns local authorities against creating buffer zones around the edges of nationally designated areas, while recognising the need for care.

4.4.2 Biomass

Section 4.3.3 looked at the production potential of biomass within the county, including the element that might arise from within the National Parks. By 2021 there are likely to be additional areas in NPs/AONBs planted with biomass for fuel use, potentially including coppices and conifer plantations, but oil seed crops (eg rape) and grasses (such as miscanthus) are unlikely to be grown.

4.4.3 Hydro

The contribution of the National Parks and AONBs to the electricity targets is largely confined to the development of hydro projects, where potential sites are located in their areas. A summary of the hydro capacity in National Parks and AONBS is provided in Table 14.

[15] Delivering Sustainable Energy in North Yorkshire, Recommended Planning Guidance (2005)

Table 14: Hydro capacity in National Parks or AONBs by District

	MW		
	NP	AONB	Neither
Craven	0.49	-	0.12
Hambleton	-	0.22	0.90
Harrogate	-	0.29	1.16
Richmondshire	1.71	-	0.23
Ryedale	-	-	-
Scarborough	-	-	0.11
Selby	-	-	0.26
York	-	-	0.90
N Yorkshire	**2.20**	**0.50**	**3.69**

The Hydro capacities above are for 2010 and they are not expected to change significantly by 2021.

4.4.4 Micro-generation potential in National Parks and AONBs

The potential for micro-renewables is directly related to the number of buildings. There will be opportunities for small-scale biomass CHP, micro wind and PV where there are farms or houses, and more generally in centres of population. The same applies to the heating technologies solar thermal, ground source heat pumps and wood heating. The following tables show the proportion of buildings in each district, which is within a National Park. It has been assumed that the number of non-domestic buildings is approximately proportional to the domestic dwellings.

It is assumed that sympathetic building integrated renewable systems should be acceptable to National Park Authorities. A very small number of micro-wind installations have been accounted for, as these are unlikely to be as visually intrusive as TV satellite dishes and should be subject to similar planning controls. Solar water heating and PV panels would normally be integrated into a roof or extend no more than six inches above the plane of the roof. Most wood heat and GSHP installations would be totally invisible from outside the property.

Tables 15 & 16, below, summarise the number and nature of installations of micro-generation installations that would be installed in National Park areas assuming that the penetration of micro-generation technologies is broadly similar to that in non-NP areas.

Table 15a: No of installations in National Parks – 2010

2010	% Buildings in NP	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	19%	71	27	36	7	3
Hambleton	4%	19	8	10	2	1
Richmondshire	19%	70	27	35	7	3
Ryedale	11%	35	13	17	4	2
Scarborough	10%	74	29	38	8	3
Dales		142	53	70	14	6
Moors		128	50	65	14	6

Table 15b: Capacity (MW) in National Parks – 2010

2010	% Buildings in NP	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	19%	0.19	0.16	0.49	0.02	0.01
Hambleton	4%	0.05	0.05	0.13	0.01	0.00
Richmondshire	19%	0.18	0.15	0.42	0.02	0.01
Ryedale	11%	0.09	0.08	0.23	0.01	0.01
Scarborough	10%	0.19	0.17	0.51	0.03	0.01
Dales		0.37	0.31	0.91	0.04	0.02
Moors		0.34	0.29	0.87	0.04	0.02

Table 15c: Output (GWh) in National Parks – 2010

2010	% Buildings in NP	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	19%	0.09	0.41	0.98	0.02	0.03
Hambleton	4%	0.02	0.12	0.26	0.00	0.01
Richmondshire	19%	0.20	1.06	2.33	0.05	0.07
Ryedale	11%	0.05	0.22	0.49	0.01	0.01
Scarborough	10%	0.04	0.18	0.44	0.01	0.01
Dales		0.29	1.47	3.31	0.07	0.10
Moors		0.12	0.51	1.19	0.02	0.03

Table 16a: No of installations in National Parks – 2021

2021	% Buildings in NP	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	19%	521	241	219	117	55
Hambleton	4%	148	71	59	36	17
Richmondshire	19%	1,238	615	470	339	154
Ryedale	11%	303	140	129	64	29
Scarborough	10%	240	110	98	55	26
Dales		1,759	857	689	455	209
Moors		691	321	286	155	72

Table 15b: Capacity (MW) in National Parks – 2021

2021	% Buildings in NP	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	19%	1.34	1.42	2.92	0.34	0.12
Hambleton	4%	0.38	0.40	0.75	0.10	0.03
Richmondshire	19%	3.17	3.60	6.33	0.98	0.33
Ryedale	11%	0.77	0.77	1.53	0.17	0.06
Scarborough	10%	0.61	0.64	1.28	0.16	0.06
Dales		4.51	5.02	9.25	1.33	0.45
Moors		1.76	1.81	3.56	0.42	0.14

Table 15c: Output (GWh) in National Parks – 2021

2021	% Buildings in NP	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	19%	0.67	3.54	5.83	0.26	0.26
Hambleton	4%	0.19	1.00	1.51	0.07	0.07
Richmondshire	19%	1.59	9.00	12.67	0.74	0.73
Ryedale	11%	0.38	1.93	3.06	0.12	0.12
Scarborough	10%	0.31	1.60	2.56	0.12	0.12
Dales		2.26	12.54	18.50	0.99	0.99
Moors		0.88	4.52	7.13	0.31	0.31

Data is not provided in the tables above for AONBs, although the principles remain the same. A broad brush approach assuming the same pro rata penetration across all technologies would give the following as the respective capacities and output for 2010 and 2021 across all technologies:

Table 17: Possible AONB Capacity and Output from Micro-generation in 2010 and 2021

	% in AONB	Dwellings in AONB	Capacity MW 2010	Output GWh 2010	Capacity MW 2021	Output GWh 2021
Craven	2.0%	486	0.1	0.2	0.6	1.1
Hambleton	1.3%	472	0.1	0.2	0.6	1.0
Harrogate	16.1%	10,618	1.8	3.1	12.2	20.9
Richmondshire	0.2%	49	0.0	0.0	0.1	0.1
Ryedale	10.9%	2,481	0.4	0.7	2.9	5.0
N Yorkshire	30.5%	14,107	0.1	0.2	0.6	1.1

4.5 Potential overall CO2 savings from Renewables in North Yorkshire

Bringing together the larger-scale technologies identified in the AEAT report, with the potential for microgeneration (assessed in Technical Annex A), York and the county of North Yorkshire could make a substantial contribution towards reducing the impact of global climate change by reducing CO_2 emissions. A summary of the potential CO_2 savings (in tonnes per annum) that could be achieved by 2010 and 2021 is set out in Tables 18 a and 18b.

Table 18a: Showing the CO_2 savings in t/annum achievable by 2010 for the potential targets identified above

2010	Large Wind	Biomass	Co-firing	Hydro	PV	Micro Wind	SWH	GSHP	Wood Heat
CO_2	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
Craven	19,006	-	-	633	16	20	47	478	911
Hambleton	44,720	-	-	-	23	28	76	769	1,391
Harrogate	17,888	-	-	1,238	46	60	127	1,308	2,503
Richmondshire	19,006	-	-	1,073	15	17	49	493	875
Ryedale	11,180	-	-	-	13	16	39	398	751
Scarborough	5,590	-	-	-	31	38	90	925	1,750
Selby	15,652	-	-	372	19	22	61	619	1,109
York	11,180	-	-	1,238	47	60	136	1,401	2,620
N Yorkshire	**144,222**	**-**	**185,760**	**4,555**	**208**	**257**	**624**	**6,386**	**11,719**

Table 18b: And in 2021…

2021	Large Wind	Biomass wood	Biomass other	Hydro	PV	Micro Wind	SWH	GSHP	Wood Heat
CO_2	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
Craven	48,074	1,734	5,449	633	287	207	626	4,096	4,492
Hambleton	100,620	2,724	9,164	-	433	305	1,016	6,461	7,025
Harrogate	62,608	4,954	15,852	1,252	819	597	1,699	11,336	12,500
Richmondshire	38,012	1,734	5,201	1,073	273	191	653	4,120	4,470
Ryedale	16,770	1,486	4,954	-	237	170	522	3,401	3,726
Scarborough	16,770	3,468	11,146	-	553	397	1,211	7,903	8,661
Selby	29,068	2,229	7,430	372	347	244	819	5,197	5,648
York	16,770	5,449	17,833	1,252	849	613	1,829	12,023	13,201
N Yorkshire	**328,692**	**23,777**	**77,028**	**4,582**	**3,778**	**2,708**	**8,371**	**54,417**	**59,561**

It can be seen that the heating technologies (Solar Thermal (SWH), Ground Source Heat Pump (GSHP) and Wood heat could make significant contributions to CO_2 savings by 2021. Even in the short term Wood Heat and GSHP have the potential to be more important than Hydropower.

It is possible to relate these figures back to the baseline numbers from Table 2. Doing so will understate the percentage of energy coming from renewable sources due to the expected reduction in demand through greater energy efficiency. However this effect will be offset in the more rural districts through the baseline figures just taking into account carbon dioxide emissions associated with electricity and mains gas, and omitting emissions from the use of fuel oil or coal as a heating source.

Table 19: CO_2 savings from Renewable Energy expressed in terms of Baseline emissions

	Baseline emissions	Potential Savings by 2010		Potential Savings by 2010	
CO_2	tonnes	tonnes	%	tonnes	%
Craven	212,000	21,111	10.0	65,598	30.9
Hambleton	369,000	47,007	12.7	127,748	34.6
Harrogate	697,000	23,170	3.3	111,617	16.0
Richmondshire	175,000	21,528	12.3	55,727	31.8
Ryedale	264,000	12,397	4.7	31,266	11.8
Scarborough	503,000	8,424	1.7	50,109	10.0
Selby	590,000	17,854	3.0	51,354	8.7
York	898,000	16,682	1.9	69,819	7.8
N Yorkshire	**3,708,000**	**353,731**	**9.5**	**562,914**	**15.2**

4.5.1 General Comments regarding renewable energy potential

The 2010 target can realistically only be met through the deployment of large wind turbines. Based on the current average turbine size of 2MW, the total number required to meet the target is 65. This could be achieved through an average of one or two wind farms per district, or through a greater number of smaller turbines erected by communities in ones or twos. It may be that this approach, which is common enough in Denmark and has been pioneered in the UK by the Baywind Energy Co-operative[16], will prove more acceptable to communities in areas of higher landscape sensitivity. The number of turbines would have to be nearly doubled by 2021, and achieving the overall renewable energy target will still be highly dependent on wind technology.

Current economics of the technology and Government support (or lack of support) would suggest that there is little scope for electricity generation from biomass by 2010 except through co-firing. The resource for co-firing will come from a range of sources and is not included in the District targets; in practice it will be delivered in the district of Selby.

There are significant quantities of other biomass such as straw, which could be used for power generation, but the viability of this will depend on the demand for (and hence the price of) straw. It is not envisaged that this is a short-term option by 2010 but could be significant by 2021, as indicated by the Biomass Other column in the 2021 assumptions (Table 18).

Micro generation via wind and PV will not make a significant contribution by 2010 but will be more significant by 2021.

Renewable heat technologies could be quickly deployed and in particular wood heat would make good use of the existing woodland resource.

It is anticipated that the National Parks and AONBs' main role will be in raising awareness with opportunities for exemplar renewable energy and energy efficiency projects, which will be accessible to the general public. For example, the two AONBs in North Yorkshire have committed £70,000 to renewable energy demonstration projects in the 2005/6 financial year. However, due to the landscape sensitivity and value of these areas, it is likely that commercial scale electricity generation in the National Parks and the AONBs will be limited, although they should not have significantly lower levels of micro-generation than proportionate across the county as a whole.

[16] Baywind Energy Co-operative was set up as an Industrial and Provident Society in 1996 to ensure community involvement in a series of wind turbines at Harlock Hill, near Barrow-in-Furness, Cumbria. Baywind started with two 500kW turbines, but was later able to acquire the balance on the development, and has since expanded to another Cumbria wind farm, Haverigg II.

5 EXAMPLES OF LOCAL STRATEGIES AND SPECIFIC POLICIES

A number of local authorities have or are in the process of developing energy (or climate change strategies). Yet others have strategies on sustainable energy within their environment strategies. Two of the better known examples are the strategies of Woking Borough Council and the Mayor of London's energy strategy for London, Green Light to Clean Power.

Woking's Climate Change Strategy

The Climate Change Strategy for Woking aims to build on the Council's current environmental success and to take a carbon neutral approach to the future of services and activities within the Borough. The strategy sets out a range of options, which aim to reduce CO_2 equivalent emissions and take further measures to enable the habitats within Woking to adapt to Climate Change.

In 1990 it was estimated that Woking produced 1 million tonnes of CO_2 emissions per year -- the aim is to reduce this output to 200,000 tonnes per year by 2090. This reduction can be implemented in a variety of ways. Some of these are already in place and will be developed further in the future.

A first step towards putting the Strategy into action has been taken with the publication of **guidance on Climate Neutral Development**. The guidance encourages developers to design and build new development, which does not contribute to the causes of climate change, and is resilient to future changes in climate.

Green Light to Clean Power

The Mayor of London wants renewables to make a major contribution to London's future economy and energy supply mix. To that end his energy policy states that London should aim to generate at least 665GWh of electricity and
280GWh of heat, from up to 40,000 renewable energy schemes by 2010.
This would generate enough power for the equivalent of more than
100,000 homes and heat for more than 10,000 homes.

To meet this target, London should aim to install:

- at least 7,000 (or 15MW peak capacity) domestic photovoltaic installations; 250 (or 12MW peak capacity) photovoltaic applications on commercial and public buildings;
- six large wind turbines;
- 500 small wind generators associated with public or private sector buildings;
- 25,000 domestic solar water heating schemes;
- 2,000 solar water heating schemes associated with swimming pools; and
- more anaerobic digestion plants with energy recovery and biomass-fuelled combined heat and power plants.

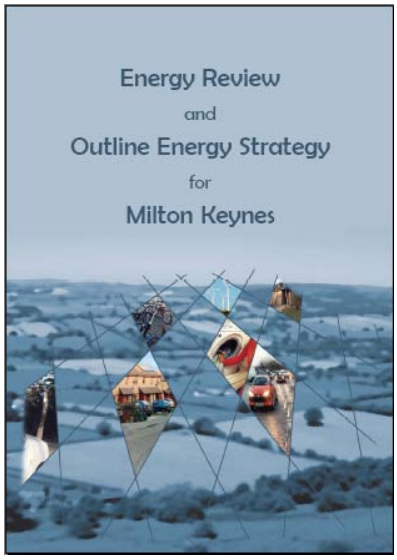
These capacities should then be at least tripled by 2020.

A copy of the strategy can be found at http://www.london.gov.uk/mayor/strategies/energy/index.jsp

The strategy is supported by a comprehensive toolkit for planners, developers and consultants on "*Integrating renewable energy into new developments*".

Following the lead from the London Borough of Merton, **Calderdale Metropolitan Borough Council** has adopted a renewable energy planning policy (EP23A) in the its Revised Deposit Draft for the Replacement UDP which states that, "Major employment, retail and residential developments will be required to incorporate renewable energy generation to provide at least 10% of predicted energy requirements up until 2010, 15% up until 2015 and 20% up until 2020." Although there is some evidence that this may, initially at least, be interpreted flexibly[17], to avoid discouraging developers, it is recognised as a significant step forward in requiring the installation of renewable energy on all new qualifying developments. Further information about this policy approach is contained in the accompanying *Delivering Sustainable Energy in North Yorkshire: Recommended Planning Guidance (2005).*

Milton Keynes has a long reputation for innovation in energy efficiency and the encouragement of small-scale renewables; it hosted the Energy World housing exhibition as far back as 1986 with over 50 low-energy homes, including what was probably Britain's first example of building-integrated PV and an associated small wind turbine.



Its Energy Review and Outline Energy Strategy (2002) provided 17 recommendations, including an intention to adopt a zero Carbon growth target and to investigate the development of a local Carbon Offset Fund. The latter is now being set up through a proposed tariff payment of £200 on all new residential properties being constructed in the new city as part of a much larger S.106 development payment. The level has been set so as to permit the local authority to invest in making carbon savings on older properties (typically built in the 1970s) within the city that offset the residual carbon emissions likely from the newly built properties. Developers may be able to avoid paying this tariff if they can demonstrate that they have achieved net annual zero carbon emissions for their new homes.

Within North Yorkshire, York has included the following General Policy as part of its City of York Local Plan Incorporating the 4th Set Of Changes – Development Control Local Plan (April 2005):

General Policy 5: Renewable Energy

The development of renewable energy will make a vital contribution to the reduction of carbon dioxide emissions, facilitating the delivery of the Government's commitment on climate change.
Proposals for the development of renewable energy facilities will therefore be encouraged provided there is no significant adverse effect on the existing landscape, air quality, biodiversity,) water resources, agricultural land (defined as grades 1, 2 or 3a) or sites of archaeological or historic importance.

2.20 Renewable energy sources, such as wind power or solar energy, offer the possibility of increasing diversity and security of supply, and of reducing harmful emissions to the environment from non-renewable sources.

2.21 In assessing applications for renewable energy facilities the potential impact of the proposal on the local environment will be balanced against the wider contribution to reducing emissions of greenhouse gases (and also improving air quality) in the City of York. Proposals within the City of York Green Belt would have to demonstrate (in line with policy GB1) very special circumstances why they should be located there as opposed to elsewhere in the City.

[17] One of the first proposals to come before Merton offered the planners a choice of reducing CO_2 emissions by 20% through first cutting energy consumption by an additional 10% through enhanced energy efficiency, then adding 7% renewables, or by using PV to cut emissions by just 10% for the same capital cost. The planning committee opted for the former, preferring greater CO_2 savings over a rigid interpretation of the new policy.

6 PLANNING GUIDANCE

Guidance on how local planning authorities can encourage the appropriate development of sustainable energy schemes through the effective use of the planning system is set out in the accompanying document *Delivering Sustainable Energy in North Yorkshire, Recommended Planning Guidance* (2005). This section seeks to compliment that Guidance by providing further information on how local authorities can encourage the uptake of energy efficiency measures. At the level of planning, local authorities have limited ability to specify enhanced levels of energy efficiency, although they do have influence, for example through the use of recommendations or guidelines.

Energy efficiency can be measured in terms of designed energy consumption (usually in kWh/m^2) or by reference to an energy rating or label (usually the Government's Standard Assessment Procedure (SAP)[18] for dwellings. For some purposes, carbon dioxide (CO_2) emissions are preferred, again measured in terms of kgCO_2/m^2 or as a Carbon Index in line with Building Regulations.

6.1 Domestic dwellings

Although there is no legal right to insist on a minimum SAP, authorities can issue recommendations or guidelines. (In limited circumstances, on a site where they own the land, authorities may be able to impose levels).

Guidelines will usually be drawn up in terms of one of two measures:

- the Building Research Establishment's EcoHomes, or
- the SAP or the National Home Energy Rating (NHER[19]) which includes additional factors such as orientation, exposure and lighting.

6.1.1 Setting guidelines using EcoHomes

An appropriate level may be to require EcoHomes levels or "very good" or "excellent", or SAP levels in excess of (say) 85. EcoHomes' energy component is worth up to a maximum of 20 credits out of a total of 92 credits. 10 credits are based on the SAP calculation of CO_2 emissions with minor adjustments, principally for low-energy lighting, CHP, air-conditioning and the use of renewable energy (see table). A further 10 credits take into account building fabric (up to 5 credits requiring U-values better than building regulations), drying space (1 credit), the use of "A" rated appliances (2 credits) and low-energy external lighting (2 credits).

[18] The Standard Assessment Procedure (SAP) was first introduced in 1992, and has since been through two scale revisions. This document is based on SAP 2001, in use since 1 April 2002, which rates homes on a scale from 1 to 120: a level of 80 is broadly in line with current building regulations. SAP2005, which is due to be introduced within the next year, will revert to a 1-100 scale, although most properties with a SAP below 80 will suffer only minor changes in their SAP value. Based on the latest draft (v9.80 of 20 June 2005), the SAP framework will also include a Domestic CO_2 Emission Rate (DER) equal to the annual CO_2 emissions per unit floor area for space heating, water heating, ventilation and lighting, less the emissions saved by energy generation technologies, expressed in kg/m^2/year.
For compliance with Part L of Building Regulations, the Energy Rating Method which used SAP was replaced by a Carbon Index Method in the 2002 approved documents. However, SAP Ratings must continue to be notified to building control bodies and posted as notices in new dwellings.

[19] The NHER runs on a scale from 0 to 10 and is operated by National Energy Services Ltd. NHER is a super-set of the SAP, including additional factors. House type approval is possible with SAP but not with NHER, which more accurately reflects the running costs of a dwelling. English Partnerships specifies use of NHER in New Towns such as Milton Keynes to impose high standards of energy efficiency on new homes.

Several of the other EcoHomes elements have an indirect bearing on energy consumption. There are 8 credits relating to transport, including two connected with the provision of public transport within walking distance, and this is an area where the County Council can have a direct influence. There is also a single credit for the provision of either 10% or heating/hot water or 10% of non-heating electrical load from building integrated renewable energy.

EcoHomes credits	CO_2 emissions ($kg/m^2/yr$)
1	≤ 60
2	≤ 50
3	≤ 45
4	≤ 35
5	≤ 30
6	≤ 27
7	≤ 25
8	≤ 20
9	≤ 10
10	≤ 0

Subject to BRE copyright, there is no reason why guidance could not be drawn up in terms of energy (or other) credits within EcoHomes.

EcoHomes notes, correctly, that it is easier to gain credits for homes that are heated by mains gas than by other fuels, given that natural gas (methane) has a relatively low delivered carbon content. This may need to be considered with different guideline levels for homes that are off the grid. Ground Source Heat Pumps are one electric technology that can generally achieve carbon dioxide emissions broadly in line with those from homes using an energy efficient gas boiler system. EcoHomes may be applied to both new and existing homes undertaking a major refurbishment.

6.1.2 Setting Guidelines using SAP/NHER

These two energy labels both calculate an energy cost index[20] (based on running costs per square metre per annum) to produce a scale independent of a dwelling size. However, rough estimates can be produced of the likely reduction in energy costs per property based on a specific increase of a home's energy rating (either at the construction stage or as a result of incremental improvements to an existing home).

In particular, the SAP is used as the basis for estimating improvements for energy savings under the Home Energy Conservation Act (HECA) – see the section on statutory duties, as well as for use in building regulations. SAP 2005 will run on a scale from 1-100, where the rating improves as homes become more energy efficient.

The National Home Energy Rating was the first UK energy label based on the Building Research Establishment's Domestic Energy Model (BREDEM) which also underlies SAP. Unlike the SAP, the NHER includes locational factors (including overshading and orientation), as well as some allowance for low-energy appliances. As it is a more accurate predictor of total household energy running costs, it is preferred by some to measure the risk of fuel poverty, through its inbuilt Affordable Warmth Index.

English Partnerships, which use a combination of the NHER and EcoHomes to set standards on developments on land controlled by them, estimate that savings of up to 30% above current building regulations levels can be achieved at an acceptable additional cost to developers (see box).

6.2 Non-domestic buildings

6.2.1 BREEAM

The Building Research Establishment provide an Environmental Assessment Method (BREEAM) equivalent to EcoHomes for use in offices, industrial units, retail units and schools. Essentially each version of BREEAM awards credits to a development based on the environmental impact in 8 areas: management, energy use, health and well-being, pollution, transport, land use, ecology, materials and

[20] The SAP is undergoing a revision to provide a revised scale from 1-100 (previously 120), and will cease to be directly linked to running costs, but have a greater correlation with CO_2 emissions under standard occupancy assumptions. Although homes with a SAP below 60 will see little change in their rating, homes towards the top of the old scale, including those promoted under the SAP>80 campaign, will see a substantial reduction in their rating.
The NHER scale will be extended above 10 to permit homes with very low or zero running costs to be properly reported; above NHER=20 a home will have negative running costs (ie. energy sales in excess of use).

water. As with EcoHomes, the assessment is then rated on a scale of pass, good, very good or excellent. The energy factors vary according to the type of property or business being assessed.

In addition, local authorities can set their own local reward schemes, such as that introduced by Woking Borough Council to recognise any developments that incorporate features that contribute to their long-term aim of sustainable development, including reducing CO_2 equivalent emissions and mitigating against climate change.

Setting Energy & Environmental Standards – the Approach of English Partnerships

English Partnerships is the national regeneration agency, helping the Government to support high quality sustainable growth in England.

English Partnerships has adopted a wide-ranging set of environmental standards for all new homes, retail, office and industrial buildings constructed on its land. The standards could cut carbon emissions generated by new homes by up to 30 per cent and reduce water use by up to 40 per cent while contributing to a sustainable future and a higher quality of life. For occupiers, the implementation of the standards will lead to lower utility bills, as well as more pleasant surroundings.

All development briefs prepared by English Partnerships set environmental standards to be achieved as follows:

Building Type	Rating Scheme	Standard
Residential	EcoHomes/ NHER	Very Good/ 9.0
Offices	BREEAM for Offices	Very Good
Industrial	BREEAM 5/93	Very Good
Retail	BREEAM Retail	Very Good

Currently there are a number of landmark or exemplar schemes in progress which have adopted higher standards. These include the Millennium Communities, Broughton Atterbury, Central Milton Keynes, Omega and Lightmoor which will all achieve BREEAM "Excellent" and NHER 10.0.
All schemes in Milton Keynes achieve NHER 10.0. The Millennium Communities also achieve other, higher, specific environmental and construction targets.

6.2.2 Energy Standards and Carbon Performance Ratings

An alternative approach is to set energy standards with reference to published best practice levels, for example using figures recommended by CIBSE or the Energy Efficiency Best Practice Programme.

Table 20: Typical and Good Practice Energy Consumption in UK Offices

	Cellular		Open Plan		A/C, standard		A/C, prestige	
	Good	Typical	Good	Typical	Good	Typical	Good	Typical
Heating & Hot Water	79	151	79	151	97	178	107	201
Cooling, fans & humidification	2	6	5	10	52	109	69	131
Lighting	14	23	22	38	27	54	29	60
Office Equipment	12	18	20	27	23	31	23	32
Other, including catering	5	7	7	10	26	32	120	144
Total	112	205	133	236	225	404	348	568

Table 20 shows annual energy consumption in per kWh per square metre, as indicated by Defra and based on 2000 data. The first two pairs of columns are for naturally ventilated offices; the Association of the Conservation of Energy estimate that only 25% of newly built offices are now naturally ventilated, compared with 70% in 1970[21].

However in terms of setting targets or guidelines to developers, including those redeveloping offices, the good practice figures should be seen as that, and not as being very best practice: for example total energy consumption in the 430m^2 National Energy Centre North Building was estimated at approximately 57kWh/m^2 in its first full year of operation. This office, which was opened in 2004, is a naturally ventilated open plan office using a ground source heat pump as its principal heating source.

At present, it is still a common complaint that there are few widely available and cost-effective tools for estimating energy consumption of non-domestic buildings at the design stage. Building Regulations (part L2) are generally met through elemental values, although whole building methods are approved for offices, schools and hospitals. The offices method involves calculating a Carbon Performance Rating (CPR), and providing this is below a threshold equivalent to typical practice in ECON19 (the document from which the above table data is extracted), the building can be deemed to meet the regulations. Guidelines or targets can be drawn up to require better CPRs than the minima specified (currently 6.5 for naturally ventilated or 10.3 for air-conditioned buildings) – for example by demanding a CPR of 5.0 for any office, irrespective of its ventilation strategy.

The forthcoming introduction of the EU Energy Performance of Buildings Directive will at least require non-domestic properties in excess of 1,000m^2 and those that are publicly accessible to undergo periodic energy assessment.

6.2.3 Advice for Developers

As well as providing guidelines in terms of energy, environmental or carbon performance indices, local authorities can provide support through offering general advice and guidance to developers about ways of constructing properties that will achieve higher ratings. This advice could be offered directly or through intermediaries, such as the York & North Yorkshire Energy Efficiency Advice Centre.

Among the topics that could be offered to developers is advice on:

- orientation, so that living spaces in dwellings generally face to within 45° of South, but that care is taken in non-domestic applications to avoid creating a cooling demand;
- planting shelter belts (and laying out developments to create shelter between buildings), but taking care to avoid trees potentially over-shading the location of solar collectors (current or future);
- making maximum use is made of natural daylight, through layout and – where necessary – light shelves or sun pipes;
- including private drying space (e.g. rotary clothes lines) for dwellings;
- providing cycle racks and showers in new commercial developments;
- the use of lighting control systems and building energy management systems (BEMS) for non-domestic applications;
- ensuring that developers consider cost-effective ways of exceeding minimum standards for insulation, glazing performance and heating systems, and do not ignore less common technologies such as ground source heat pumps (GSHPs) and micro-CHP.

[21] Energy Efficiency in Offices: Assessing the Situation, ACE, for the Carbon Trust, 2003.

6.3 Energy saving effects

Domestic savings from increasing energy efficiency in new properties will be modest in any given year. The table shown here assumes that average SAPs were to be increased from 81 to 91, for homes with an average floor area of 85m2. Under standard occupancy patterns, the higher rated homes would on average use around 3,000kWh less energy per annum, principally in the heating fuel. (SAP does not take into account energy use by lights or appliances; additional electrical saving could be encouraged by setting standards based on EcoHomes or NHER).

These are very broad-brush assumptions but should at least indicate the order of magnitude of savings achievable compared to building homes meeting the minimum standards under building regulations. However, these savings are still worthwhile as they could probably be achieved at a cost of under £500 per home, and would continue to generate savings for the next 100 years.

Table 21	Est. newbuild by 2010	Annual Savings (GWh)
Craven	1,138	3.4
Hambleton	1,950	5.9
Harrogate	3,413	10.2
Richmondshire	1,138	3.4
Ryedale	975	2.9
Scarborough	2,275	6.8
Selby	1,625	4.9
York	3,738	11.2
	16,252	48.8

Extension of this table to 2020 is highly speculative, as it would assume that local planners can continue to encourage significant savings above national building regulations. As there has been a major improvement in national standards since 1990, the law of diminishing returns will inevitably set in, and it is unlikely that absolute savings as high as 3,000kWh/yr against national standards will be possible in future. Indeed, savings are more likely to come in the area of small-scale integrated renewables, considered elsewhere in this report. For this reason, it is assumed that savings of no more than 1,000kWh per home per annum can be achieved for the 2010-2020 period, and based an anticipated build figure of 43,750 homes, gross annual savings would be unlikely to exceed 40GWh/yr from this source.

Energy savings in industry and commerce are, if anything, even more difficult to estimate, but would generally be restricted to heating, cooling and lighting. Assuming that there is a 2.5% increase in floor area by 2010 and that 30% on non-domestic energy use is broadly building-related, and that 5% savings against minimum national standards could be achieved, this would only result in annual savings of around 3GWh/yr[22]. Similar percentage savings should be achievable over the next decade (as there is more incremental improvement possible than in the domestic sector), adding perhaps a further 7.5GWh/yr of savings.

[22] Current total annual non domestic consumption (Ofgem figures) for gas + electricity is 7,520GWh. Oil or LPG use will be significant, but has been excluded as these figures are very broad brush at best. The 2020 figure assumes a 6% increase in floor area over the second decade.

7 PARTNERSHIPS

In helping to establish partnerships with third parties, the first priority must be to ensure an effective partnership between the local authorities and county council. Many of these links are already in place, with the active support of the Local Authority Support Programme through the York & North Yorkshire EEAC.

7.1.1 Local Strategic Partnerships

Local Strategic Partnerships (LSPs) are non-statutory, multi-agency bodies, matching local authority boundaries, which aim to bring together at a local level the different parts of the public, private, community and voluntary sectors. ODPM established LSPs to tackle deep seated, multi-faceted problems (notably a lack of progress in delivering sustainable economic, social and physical regeneration), requiring a range of responses from different bodies. Local partners working through a LSP will be expected to take many of the major decisions about priorities for their local area.

Initially implemented in areas of deprivation, LSPs are being rolled out across all English local authorities. The partnerships are expected to draw up a community strategy or plan, which will feed into the Local Development Framework (LDF) that has superseded the former Local Plans. A complication remains in that the National Park areas prepare their own LDF although they are part of the District's LSP.

LSPs, including task-oriented subgroups of the full partnership committee, will thus have an important role to play in determining the energy strategy for a district, and – in particular – the appropriate level of renewable energy. Within North Yorkshire, the status and achievements to date of LSPs appears somewhat mixed. Most LSPs follow Government guidelines in establishing the framework for more localised policies, so will include a "Safe and Healthy" environment and "Sustainability" are two of their aims. In Craven, for example, these form two of five aims. Ryedale's Community Plan "Imagine Ryedale" runs to six topics and within the Sustainability head identifies 11 key sustainability areas, including *Protecting Landscape and Character*, *Climate Change*, and *Maximising energy, water efficiency and minimising of waste*. Richmondshire's "Safe and Healthy" priority area includes an action for a minimum SAP of 65 on all council-owned homes to reduce the risk of fuel poverty.

At this stage of development (summer 2005) it is hard to generalise about the direction of the plans & strategies being produced by LSPs. There seems to be a tendency for more urban areas (such as York) to focus on renewable energy, with more rural districts (where renewables may have a greater part to play) to focus more on improving energy efficiency, especially in public buildings or housing stock.

Local Strategic Partnerships must play a key role in developing any Energy Strategy or Action Plan. They have Government support and authority to shape all components of local plans and should bring in a broad base of local community interests, including business. In practice, this may need some guidance from the local authority itself, and is likely to work best where the LSP has established topic-based committees. For example, in Milton Keynes, the LSP has established an Environment Committee which has in turn set up limited life topic groups, including one looking into the possibility of a zero-carbon strategy for new developments.

7.2 Creating Energy-Focused Partnerships

LSPs are mainly about policy and creating a framework for action, not undertaking the actions themselves. The next stage is to seek to create expanded partnerships to include key players from the public and private sectors, as well as community and special interest groups. The example below from Cornwall indicates the range of likely sectors; any effective partnership will then of necessity need to develop smaller, more-focussed working groups.

Partnership Example: Cornwall Sustainable Energy Partnership

The Cornwall Sustainable Energy Partnership (CSEP) was created in November 2001 to form a partnership combining the expertise and knowledge of organisations within the public, private, health and community sectors. It now has a membership of over 50 organisations and aims to actively integrate sustainable energy into countywide strategies by:

- Encouraging the inclusion of sustainable initiatives into existing partnerships and programmes
- Promoting the development of new sustainable energy programmes
- Prioritising activities that explicitly address climate change and fuel poverty issues.

The Partnership is overseen by a strategic steering group, which comprises of Chief Executive / Director level representatives from each of the following sectors:

- Local Authorities
- Education
- Business
- Community
- Health
- Housing
- Energy Efficiency
- Renewables
- Environment

The steering group agree the work of the four main task groups of the partnership, each of which meet on a quarterly basis, but each task group also has working parties that meet more regularly to take forward specific projects and which are establishing targets for 2010, in line with Kyoto.

CSEP has also been actively involved in influencing national policy, especially through its pioneering work with local health authorities through its Home Health programme, which seeks to alleviate cold-related ailments including respiratory diseases by tackling fuel poverty at source. It has used this to create a Fuel Poverty Tool Kit for Primary Care Trusts. CSEP has also placed high priority on promoting greater engagement with the Tourism Industry. For example, this is working on schemes that allow tourists to not use their cars for a day whilst on holiday.

The Cornwall Sustainable Energy Partnership is an initiative of the Cornwall Local Authority Support Programme, which is funded by the Energy Saving Trust and Community Energy Plus.

7.2.1 Engaging Local Business

Partnerships with local businesses are of great importance and should build – where possible – on existing networks. The box above shows some of the initiatives being undertaken through the York and North Yorkshire Business Environmental Forum, but effective partnerships can, and should, be established with more general groups, including Chambers of Commerce and Tourism sector groups. Energy efficiency has a particular role to play in the National Parks and AONBs, where certain renewable energy solutions may be impracticable, so it is important to bring local business in at this level.

Projects through the York and North Yorkshire Business Environmental Forum

The York and North Yorkshire Business Environmental Forum delivers a number of projects across the county. These include:

- York Green Business Club
- Green Business Support Organisation (GBSO) Project
- Rural Action Project
- Supporting Businesses Implement Environmental Technologies Project

York Green Business Club
Businesses in the City of York can join the 'York Green Business Club' to learn how they can adopt environmental friendly business practices and save money. The club runs regular seminars offering practical advice on how to take action and topics include energy efficiency and transport.

Green Business Support Organisation (GBSO)

In York and North Yorkshire, the Business Environmental Forum, in conjunction with Business Link, is assisting 70 businesses mainly in urban areas or industrial estates such as that at Sherburn-in-Elmet as part of a wider Green Business Support Organisation (GBSO) project offering free environmental consultancy support and an initial environmental audit in conjunction with Envirowise.

Rural Action Project
Businesses that were not eligible for the GBSO project in rural upland and coastal areas of North Yorkshire can take part in the Rural Action project. This also enables businesses to receive free environmental consultancy support and professional advice about energy efficient cost saving measures and has assisted 30 firms. The project was funded by the European Union and Yorkshire Forward. It is managed by Business in the Community and delivered by YNYBEF.

Both the GBSO and Rural Action Projects are now closed to new participants.

Supporting Businesses Implement Environmental Technologies Project
Since 1st April 2005, the Business Environmental Forum has been delivering a new project that works with businesses to identify energy efficient improvements and install energy efficient technologies. Support will be given through a cash grant of up to £1,500 of which the business must match equally. The project will allow businesses to turn advice into action and benefit in the long term, with lower operating costs and a reduction in their carbon emissions.

An energy audit will be carried out in each participating business highlighting areas where energy consumption can be reduced. This will form an action plan for the business to implement improvements and will identify suitable installations, such as boiler replacements, lighting and heating improvements, insulation, and water reduction controls. Businesses will also receive help on waste reduction and staff training.

The York and North Yorkshire Business Environmental Forum is working in conjunction with the Energy Partnership (York Energy Efficiency Advice Centre) to assess businesses for the cash grant. It can only help businesses that are based in rural, upland and coastal (Objective 2) areas of North Yorkshire.

7.2.2 *Action-based Partnerships*

Partnerships can also be formed with third-party organisations to undertake specific actions in promoting energy efficiency and renewable energy.

For example, the **National Energy Foundation** (NEF) (a registered charity) is, through its ***Energy for Good*** Scheme, offering practical help to Councils and residents on installing renewable energy technologies in their homes. For a modest fee NEF works with local authorities to:-

- promote Renewable Energy to the public such as solar systems and the use of wood as a fuel
- offer accurate information about renewable energy systems
- offer a quality and value guarantee for installations
- help people get grants towards installations

NEF uses its expertise to vet installers to ensure good quality workmanship, so that installations are reliable and are offered at good value for money prices. The types of installations offered include:-

- Solar Water Heating
- Wood Heating Systems
- Ground Source Heat Pumps
- Wind Turbines
- Electric Solar Panels

For further information contact Saffron Myhill Hunt at NEF on 01908 665555 or e-mail: saffron.myhillhunt@nef.org.uk

Within West Yorkshire, **Kirklees Energy Services** (KES) has run a number of partnership-based projects. These include:

- ***ZEN: Zero Energy Neighbourhood*** – an EC-supported programme focusing on small-scale renewables including PV, small hydro and wood heating;
- ***WYSE: West Yorkshire Saving Energy*** – discounted prices for insulation and cashbacks for certain high efficiency boilers;
- ***West Yorkshire Affordable Warmth & Hard To Treat Homes*** – related schemes for tenants and low-income homeowners providing insulation measures and heating sources for those off the gas main;
- ***Simply Solar***: - an initiative funded by Kirklees and Calderdale Councils, set up to provide discounted solar hot water systems to householders using accredited installers.

The **Energy Partnership**, run by the York & North Yorkshire Energy Efficiency Advice Centre runs a number of schemes in its area, described in more detail in Section 8.5 below.

Local authorities can also help facilitate community-based energy developments, along the lines of the **Baywind** co-operative, referred to in section 4.5.1 above. However they should be careful not to be partisan in support of a particular group that may subsequently be approaching another department of the council seeking planning permission.

8 THE ROLE OF LOCAL AUTHORITIES IN PROMOTING SUSTAINABLE ENERGY

In section 1.1.1 of this document, the energy hierarchy to prioritise necessary actions was cited as:

1. **Use less energy by avoiding waste (*Be Mean*)**
2. **Use energy efficiently (*Be Lean*)**
3. **Use energy generated from renewable resources (*Be Green*)**
4. **Use any remaining energy required from the least polluting sources of fossil fuels (*Be Clean*)**

After a brief consideration of the first element, this section will look in parallel at the middle two actions where a local authority has the greatest ability to influence its residents and, through developers, new construction in its area.

8.1 Energy Conservation: avoiding waste of energy

There is some overlap between the first two elements: energy conservation through avoiding waste naturally leads to energy efficiency. However "pure" energy conservation is as much about making lifestyle choices, and following simple housekeeping advice.

Lifestyle changes are often about transport, for example by encouraging residents to walk or take the bus, rather than automatically jumping into a car. However even at this level local and county authorities can have an important role to play, for example through provision of dedicated cycle routes and secure cycle parking, and ensuring that bus operators provide services to outlying villages that permit commuting to nearby towns. It can be argued that the National Park authorities also have a role by facilitating domestic tourism (including so-called eco-tourism), which might be substituted for trips overseas involving long flights.

But lifestyle can also be about seemingly minor habits, where simply rethinking everyday actions can cumulatively have a significant impact on total energy consumption:

Ten top tips for zero-cost energy conservation actions at home

- Don't leave TVs or videos on standby.
- Switch off lights when rooms are not being used.
- Check central heating and hot water thermostats are set correctly, and timers are programmed to meet occupants' needs.
- Don't overfill baths – or even share them with a friend!
- Keep furniture away from radiators.
- Choose the right pan size for the food and the cooker, using lids on pans.
- Defrost fridges and freezers regularly, ensuring that freezers are well packed.
- Use full loads on washing machines (and dishwashers) and use the lower temperature washes with modern detergents.
- Make use of the sun by opening internal doors of South-facing rooms in winter to let the warm air travel between rooms.
- Dry clothes outside on bright or windy days.

Source: www.nef.org.uk

8.2 Promoting the better use of energy

Local authorities have a key role in promoting and co-ordinating the reduced use of energy and the generation of renewable energy. Ways in which this can be done include:

- promotional campaigns;
- taking on an educational role (for schools and the general public);
- supporting other local players, including the York and North Yorkshire Energy Efficiency Advice Centre, the Yorkshire Renewable Energy Network, the Alternative Energy Centre (in West Yorkshire) and LA21 groups;
- signposting consumers towards grant and other support schemes;
- setting local planning guidance to encourage a fully integrated approach to energy efficiency and renewable energy in new developments (both residential and commercial);
- Developing energy/climate change/environment strategies that promote the use of sustainable energy.
- acting as an exemplar, identifying their own achievements;
- encouraging their supply chain to take advantage of energy saving opportunities and to develop energy policies themselves;
- creating partnerships with local communities, housing associations, interest groups, the local media, schools, colleges and businesses to forge a common purpose in moving towards more sustainable energy;
- through statutory duties, including collecting data under the Home Energy Conservation Act to underpin other activities, and through the councils' Local Strategic Partnerships.

The County Council also has the capacity through its education and library services to address the important constituencies of young people and the general public about the need for and ways of achieving more sustainable energy. This work can itself be carried out in partnership with key other local players (including local authorities, the Energy Efficiency Advice Centre and community-based groups).

8.3 Promotional Campaigns

One of the most high profile energy efficiency campaigns in England in recent years has been "Planet York" (see box), which was funded with the support of the Energy Saving Trust in 2001-2 and officially ran for twelve months. This campaign aimed to capitalise on residents' recent experience of flooding in York to draw together strands of energy awareness with the effects of climate change, in a way that would act as a call to action.

EST undertook independent awareness surveys at the beginning and end of the campaign and also collated evidence of actions taken as a result. Over the two year period from August 2001 to August 2003, over 4,000 Home Energy Checks were completed providing local householders with information on how to save energy in their homes and an estimated 5,000 householders took some kind of energy efficiency action within their homes, such as installing insulation, upgrading their boiler to a condensing boiler or purchasing A rated appliances. A total of 86 businesses signed the Planet York pledge to incorporate energy efficiency issues into their company. This included awareness raising amongst employees and some companies looked at travel plans to reduce road congestion including paying for staff park and ride facilities, encouraging home working and offering bike storage.

PLANET YORK

The principal aim of the Planet York campaign was to link local evidence of climate change (the year 2000 floods were the worst in York for 400 years) with the area's use of energy. It was a 12-month marketing project in the City of York funded as a pilot by the Energy Saving Trust (EST).

Key objectives
Planet York was designed to test whether concerted local activity could make a real difference in achieving national climate change objectives. The overall aims were:

- to show that if a community works together, it can lower carbon dioxide (CO_2) emissions and begin to address the problems of climate change;
- to show that if a community works together, it can reduce local transport emissions;
- to test a potential model of local environmental partnerships for sustainable energy.

As well as awareness raising, it aimed to measure changes in consumer attitudes, behaviour and reductions in CO_2 emissions. The challenge was to turn the scientific debate into issues that captured the public imagination without creating unrealistic short-term expectations.

The project was run from the local Energy Efficiency Advice Centre (EEAC) in partnership with City of York Council, local media, local housing associations and key businesses in the area.

The approach
Three key messages were selected:

- Reduce car use by using public transport (P+R), cycling, walking and car share.
- Investing in energy efficiency will save you money and help the environment.
- The energy we all use causes CO_2 emissions contributing to climate change.

At the outset, it was determined that awareness was key to the success of Planet York and to gaining community ownership of the scheme. The local paper, York Evening Press, was a key partner in the campaign to ensure continuous media coverage of the various activities. Journalists came up with the name of the campaign and a logo that helped generate a sense of ownership at the paper. This guaranteed at least one story a week and a dedicated reporter was assigned to the campaign.

In addition to the 97 local editorial pieces, there were 17 local radio interviews, four national BBC Radio and TV pieces, six regional TV pieces, and articles in the national and trade press. A lot of the coverage generated was linked to the floods in York. The BBC ran a story looking at two families affected by the floods; one that had taken no action subsequently and the other that had changed their lifestyle by purchasing A rated appliances and insulating their home. The local pantomime Dame agreed to have a home energy check on his home, and included Planet York in his Christmas 2001 pantomime script. With the sponsorship of npower, York's Christmas lights were powered by renewable energy. This generated debate in the local newspaper and raised awareness of green household energy tariffs.

Schools were heavily involved in the campaign. Five schools took part in a pilot looking at a whole school approach to energy efficiency, and 25 schools in a poster competition looking at energy saving and greener transport. The winning posters were then made into advertisements on buses for the campaign. A light bulb amnesty was held to allow people to exchange old incandescent light bulbs for low energy bulbs with the old bulbs made into a sculpture at the local art college, raising its profile among 15–25 year olds.

Source: Energy Saving Trust (Practical Help leaflet)

Compared with the national EST TV campaign, the monitoring showed that initiatives in York achieved greater pre to post shifts in total awareness of energy efficiency and recognition of the Energy Efficiency logo. Overall, the Energy Saving Trust calculated that incremental annual savings of carbon dioxide (CO_2) amounted to some 2,649 tonnes.

However a key, non-quantifiable, result has been the longer-term interest of the local media in climate change and sustainable energy issues. The manager of the York and North Yorkshire Energy Efficiency

Advice Centre believes that relationships with the Press are still significantly better than before the campaign stared and are likely to remain so. Planet York really did achieve a lasting change in the local environment.

One-off campaigns such as Plant York have a role to play, but need to be supported by ongoing marketing initiatives, such as those arranged through the Energy Efficiency Advice Centres and Local Agenda 21 groups.

Another local promotional scheme that this time promotes the use of renewable energy is the **Sunrise Project.** In Phase 1, this is a two year Yorkshire Forward funded Solar PV pilot for the West Yorkshire Region. Its main aims were to maximize the uptake of the Major PV Demo Programme, establish a regional installer base and increase the awareness of solar energy technologies in general. The pilot stage was also to establish a blue-print for replication in other Yorkshire & Humber sub-regions and explore the impact of a third-party technology specific officer on the uptake of that technology. All project targets were met and exceeded. This was recognized by Sunrise winning the Eurosolar UK Award 2004 for Local Authorities. The Solar Development Officer was based at Calderdale Council throughout Phase 1, but covering the whole of the West Yorkshire region.

Sunrise (Phase 2) is now underway, covering the Yorkshire and Humber region and also covering both solar techs + passive solar in construction. Sunrise is now the Market Development function of Future Energy Yorkshire, Yorkshire Forward's arms-length company set up to help deliver its objectives and priorities in the energy sector.

Further details can be obtained from Tanya Christensen on 07835 945039 or e-mail Tanya.Christensen@Yorkshire-Forward.com

Other successful campaigns to promote solar energy by local authorities include **Solar Plan**, a scheme that was initiated by a partnership of local authorities in Northamptonshire in 2002 to encourage householders to invest in solar water heating and solar electricity. It made available grants for solar thermal heating panels (hot water producing) and photovoltaic (electricity producing) panels in addition to those available through Clear Skies and the PV Grant Scheme. Funding came from the Energy Saving Trust and Powergen. In addition the solar thermal installer offered a discount. The scheme now runs on a smaller scale with only the installer discount and Clear Skies grant available.

8.4 Education

Local authorities have a role to play both in supporting the educational work carried out in schools, but also in educating the general public on climate change issues and the benefits of renewable energy. It can do this by assisting with the installation of renewable energy in schools (as the County Council did with the Nidderdale School Wind Turbine Project) or by helping schools find the money needed to join schemes (such as the SuSchool project being run by the Alternative Technology Centre). The aim of SUSchool is to help school's learn about, teach and implement Sustainable development. Further information is available at http://www.suschool.org.uk/
Local authorities can also assist schools in hiring an exhibition vehicle such as the one run by NEF. Its exhibition vehicle (the Green Energy Machine or GEM) is used to promote renewable energy at various events throughout the country and is frequently hired by local authorities as well schools and other event organisers.

The Green Energy Machine (GEM)

Provides a very visual display of a number of renewable energy technologies, which include:

- a solar water heating demonstration
- an 800 Watt photovoltaic array
- a wood pellet stove
- a wind turbine (350 Watts)

A trained member of staff accompanies GEM at all events to provide impartial advice and information on renewable energy. A visit by GEM to any event can really help develop an understanding amongst those attending of renewable energy and the need to reduce CO2 emissions.

York & North Yorkshire EEAC also operate an Energy Bus that is able to tour local communities to spread the message about sustainable energy (see box on next page).

Councils can also undertake a more direct educational role by having one or more buildings open to the public that have been designed or refurbished to illustrate the best in sustainable development, including energy efficiency measures and the deployment of renewable energy. This has been done both on a temporary basis (by Guildford Borough Council who refurbished an existing property and opened it to the public prior to letting it) and on a more permanent basis, by Leicester City Council.

The Eco House in Leicester

The EcoHouse in Leicester was the first environmental show home in the country to be opened to the public and has attracted over 100,000 visitors since 1989.The house contains hundreds of environmentally friendly features. Its outstanding environmental features are a solar thermal system providing 50 per cent of the energy needed for water heating, a photovoltaic system, a rainwater harvesting system and a compost toilet.

Other green features of the EcoHouse include a designated recycling area, on-site composting, heat recovery ventilation, high insulation, low-energy lighting, intelligent lighting controls, double glazing throughout, draught lobby entrance, specific design for passive solar gain, waterless urinals, cycle parking, Forest Stewardship Council accredited timber (from renewable sources), PVC alternatives, natural floor coverings, recycled materials (such as newspapers for insulation, incinerator ash for breeze blocks, car tyres for carpet underlays), low-VOC (Volatile Organic Compound) paints and grounds managed so as to enhance habitats.

8.5 Support for key local players in sustainable energy

Local authorities cannot be expected to address raising the profile of sustainable energy on their own. They need to work within established partnerships, and develop new ones where gaps are identified. Within York and North Yorkshire, key players include the York and North Yorkshire Energy Efficiency Advice Centre, the Yorkshire Renewable Energy Network (YREN), the Alternative Technology Centre, York's Local Agenda 21 group and, for businesses, Business Link York and North Yorkshire and the York and North Yorkshire Business Environmental Forum.

The York Energy Bus

The Energy Efficiency Advice Centre for York, North Yorkshire and East Riding purchased the Energy Bus as a pilot to see if a mobile demonstration unit would be beneficial in this rural area. The Bus was second hand and is unfortunately no longer in use due to mechanical problems. The main idea was to utilise the vehicle to improve our ability to reach rural areas, provide a visual attraction/ draw for the general public, and a tool to use at schools as a demonstration of renewable energy at work.

The Energy Bus is an ideal tool to encourage an understanding of renewable energy and energy efficiency. It has its own renewable energy supply, comprising a 375Watt photovoltaic panel, and has a Rutland 503 wind-charger. The bus also carries information display boards, leaflets and the opportunity to receive face to face advice from our trained energy advisors. It also provides a sheltered venue for people to browse and talk to the energy advisors which has increased attendance at outreach events, especially where the weather is not too good!

We found that the Energy Bus was invaluable. It allowed us to form new partnerships with the Yorkshire Dales National Park and North York Moors National Park and do a renewable energy roadshow throughout the Parks. This allowed us to provide face to face advice in areas that we have previously not been able to easily reach. Many schools in the area have benefited from the Bus as it is an interactive activity for the children which helps them to engage.

The nine local authorities in our area have found the new resource extremely beneficial for use at events, school programmes and as a marketing tool (it provides a good visual for photographs).

The Energy Efficiency Advice Centre are confident that a mobile unit is an extremely useful resource especially given the rurality of our region. We have had to disappoint a number of partners already this year as we cannot fund a new vehicle due to funding restrictions. We would like to find further funding to replace the Bus.

The Energy Efficiency Advice Centre was initially set up as part of the Energy Saving Trust's pilot scheme for local energy advice centres in Malton in 1993. After several years operating successfully in Ryedale district it relocated to York, where it has since expanded its services considerably.
Its key activities are:

- the provision of free and impartial energy efficiency advice to domestic consumers;
- support for local authorities through its Local Authority Support Programme (LASP) officers, including helping councils meet their statutory responsibilities under the Home Energy Conservation Act;
- the facilitation of energy efficiency improvement measures through the Energy Partnership;
- advice and support for SMEs, working in partnership with Business Link;
- work in schools and through the centre's Energy Bus;
- innovative energy saving and renewable energy projects, acting as a catalyst for the region.

The EEAC takes a structured approach to advice, based on the Energy Saving Trust's Home Energy Checks, but also through grouping suggestions into four cost bands: -

Recommendations from York & North Yorkshire Energy Efficiency Advice Centre

No Cost Measures

- Turning down your thermostat by 1°C could cut your heating bill by 10%.
- Set your hot water tank thermostat to 60°C.
- Close your curtains at dusk to prevent heat escaping through the windows.
- Always turn lights off when you leave the room
- Don't leave appliances on standby - TV's may use up to 80% of the electricity on standby as they do when switched on.
- Don't over fill your kettle. Jug style kettles also need less water as they have smaller elements.
- If you shower you will save 5 times the amount of water you use in a bath - this saves energy by using less hot water.

Low Cost Measures (£50 or less)

- Fit energy saving light bulbs. Each bulb can save £10 a year off your energy bills and they last up to 12 times as long! We sell bulbs from our Advice Centre for £2.75.
- If your hot water tank is not insulated fit a hot water jacket. They cost about £10 from DIY stores and save £10-15 a year.
- Chimney balloons block out draughts from unused chimneys. They cost £15 to £25 and will also make your room more comfortable.
- Draught proofing windows and doors can save £25 a year.

Measures that Cost £500 or Less

If you are able to invest in energy efficiency measures there are several measures that will save hundreds of pounds off your bills year after year.

- Loft Insulation. 25% of your heat could be escaping through your roof if your loft is not insulated. You could save 25% off your bills by installing 250mm. Check out the Energy Partnership pages for prices.
- Cavity Wall Insulation. If your walls have a cavity and they are not insulated you will be losing 35% of your heat through your walls! Check out the Energy Partnership pages for prices.
- Replacing old appliances could save you a small fortune. If you are looking to replace any of your white goods make sure you look out for the Energy Efficiency Recommended logo. Appliances are rated A-G for efficiency, an A-rated fridge freezer costs £45 less to run a year than a G-rated, or old model!

Measures that Cost Over £500

- If your boiler is 15 years old or more it will not be working as efficiently as it should. By replacing your boiler with a new condensing boiler you could make immediate savings of up to 1/3 off your energy bills - and even more if you install controls such as room thermostats and thermostatic radiator valves.
- Double glazing creates an insulating barrier that reduces noise, condensation and heat loss through your windows by 50%.
- Think renewable! The Energy Partnership is running a Solar Hot Water Discount Scheme. Despite the weather in Yorkshire a solar system will still provide 90% of your hot water needs in the summer and 15-20% in the winter!

Source: Energy Partnership website

8.5.2 Yorkshire Renewable Energy Network (YREN)

YREN is funded through the Countryside Agency and Yorkshire Forward. They run the Community Renewables Initiative for Yorkshire & Humberside. They also have an informative website at **http://www.yren.org.uk**.

8.5.3 The Alternative Technology Centre

Although based at Hebden Bridge in West Yorkshire, The Alternative Technology Centre (ATC) has much it can offer to North Yorkshire Councils. It is a not-for-profit organisation established in 1999 as an educational resource centre. It aims to make sustainability achievable and simply irresistible by working from a strong base within its local community to provide inspiration, accessible information and advice to improve the quality of life using sustainable means – economic, environmental and social.

8.5.4 York Local Agenda 21 Group

All local authorities have Local Agenda 21 groups, but their level of activity varies. As an example, the York group, with is one of the most active in the sub-region, has drawn up 15 specific objectives into a detailed action plan. Although energy is not specifically included as an objective *per se*, transport, resources and waste, environment and pollution are. Energy is a recurring theme in the full LA21 strategy (there are 60 references to it in the document) and it includes less traditional concerns such as the energy saved through avoiding the need for refrigerated transport by using local food production. The main energy efficiency recommendations occur in the pollution section, and for practical assistance, people are recommended to contact the Energy Efficiency Advice Centre.

8.6 Promoting Grant and Other Support Schemes

These are looked at in more detail in a separate section of this guidance. However in essence local authorities can assist in the process through a combination of promotional activities, working with statutory and other agencies in targeting fuel poverty, "franking" third party schemes (such as those run through the Energy Partnership or the Energy for Good initiative) and, where possible, assisting in funding directly.

8.7 Acting as an Exemplar

If initiatives led by the public sector are to be successful, local authorities must be seen to be leading by example. The key ways in which this can be done is through improving energy efficiency in the council's own estate; making use of renewable energy (either through installation of the technology in its own estate or purchasing green electricity) and publicising its achievements.

At the moment this has to be done on a voluntary basis. Two leading ways of reporting results are through:

- the Energy Efficiency Accreditation Scheme (see box)
- the Display programme, which is being run as a pilot through Energie-Cités to demonstrate how public buildings may be labelled in advance of the EU Directive on the Energy Performance of Buildings.

Councils may of course choose other local initiatives to publicise their energy saving achievements.

Energy Efficiency Accreditation Scheme

The Energy Efficiency Accreditation Scheme is a voluntary scheme run by the Carbon Trust and is the UK's only independent award recognising achievements in reducing energy use by leading organisations in industry, commerce and the public sector.

The Scheme is recognised as the national benchmark standard in energy efficiency and the process of gaining accreditation invariably identifies opportunities for energy savings to be made. Evaluations are carried out by independent, experienced assessors who examine an organisation's performance in a number of areas. On average, accreditation of itself normally enables fuel bills to be reduced by about 3%. This means that becoming accredited should be a highly cost effective investment.

In order to gain accreditation, organisations must demonstrate:

- management commitment to energy efficiency and clear energy policies
- at least three years' investment in identifiable energy efficiency measures
- a three year track record of declining specific energy consumption

To date, over two hundred organisations, including around 45 local authorities, have gained accreditation by reaching the standards set for the Scheme and a large number of others are on the way to doing so.

Many councils have installed renewable energy technology within their own building stock. For example Woking Borough Council has installed a water heating system on its Council offices. During the summer these can heat 400 litres of water from the mains temperature of 10-15°C to 45°C and save the Council £450 a year through reduced gas consumption. The Council has also installed an advanced evacuated tube water heating system at a city swimming pool.

Another example is Worcestershire County Hall which is heated with a 700kW woodchip boiler under a 10 year heat supply contract. The boiler provides 1-1.3 Mn kWh/year of biomass heat and is estimated to offset 250 tons of CO_2 per year. A further example of the use of wood fuel is the 320kW wood chip boiler installed at Oakengates Leisure Centre in Telford. This boiler, together with a 400kW standby oil boiler replaced two old oil boilers. This has lead to a reduction in carbon emissions of about 250 tonnes per annum to an estimated 40 tonnes per annum for the heating.

Leicester City Council has developed an innovative scheme to encourage building managers within the Council to install solar water heating systems in their own properties. The scheme offers them the chance to rent rather than purchase a system. The rental cost is linked to the amount of money saved through not purchasing gas or electricity to heat the water, thus there is no net cost for the building manager. The rent from panels is paid to the City Council's Energy Management billing team who use it to fund further installations by rotating the fund.

In the first instance panels were installed in three schools within the City boundary through a partnership of Leicester City Council's Energy Team and the management of the schools as well as the Education Department. The project has also become part of the educational work within the school.

The scheme works by shifting the issue of initial capital outlay from the building manager to Leicester City Council's Energy Management Team. The Energy Management Team sources the funding to pay for the installation of the panels while the building manager pays for the service provided by these panels (i.e. hot water). The building manager can budget for the rent within a single financial year. The Energy Management Team can source the financing from various sources:

- As part of overall building maintenance programme;
- From savings received from previous energy efficiency improvements; and
- Through other sources such as utilities.

For further details contact Leicester City Council; 2-4 Market Place South, Leicester, UK, LE1 5HB; +44 (0) 116 2995142. E-mail patep003@leicester.gov.uk; **http://www.energy-advice.co.uk**

Councils can also lead by example in purchasing green electricity, that is electricity that has come from a renewable source. It is noted that the City of York has been recognised by Npower for its commitment to using energy from renewable sources by the presentation of one of its Green Certificates in 2004.

An important first step is for each council to monitor its energy consumption and then to set its own targets for energy efficiency. Once this has been done, a programme of improvements – and associated budget – can be developed.

Councils may be assisted in doing this through two schemes: the Beacon Scheme developed by I&deA (the Improvement and Development Agency) or the Carbon Trust's Local Authorities Carbon Management Programme.

The Beacon Scheme

The scheme aims to identify excellence and innovation in local government. The scheme also exists to share good practice so that best value authorities can learn from each other and deliver high quality services to all. In the previous round (round six), sustainable energy was one of the themes and seven local authorities or groups of local authorities (Cornwall County Council, High Peak Borough Council, Leicester City Council, the London Borough of Lewisham, Nottingham County Council, Shropshire County Council and Woking Borough Council) were awarded Beacon status.

Each of these local authorities is currently running an open day for other local authorities wanting to develop their own sustainable energy policies and programmes. The next round on sustainable energy is unlikely to be announced for a couple of years.

Further information can be obtained from http://www.idea-knowledge.gov.uk/idk/aio/829024

Local Authorities Carbon Management Programme

This is a pilot programme being run by The Carbon Trust, which provides council's with support and guidance to help them cut carbon dioxide emissions. Now in its second phase it now includes a toolkit designed for local authorities that provides technical support in specific areas such as improving energy efficiency in buildings and managing funding, and includes tools such as analysis software to calculate an emissions guideline. The programme also involves support for staff, and senior management training.

The toolkit is available to all local authorities free of charge. It is anticipated that the final Local Authorities Carbon Management Toolkit will become nationally available during 2005, once the programme's pilot phases are complete.

Anyone interested in the current toolkit should visit **www.thecarbontrust.co.uk** for more information or e-mail **Richard.rug@thecarbontrust.co.uk** to request a copy.

It is noted that North Yorkshire County Council is one of the Local Authorities participating the second phase of the pilot programme.

The Local Government Association has also published (June 2005) a Vision document to help local authorities combat Climate Change, in association with the Energy Saving Trust and the Energy Efficiency Partnership for Homes. This vision document is entitled "Leading the Way: how local authorities can meet the challenge of Climate Change".

The vision examines the work of local authorities in adapting to climate change effects and developing sustainable energy and how the UK's target of 60% for 2050 to cut carbon dioxide emissions can be achieved. It identifies that local authorities have a unique role and a real opportunity to make a difference through their own activities and in their local communities.

The vision offers a look at "Anytown 2025" examining what local communities could look like if the appropriate mechanisms and energy efficient methods were put into place. Current case studies of good practice from local authorities are presented to highlight how changes can be made without the need for futuristic, unproven technologies and innovations.

8.8 Support for the supply chain

Local authorities and county councils are important regional purchasers of goods and services. Through their procurement policies they can have an important influence on businesses within their districts, especially in the SME sector. Although it is important not to add to bureaucracy for suppliers, councils do have the ability to ask suppliers about their own energy choices, and to be able to help signpost them to further advice and support.

Questions that may be asked of suppliers include:

- do you monitor and target your energy consumption?
- have you considered cost-effective energy efficiency improvements?
- are you registered under the Energy Efficiency Accreditation Scheme?

9 GRANTS FOR ENERGY EFFICIENCY AND RENEWABLES

There are a wide variety of possible sources for local authorities and county councils to fund sustainable energy initiatives. Some are specifically targeted at energy and come from specialist quasi-governmental agencies such as the Energy Saving Trust or Carbon Trust; some are small-scale from charitable trusts or similar bodies; some come from the major energy utilities via the Energy Efficiency Commitment; and others come from much more general funding streams for local government, where energy-related projects may be eligible for large-scale funding.

This section reviews the main sources of grant funding, split into three broad categories:

1. Sources of Potentially Major Grants (£50,000 per local authority or more)
2. Sources of Relatively Minor Grants (typically for studies, rather than measures)
3. Sources of Grants for direct payment to Householders

As grant schemes can be introduced and withdrawn at any time, often with little prior warning, it can at best be a snapshot of the most widely applicable sources of money at the time of writing (June 2005). Where a scheme is known to be time limited, but likely to be renewed – although possibly with modifications – that is indicated here. For an up to date summary of grants available, the Energy Saving Trust's Practical Help website (which has been drawn upon for some of the information below) is normally the most convenient single source for local authorities.

9.1 Major Grants

9.1.1 Energy Efficiency Commitment

Available to: Housing Providers

The current round of the Energy Efficiency Commitment requires gas and electricity suppliers to deliver improvements in domestic energy efficiency that will correspond with an overall saving of 130TWh between 1 April 2005 and 31 March 2008.

It is estimated that the current three year round of EEC will lead to investments of £1,250 million and a reduction of carbon emissions of approximately 0.7 million tonnes a year. All domestic sector homes are eligible, although 50 per cent of the EEC must be targeted at priority groups consisting of householders receiving certain benefits or tax credits.

EEC funding supports a range of energy efficiency measures such as:

- cavity wall and loft insulation;
- condensing boilers (see below);
- solar water heating;
- energy efficient appliances.

Simple replacement of old boilers with condensing boilers is likely to end under EEC, as the new 2005 Building Regulations mandate that all installations, wherever physically practicable, should be of condensing models, and Ofgem considers that there will in future be no incremental energy efficiency gain compared to the minimum standard.

Ofgem outlines the specific technical details for what measures are eligible, so the above list is not exhaustive. Capital and installation costs of energy efficiency measures can either be routed thorough local authorities in major works programmes or applied for individually at a householder level (see section 9.3 below).

9.1.2 Transco Affordable Warmth

Available to: Local authorities/Housing Associations

Transco's Affordable Warmth Programme which works with Government and social housing providers to tackle fuel poverty by integrating sources of funding to tackle the issue in a concentrated and systematic manner. It enables local authorities and housing associations to borrow money more cheaply to install efficient gas central heating coupled with other energy efficiency measures in social housing. There is a medium-term target of supporting 1,000,000 households.

Affordable Warmth works on a number of important fronts by:

- Providing a financial solution, known as 'heat leasing', to underpin the installation of heating equipment in social housing;
- Delivering partnership solutions – a community based approach to eradicating fuel poverty;
- Supporting the evaluation of the social and environmental benefits associated with renewables;
- Helping develop local training courses in energy efficiency and gas industry skills in order to sustain the programme; and
- Developing a solution that goes far beyond simply extending the gas network and applies a 'whole community, whole house' partnership approach.

The programme is not restricted to the provision of gas central heating. As an example, it has recently been involved in the testing of air-source heat pumps in Yorkshire. Transco has a particular interest in novel methods of heating hard to treat (HTT) homes.

9.1.3 Energy Saving Trust Innovation Programme

Available to: Any Organisations, but all consortia receiving awards must include at least one local authority

The Innovation Programme provides support for local authorities and housing associations along with their project partners to promote and implement innovative approaches to reducing carbon emissions in their local areas.

Funding is available for feasibility studies and for project implementation and can be used to provide project management resources, marketing resources, administrative support, energy efficiency measures, staff employment, equipment installation or the employment of managing agents.

From 2005, the Innovation programme is offering funding and technical support for feasibility and implementation grants via two streams: **innovation** and **replication**. The replication stream offers awards for the replication of previously funded Innovation projects in different geographical locations.

The following are some of the key criteria for projects.

- Projects should be innovative i.e. include a novel technology/approach/methodology/partnership;
- Projects should target the housing sector (no less than 70% of carbon reductions for the project should be made in the domestic sector);
- Projects should include basic energy efficiency measures such as insulation as well as more novel low carbon technologies;
- Each consortium must have a Local Authority or Housing Association as an active participant although they need no be the lead partner;
- Projects should aim to support the development of new, innovative and useful partnerships;
- Projects should address the threat of climate change and demonstrate links with appropriate local authority strategies (e.g. climate change strategy) or support the development of such strategies where they do not already exist.

Funding can be received up to the following levels:

Innovation	**Replication**
Feasibility: £10,000 Implementation: £90,000	Feasibility: £3,000 Implementation: £50,000

There are two application rounds for Innovation projects during 2005-6 with deadlines of 29 July and 30 November 2009. More information came be found on the EST's Practical Hep website www.practicalhelp.org.uk

9.1.4 Housing Corporation: Innovation and Good Practice Research

Available to: Housing Associations

Innovation & Good Practice (IGP) Grants are discretionary grants, provided by the Housing Corporation to assist with the revenue costs of specific projects concerned with the proper performance of the functions of Registered Social Landlords (RSLs) or unregistered Self-Build Societies (SBSs). They may be paid to any organisation or individual. The essential requirement is that the proposed outcomes and outputs of the grant will fall within the role of the Corporation and be of benefit to Registered Social Landlords (RSLs) and their tenants. Full details of the requirements are maintained on the IGP website.

Since its launch in 1995, the programme has supported over 2,000 projects. With around 300 currently active, the programme has had, and continues to have considerable impact to help shape the housing policy agenda, push forward significant improvements in housing association performance, support vital innovation and, at a very practical level, improve the quality of life for present and future residents in supporting tenant involvement, training and locally based projects.

The programme enables the Housing Corporation, and in turn housing associations, to be proactive and respond effectively to the major challenges facing the sector.

The Energy Saving Trust is working with the Housing Corporation to further promote energy efficiency through a number of joint ventures:

The ***Managed Housing Programme*** offers advice, support and information on funding to public and private sector housing managers. Although in its early stages, several projects to support housing managers have already been launched, including a number of joint ventures with the Housing Corporation such as:

- investigating opportunities for joint representations to Government on policy areas of mutual interest
- joint funding energy efficiency projects
- sharing results of research

Other projects include a ***Funding Database***, which aims to identify possible funding for sustainable energy projects, and the Large Scale Voluntary Transfer/Arms Length Management Organisation research programme.

There is no timescales for projects with a national scope, although some regional offices operate a timetable for applications and if the project has a regional focus, the relevant regional office should be approached initially. Grants are generally in the range from £50 - £500,000, with an on-going application process, although proposals are generally expected by March each year.

9.1.5 Private Finance Initiative (PFI)

Available to: Local authorities/Housing Associations (capital projects only)

The Private Finance Initiative (PFI) offers one form of public-private partnership (PPP) in which local authorities can gain access to new or improved capital assets (broadly buildings, roads, plant, equipment and vehicles).

PFI projects are long-term contracts for services that include the provision of associated facilities or properties. Under the contract, the private sector will have responsibility for designing and constructing the building or facility and maintaining and servicing it throughout the contract term, while the public sector retains accountability for the main public services. PFI finance may be used for large-scale sustainable energy schemes, such as District Heating or Combined Heat & Power.

Examples of PFI funded schemes to support district heating schemes can be found in a project supplying 417 dwellings in Manchester, and in Bloomsbury (central London), where five University of London colleges are linked. Another pathfinder PFI scheme, which incorporated CHP, has been installed in Tower Hamlets. To date, PFI initiatives tend to have been implemented in larger cities, where there is a greater density of demand for energy services, and are often combined with an ESCO structure. The ODPM has also stated that street lighting may be a suitable application for financing through a PFI structure.

The workings of Public/Private Partnerships and the Private Finance Initiative are far too complex to be considered here. More specific information on the use of Private Finance Initiatives in the sustainable energy sector can be found in the Energy Saving Trust's Practical Help briefing note 'Financing energy efficiency activities'.

9.1.6 Major PV Demonstration Projects

Available to: Any Organisations, including Housing Providers

The Solar Grants programme which is run by the Energy Saving Trust on behalf of the DTI provides grants that contribute towards the cost of installing grid-connected or off grid photovoltaic arrays (PV) on public, domestic and commercial buildings. There are two types of grant available:

- stream 1 grants for small scale PV installations (between 0.5kWp and 5kWp);
- stream 2 grants for medium to large scale PV installations between 5kWp and 100kWp.

Both streams of grant will help cover the cost of the equipment and work directly rated to the PV system, including the modules, inverter(s), installation, grid connection and warranty, but not the associated building works.

Applications for funding under Stream 1 can be made at any time. There are two more funding rounds under Stream 2 with deadlines of the 3 September and 2 December 2009. The programme itself is due to run until March 2009. Its replacement is likely to form part of the new integrated small-scale renewable energy grants package (provisionally known as the Low Carbon Buildings capital programme) to be announced in autumn 2005 following a DTI consultation process.

Further information can be obtained at: http://www.est.org.uk/solar

9.1.7 EU Sixth Framework (FP6 – Concerto/Energie)

Available to: Any Organisations, including Housing Providers

The Sixth Framework Programme of the European Commission is jointly administered through DG-TREN and DG-RTD, and provides large-scale funding for "research projects" demonstrating a significant degree of innovation in the field of sustainable energy.

The next call for proposals will have a budget of approximately £123 million, and a deadline for submissions of December 2009. However projects may not commence until all contract details have

been negotiated with the Commission, and this has taken up around 18 months from the call deadline in the case of the first round of Concerto projects. Projects are often very large, with a budget of as much as £20 million, involving many participants from at least three EU member states. EC funding is unlikely to exceed 40% of the total budget of a project under the FP6 programme.

The topics in the current call, which will be the final one under FP6, are:

- ENERGIE:
  - Cost effective supply of renewable energies
  - Eco-buildings
  - Poly-generation
  - Grid Issues
  - Thematic Promotion and Dissemination
- CIVITAS: Projects that use technology and policy based strategies to achieve a significant change in the modal split towards sustainable transport modes.
- CONCERTO II: Projects that support research and demonstration focused on optimising the energy flows in local communities.

Discussions are already underway at a political level about the Seventh Framework (FP7) which is expected to run from 2007-13, with a proposed annual budget (for energy-related sub-programmes) approaching £400 million per annum. Owing to their scale and complexity, EU Framework projects tend to be difficult for smaller local authorities to manage.

9.1.8 Community Energy Programme

Available to: Local authorities/Housing Associations

The Community Energy programme provides capital and development funding to refurbish existing and install new community heating schemes. It is funded from the Capital Modernisation Fund and has £50 million to invest from 2002-2005, with the aim of attracting up to £200 million of further investment from other sources. The Government has recently extended the programme with £10 million of new money for the next three years.

Examples of projects funded in the latest round include a community heating scheme – for 300 households and four public buildings – using waste heat from a landfill site, a new scheme using a wood-fired boiler – using a local woodchip supply – to serve 35 purpose-built flats, replacing coal fired boilers serving three public buildings with biomass on an existing network using arboricultural arisings produced by a Council's own tree work, and a new heat network connecting 22 dwellings by replacing individual storage heaters.

Community Energy is managed on behalf of Defra by the Energy Saving Trust and the Carbon Trust, assisted by the Combined Heat and Power Association.

More information is available from Energy Saving Trust, 020 7222 0101.

9.2 Minor Grants

Minor Grants are generally in respect of research studies or promotional or educational activities. They do not generally provide capital funding for programmes of works, although individual installations may be supported on a demonstration basis.

9.2.1 Charitable Trusts

9.2.1.1 Ashden Awards for Sustainable Energy

Available to: Any Organisations

The Ashden Awards for Sustainable Energy reward outstanding and innovative renewable energy projects. Award winners will be exemplary in the field of renewable energy and inspirational for others to follow. Awards will support schemes that aim to alleviate poverty and/or improve peoples' quality of life while protecting the environment.

Ashden Award for Sustainable Energy: For projects demonstrating excellence in at least one of the three following areas: electricity generation (eg micro-hydro, solar photovoltaics, wind power, etc), heat generation (eg biomass or biogas heating schemes, solar water heating, ground source heat pumps, etc) or energy efficiency.

Ashden Energy Champion Award: For innovative and effective sustainable energy initiatives in the UK (eg energy agencies, advice centres, NGOs).

Awards of up to £30,000 can be made for winners, with awards of £1,000-£7,500 for runners-up – the details for 2006 are still to be confirmed.

9.2.1.2 Eaga Partnership Charitable Trust

Available to: Any Organisations

The objectives of the Trust are "the relief of fuel poverty and the preservation and protection of health by the promotion of the efficient use of energy." Applications for funding by the Trust should:

- assist to clarify the nature, extent and consequences of fuel poverty;
- offer insights into opportunities for the energy efficient and cost-effective relief of fuel poverty in any part of the United Kingdom.
- The work funded by Eaga-PCT can be divided roughly into four categories:
- rigorous, policy-related research;
- action projects (eg practical, community-based initiatives which have wider applicability);
- the promotion of good practice (eg toolkits and workshops);
- practical resource materials and events (eg training and education resources).

9.2.1.3 Pilkington Energy Efficiency Trust (PEET)

Available to: Any Organisations

PEET will consider funding, or co-funding, projects whose successful completion is likely to result in the more efficient use of energy in new or existing buildings. It is stressed that projects do not need to be glass-related, or to have any specific glass aspect.

Projects should be aimed at producing results which are replicable, practicable and economic. There should also be a strategy for disseminating the results or otherwise promoting their uptake, but funding will not be awarded to purely educational or promotional campaigns.

Applications are considered from all sectors, including individuals, consultants, academic bodies, commercial organisations, NGOs and research institutions. A successful application is likely to demonstrate that it does not have internal access to the financial resource being sought, and that the project would not proceed without PEET funding. The Trust is keen to support projects for which other sources of funding are not established or available.

Applications for grants up to £20,000 will be considered.

The Trustees meet to consider applications in late October and April, so applications need to be in the secretary's hands by 30 September or 31 March respectively.

9.2.1.4 Joseph Rowntree Foundation Trusts

The York-based Joseph Rowntree Foundation administers a number of trusts that have aims designed to seek solutions to social problems, with a particular emphasis on carrying out research into the alleviation of poverty and matters related to justice. Within the main Foundation, there are a number of committees charged with commissioning and assessing research into selected areas: one of these is specifically concerned with housing and neighbourhoods (although mainly in terms of a sense of place and regeneration). The poverty and disadvantage committee has a remit that may encompass fuel poverty, but is currently focussing on "Ladders out of Poverty" and Resources in Later Life.

The Joseph Rowntree Housing Trust is a registered social landlord and does not in general support projects on third party housing stock.

9.2.2 Intelligent Energy for Europe (EIE)

Available to: Any Organisations

'Intelligent Energy for Europe' (sometimes known as EIE after its French acronym) is the European Community's support programme for non-technological actions in the field of energy efficiency and renewable energy. The programme is structured in four named sub-programmes of which three are available within the UK (the fourth being designed to aid sustainable energy in LDCs), although cross-cutting 'horizontal actions' are also considered:

a) **"SAVE"** - improvement of energy efficiency and demand management, in particular in the building and industry sectors;

b) **"ALTENER"** - promotion of new and renewable energy sources;

c) **"STEER"** - support for initiatives relating to the energy aspects of transport.

A consortium submitting a proposal must include at least three independent legal entities established in three different member states (or accession countries).

Actions or projects supported in the framework of the EIE programme must be committed to removing market barriers to the increased use of energy efficiency and renewable energy sources. Generally the actions should be 'promotional activities' in the very broad sense. The EIE programme will not support costs related to investments in technologies, so cannot be used for installation of measures in property.

The programme is scheduled to run until 2006 but the Commission is already consulting on a successor programme that will run through to 2013.

There is no grant limit. Last year 40 million euros was allocated to 80 projects. Under the general call for proposal, the programme will share the cost with the proposers, providing a maximum funding of 50% of the total cost. Although the project sizes might appear to indicate that this should be seen as a Major Grant, in practice grants are not usually available for capital improvement measures and the grants are typically payable over two to three years.

9.2.3 Interreg IIIB

Available to: Any Organisations

Interreg IIIB is funded by the European Commission to promote transnational co-operation on spatial development between national, regional and local authorities as well as a wide range of non-

governmental organisations. The objective of the programme is to achieve sustainable, harmonious and balanced development in the Community and better territorial integration.

There must be a minimum of two independent legal entities involved in a proposal, and these must be based in different EU countries. Interreg IIIB is available to groups of countries collected into Programme areas. North Yorkshire lies within two such areas, which have slightly different programme objectives:

The ***North Sea Programme*** area includes the whole of Denmark, and parts of Belgium, Germany, the Netherlands, Norway, Sweden and the UK bordering the North Sea from Essex northwards.

The strategy for the North Sea Programme addresses the following issues:

- developing spatial development strategies to promote the integration of the North Sea Region into Europe;
- developing and maintaining sustainable communications externally and within the Region to maintain the Region's position between the core metropolitan areas and the more peripheral regions of northern Europe;
- creative development to safeguard and promote the Region's valuable heritage;
- understanding and managing the natural and industrial marine resources in the North Sea and developing spatial development strategies to reconcile conflicting demands and pressures on land use and the sea;
- developing integrated spatial development and water resource management strategies to address problems of water supply and quality, flooding and drought and sea level rises.

Within the sections provide outlining the Priorities and Measures, Eligible Projects and Partnership Arrangements that apply to the North Sea Programme, there is one specifically mentioning renewable energy:

"3.3 Development and promotion of sustainable management of natural resources and renewable energies:

- strategies and action plans to minimise and manage waste in a sustainable way including renewable energy technologies that can utilise waste;
- promotion of sustainable industries as key assets to the North Sea region."

The ***North West Europe Programme*** area (NWE) covers all of Ireland, the United Kingdom, Belgium and Luxembourg, and parts of the Netherlands, Germany, France and Switzerland.

Despite the general strength of the North West Europe area it has some particular problems such as regional disparities, poor quality urban areas, social exclusion and environmental pressures that threaten its competitiveness and attractiveness. The overall objective of the NWE INTERREG IIIB Programme is to contribute to more cohesive, balanced and sustainable development of the European territory and the NWE area in particular, through an innovative and integrated approach to transnational co-operation on territorial issues.

Within NWE priority measures, virtually none could be used for energy purposes, other than perhaps *Sustainable Mobility Management*. The NWE Programme has been used in the past to fund a study of transnational energy networks (by Euronet) but is unlikely to support any implementation measures.

9.2.4 Sustainable Development Fund

Available to: Any Organisations with a project located within a National Park

This scheme is funded by the Department for Environment, Food and Rural Affairs (Defra) and is managed by the Peak District National Park Authority. The fund supports sustainable development within national parks.

Eligible projects include:

- training sessions to promote awareness raising;
- open days that promote understanding of the need to conserve the earth's resources;

- developing networks that promote good practice;
- reduction of energy use or using water, wind or solar power
- supporting 'cutting edge' ideas for sustainable lifestyles;
- ways of slowing down climate change and reducing its negative impact
- how to reduce carbon emissions.

The fund is open to any individual or organisation from the public, private or voluntary sectors, or a collective of these. Applicants can be located within or outside the National Park boundaries. This fund is expected to run up to 2008 and possibly beyond.

9.2.5 Groundwork

Available to: Any Organisations

Groundwork is a federation of Trusts in England, Wales and Northern Ireland, each working with their partners to improve the quality of the local environment, the lives of local people and the success of local businesses in areas in need of investment and support. They do this by developing and delivering partnership projects that:

- enable an integrated and community-led approach to local regeneration
- use environmental improvement as a means of achieving social and economic change
- help individuals and organisations contribute to sustainable development.

9.2.6 CAfE Community Support Panel

Available to: Any Organisations running Community Projects

The Community Support Panel is a panel of experts with a wide range of backgrounds, which can provide free consultations for community energy projects. Advice is available through an on-site visit or via phone and results in the generation of a short project specific report.

The Community Action for Energy (CAfE) Support Panel can provide a day and a half of free support to help groups:

- develop community energy projects;
- build partnerships;
- find funding for their projects.

Community Action for Energy is organised through the Energy Saving Trust.

9.2.7 Carbon Trust Programmes

Available to: Any Organisations falling within the specific requirements of the individual programmes

The Carbon Trust is funded by Defra and DTI to help industry, commerce and the public sector cut carbon emissions and capture the commercial potential of low carbon technologies. It specifically excludes domestic sector projects, including collective schemes organised through public sector housing providers.

The Carbon Trust offers the following services among others:

Energy Surveys - Organisations with energy bills of over £50,000 per year can benefit from a free visit by an energy expert, who will identify achievable savings and provide a tailored action plan. The largest users of energy can benefit from tailor-made Carbon Reduction plans, drawn up in partnership with the Trust.

Energy Helpline - Smaller companies can benefit from a free telephone advice on how to save energy and money.

Energy Loans - Interest-free loans of between £5,000 and £100,000 for small and medium-sized enterprises for investment in energy-saving equipment.

The Enhanced Capital Allowance scheme - A tax-break on investments in energy-saving technologies and products for businesses.

Design Advice - Professional, independent and objective advice on energy efficient and environmentally sound building design.

Energy Efficiency Accreditation - This Scheme provides external certification for organisations (including those in the public sector) that can demonstrate at least three years' continual investment and improvement in energy efficiency, supported by strong management commitment to saving energy.

9.3 Grants for Householders

9.3.1 Energy Efficiency Commitment

See also above under Major Grants available to local authorities. Individual homes are eligible, although 50 per cent of EEC must be targeted at priority groups consisting of householders receiving certain benefits or tax credits.

EEC funding supports energy efficiency measures such as:

- cavity wall and loft insulation;
- condensing boilers (see note above under major grants);
- solar water heating;
- low energy lighting;
- energy efficient appliances.

Installations in the private sector tend to follow marketing campaigns undertaken by one of three groups:

- the energy utilities (mainly to their customers)
- the installers themselves
- third party advisors, notably Energy Efficiency Advice Centres

Some of the third party marketing campaigns run on a broad, or even national scale, including the Big Green Boiler Scheme (arranged through the Thames Valley Energy Centre) or the EnergySmart discount schemes run by Creative Environmental Networks in Croydon with funding from London Energy (EDF). More locally, the York and North Yorkshire Energy Efficiency Advice Centre channels EEC funding from a number of different utilities through its Energy Partnership programmes.

EEC funded schemes tend to be modified relatively frequently to match the supply of funds with demand from householders. As such, current schemes will not be listed in this document. However it worth noting that as of June 2005, the EST's Grant Information Database (GID), maintained locally on its behalf by the York & North Yorkshire Energy Efficiency Advice Centre, listed some 24 EEC-funded schemes available to owner-occupiers aged under 60 and not entitled to any state benefits. 16 of these schemes were for insulation measures, with the rest focused on CFLs or appliances. All heating upgrade schemes have now been withdrawn. Several of the schemes were identical, but branded separately for sister companies within the Scottish & Southern group, leading to around 14 distinct offers to householders.

9.3.2 WarmFront

Available to individual householders in the private sector, who meet certain eligibility requirements based on personal circumstances.

A WarmFront Grant can provide a grant of up to £1,500 for a package of insulation and heating tailored to each property, including:

- loft insulation;
- draughtproofing;
- cavity-wall insulation;
- hot-water-tank insulation;
- gas room heaters with thermostat controls;
- electric storage heaters with thermostat controls;
- converting a solid-fuel open fire to a glass-fronted fire;
- timer controls for electric space and water heaters.

Other measures include:

- energy advice;
- two low energy light bulbs;
- hot water tank jackets.

This capital grant, with a maximum value of £1,500, has to be applied for by the householder who must meet strict eligibility criteria (basically those who are either pregnant, have a child living with them under 16 or are in receipt of one of a number of passport benefits).

The ***WarmFront Plus*** grant provides a package of energy efficiency and heating measures, adding central heating to the list of measures available under WarmFront above. The WarmFront Plus grant has a maximum value of £2,500.

To qualify for the Warm Front Plus grant, householders should be 60 or over, and receiving one or more of the following benefits:

- Pension Credit
- Income Support
- Council Tax Benefit
- Income-based Jobseeker's Allowance
- Housing Benefit

Both are administered by the Eaga Partnership in North Yorkshire.

9.3.3 PV Solar Grants Programme

The PV Solar Grants Programme is the name adopted for the domestic stream of the Major PV demonstration programme, described in section 9.1.6 above. This grant stream is also expected to be superseded by the DTI Low Carbon Buildings capital programme – details will be announced later in 2009.

9.3.4 Clear-Skies

Available to: Householders and Community Groups

Clear Skies, funded by DTI and managed by BRE, aims to give householders and communities a chance to realise the benefits of renewable energy by providing grants and access to sources of advice.

Householders can obtain grants between £400 to £5000 (at a set rate per technology) whilst not-for-profit community organisations can receive up to £50,000 (being 50% of the cost of the installed system).

Grants are given to the following renewable energy installations:

- Solar thermal
- Wind turbines
- Micro/small scale hydro turbines
- Ground source heat pumps
- Room heaters/stoves with automated wood pellet feed
- Wood fuelled boiler systems

Clear Skies supports projects in England, Wales and Northern Ireland. Clear Skies vets installers so ensure good quality of service. Applicants need to use registered installers and products that are listed by Clear Skies. DIY systems are not eligible for grants.

There are competitive funding rounds for community applications. The deadlines for the final two rounds are 16 August and 13 December 2009. In these rounds the scheme will give priority to applications for wind or applications with an appropriate combination of two or more technologies. Other projects will not be excluded but in order to succeed they must be of a very high quality

Clear-Skies is likely to be superseded by the DTI Low Carbon Buildings capital programme – details will be announced later in 2009. The DTI have stated that they will almost certainly apply for EU State Aid Approval for the new scheme, which may extend its availability under certain conditions to SMEs, or community groups intending to sell surplus green electricity. However, the replacement scheme is also likely to give a greater emphasis on innovation, reducing, for example, the number of grants available for domestic solar water heating installations.

For further information go to **www.clear-skies.org** or ring 08702 430 930

9.3.5 Community Renewables Initiative

The Community Renewables Initiative was put together by the Countryside Agency with funding from DTI. The Initiative involves the establishment of 10 Local Support Teams throughout England. Each Local Support team provides advice and support for the development of community based renewable energy projects. The Initiative does not provide grant funding but instead promotes and assists developments which:

- are environmentally sensitive;
- have support of all stakeholders;
- are appropriate to the circumstances of the locality;
- link to other diversification and regeneration schemes.

The Local Support Team for the Yorkshire and Humber region is based at the Yorkshire Renewable Energy Network. For further information contact them on 01422 846 648 or e-mail info@yren.org.uk. This too is likely to be superseded by an advice element within the proposed DTI Low Carbon Buildings capital programme – details will be announced later in 2009.

9.3.6 The Low Carbon Buildings Programme

In June 05 the DTI produced a Consultation document on Microgeneration and the Low Carbon Buildings Programme (the Programme).

It is proposed that the Programme will replace the PV Solar and Clear Skies grants and operate for a 6-year period from April 1st 2006 (subject to securing State Aids approval). Projects will be submitted in response to calls for proposals and will be assessed against a set of published criteria by a panel of experts and selected on a competitive basis. The criteria will be developed in conjunction with the Renewables Advisory Board. The process for project selection will also give consideration to ensuring that the full range of technologies is represented within the programme. There will be two streams of funding – one (stream 1) for individual and community projects, the other (stream 2) for larger scale developments.

The programme will be "technology blind", in other words no single technology will be favoured over another. Priority will be given to projects (under both streams of funding) that demonstrate an integrated design approach to carbon savings through energy efficiency measures as well as the installation of heat and/or electricity generation technologies. Capital grants will not be available from the DTI for the energy efficiency measures, but applicants will be encouraged to access other sources of funds such as the Carbon Trust's Energy Efficiency Loans or grants provided by local authorities and energy service providers.

The overall focus of the programme is on larger scale projects to generate economies of scale and projects that can be replicated across the UK. Therefore the programme will look to support the following developments –

- Larger scale developments including residential, commercial and public sector developments
- Developments that have wide applicability to other similar projects
- New build and refurbishment projects

10 SUSTAINABLE ENERGY TOOLKIT

The key elements of a sustainable energy toolkit are:

- reliable energy data (see Section 4 and RSS)
- clear planning guidance (see Section 5)
- information about, and access to, grants and other funding schemes (See Section 9)
- calculation and modelling tools, with benchmarking data

This section will concentrate on the final element of the toolkit.

10.1 Calculation and Modelling Tools

10.1.1 Domestic Energy Efficiency

Most UK modelling tools are based upon the Building Research Establishment's Domestic Energy Model, BREDEM which incorporates the results of many empirical measurements on energy consumption in real homes, rather than being solely based on theoretical calculations.

The Standard Assessment Procedure (SAP) and the National Home Energy Rating were introduced in Section 6.1, and is required for reporting under the Home Energy Conservation Act (HECA) and compliance with Building Regulations. For building regulations SAP values have to be computed using approved software issued through an authorised SAP Assessor using a quality system.

SAP can, in its current (2001) version be calculated from a worksheet[23] or, more commonly through purchasing software that allows building parameters to entered to compute a rating. Various software packages exist, allowing input from plans or measurements taken by building surveyors. Approved SAP software suppliers are listed in Section 11.

The National Home Energy Rating, which has a wide following among those concerned with affordable warmth, is available only through licensees of National Energy Services Ltd – again details are included in Section 11.

For setting targets, and monitoring performance against these targets, most local authorities will need to combine SAP/NHER calculations with a database. There are several database solutions that integrate with the various vendors' SAP approved software, as well as links to allow transfer of energy rating data to a larger stock condition database. Many of these databases permit estimated SAPs to be included, sometimes based upon a reduced dataset (RD-SAP), to enable reasonably accurate calculations across an entire local authority district.

At a more basic level, HECAMON is available freely to local authorities from Defra. This provides documentation and software to enable an authority to undertake a telephone or postal survey of residents to ascertain changes in energy efficiency resulting from HECA activity.

EcoHomes (see Section 6.1.1) is sometimes seen as a way of setting energy targets. It does however draw upon SAP/NHER software, with some adjustments, to calculate CO_2 emissions, and a good performance on non-energy factors can offset a relatively weak score on energy and carbon.

For giving individual householders advice on energy efficiency, the simplest route is still to go via the local Energy Efficiency Advice Centre, and all North Yorkshire authorities have good links with the York and North Yorkshire centre. Householders are able to complete a DIY Home Energy Check that is processed via the Energy Saving Trust's DaX system to provide recommended measures. Slightly more sophisticated calculations are available via the Internet, for example through the Powergen E-efficiency online survey which is based on a simplified BREDEM model and rates homes

[23] This may no longer be possible when SAP 2005 is introduced.

on the new A-G scale being introduced to comply with the EC Energy Performance of Buildings Directive.

There are some sites that can give estimates of Carbon Dioxide (CO_2) emissions by individuals. The Powergen E-efficiency programme produces a relatively sophisticated estimate of household emissions, based upon standard occupancy patterns. A much simpler conversion tool is available on the National Energy Foundation website, which allows users to enter energy consumption data (kWh from bills, litres of petrol, miles travelled etc.) to calculate CO_2 emissions.

10.1.2 Non-domestic Energy Efficiency

There is a wide range of energy analysis software for the non-domestic market, much of it based on monitoring and targeting. There are also a large number of data collection and analysis companies able to assist in the energy management of industrial, commercial and public sector organisations. Some software is also associated with Building Energy Management Systems (BEMS) that can download data as a check on the system performance.

As part of the EC Energy Performance of Buildings Directive, the Building Research Establishment has been commissioned by Defra to create software that may be freely used to analyse building energy performance, and to produce a rating and report in line with the terms of the Directive. This software, which can currently be downloaded freely in a □-test version from the BRE website runs on an Access platform.

However there is less in the way of consolidation software that might be usable by a local authority to monitor energy consumption across its entire district.

The non-domestic version of EcoHomes is known as BREEAM (Building Research Establishment Environmental Assessment Model). BREEAM assesses the performance of buildings in the following areas:

- management: overall management policy, commissioning site management and procedural issues
- energy use: operational energy and carbon dioxide (CO_2) issues
- health and well-being: indoor and external issues affecting health and well-being
- pollution: air and water pollution issues
- transport: transport-related CO_2 and location-related factors
- land use: greenfield and brownfield sites
- ecology: ecological value conservation and enhancement of the site
- materials: environmental implication of building materials, including life-cycle impacts
- water: consumption and water efficiency

Credits are awarded in each area according to performance. A set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is then rated on a scale of PASS, GOOD, VERY GOOD or EXCELLENT, and a certificate awarded that can be used for promotional purposes.

BREEAM covers a range of building types:

- offices
- industrial units
- retail units
- schools

Other building types, such as leisure centres and laboratories, can be assessed using a bespoke version of BREEAM.

10.1.3 Renewable Energy Assessments

RETSCREEN is a freely downloadable renewable energy model produced by the CANMET energy technology centre in Canada. RETSCREEN has modules able to calculate energy performance and cost-benefits for nine technologies:

- Wind
- Small Hydro
- Photovoltaics
- Combined Heat & Power
- Biomass Heating
- Solar Air Heating
- Solar Water Heating
- Passive Solar Heating
- Ground-Source Heat Pumps

The RETScreen International Clean Energy Project Analysis Software consists of a standardised and integrated project analysis tool which can be used world-wide to evaluate the energy production, life-cycle costs and greenhouse gas emission reductions for various types of proposed energy efficient and renewable energy technologies compared to conventional energy projects. In addition to the software, the tool includes product, cost and international weather databases; an online manual; a case study based electronic textbook; and an Internet-based Marketplace.

The Department of Trade and Industry wind speed database (**NOABL**) contains estimates of the annual mean wind speed throughout the UK. The data is the result of an air flow model that estimates the effect of topography on wind speed. There is no allowance for the effect of local thermally driven winds such as sea breezes or mountain/valley breezes. The model was applied with 1km square resolution and should only be used as a guide, to be followed by on-site measurements for a proper assessment. Each value stored in the database is the estimated average for a 1km square at 10m, 25m and 45m above ground level, referenced to the Ordnance Survey national grid.

There are many more sophisticated software packages available for specific renewable energy technologies. Most of these are likely to be purchased by specialist consultants, architects or installers, and are unlikely to be needed directly by local authorities. Examples include **T-Sol** or **PolySun** for solar thermal applications, **PV-Syst** for photovoltaics and **WASP** or **WindPro** for wind modelling.

11 GLOSSARY OF TERMS

6th Framework	Sixth Framework Programme of the European Union covering research and demonstration of emerging technologies; used to support large-scale energy programmes through its ENERGIE and CONCERTO funding streams.
Acid Rain	Caused by emissions of acidic gases as a result of burning fossil fuels, effects include death of trees downwind of large power stations (eg, in Scandinavia from Yorkshire coal plants) and acidification/eutrophication of lakes.
AEAT	Commercial consultancy that produced Renewable Energy Targets for Yorkshire and Humber report.
Affordable Warmth	Ability of the lowest income groups, reliant on benefits or national minimum wage, to pay to heat their home to a recognised standard (opposite of Fuel Poverty).
Anaerobic Digestion	Technique to extract fuel gas (largely methane) and organic fertiliser from farm waste or slurry; regarded as a renewable energy resource.
AWI	Affordable Warmth Index; measure of how close a low-income household is to being able to afford to heat their home.
BER	Building CO_2 Emissions Rate – see under TER, below.
BETTA	British Electricity Trading and Transmission Arrangements (qv).
Biofuels	Liquid or Gaseous fuels generated from crops, usually specifically grown for the purpose. The most common examples are Biodiesel, which can come from used cooking oil or oilseed rape (as RME), and ethanol, produced by fermentation of corn or sugar beet. Many biofuels are blended with conventional diesel or petrol (ethanol) to permit them to be used in normal engines without requiring conversion.
Biomass	Solid fuel created from crops or forest residues. Examples range from traditional logs to processed fuels such as wood chips or wood pellets.
BRE	The Building Research Establishment (qv).
BREDEM	The Building Research Establishment's Domestic Energy Model, used to estimate energy consumption, carbon dioxide emissions and running costs for UK homes. BREDEM lies at the heart of the Government's SAP and the NHER.
BREEAM	The Building Research Establishment Environmental Assessment Method, used for offices, industrial and retail units and schools. BREEAM for dwellings is now known as EcoHomes.
British Electricity Trading and Transmission Arrangements	BETTA provides a common set of rules for access to and charging for the transmission network, so that electricity can be traded freely across Britain. Replaced NETA (which gave lesser access for small scale renewables) and is administered through Ofgem.
Building Regulations	Apply to all new developments setting minimum standards. Part L (the Conservation of Fuel and Power) provides rules on energy efficiency and requires calculation of the SAP and a Carbon Index; L1 covers homes and L2 non-domestic dwellings. From 2006 the regulations will be changed requiring instead a TER to be calculated, see below.
Building Research Establishment	Technical Research Institute based as Garston, Watford, formerly directly part of Government but now controlled by an independent Foundation. Owns the intellectual rights to BREDEM, BREEAM and EcoHomes.
Carbon Index	The Carbon Index, on a scale of 0 to 10, is based on the annual CO_2 emissions associated with space and water heating of a property and can be used to demonstrate compliance with Building Regulations Part L1.
Carbon Management	An approach to combating global climate change focusing on CO2 emissions, rather than energy use, designed for use by business and fostered by the Carbon Trust.

Carbon Offset [Fund]	The principle of Carbon Offsets is that it is often cheaper to fund carbon savings at another location from that creating the carbon emissions. Carbon Offsets can be made through funding investments in energy efficiency, renewable energy or, occasionally, through tree-planting schemes. A Carbon Offset Fund is a collective mechanism for such offsets, typically associated with a new development seeking carbon neutrality.
Carbon Trust	The Carbon Trust is an independent company funded by Government, aiming to help the UK move to a low carbon economy by helping business and the public sector reduce carbon emissions and capture the commercial opportunities of low carbon technologies.
CHP	Combined Heat & Power (qv).
Climate Change Agreements	Voluntary agreements between industrial sectors (usually made through trade associations) and the Government to reduce energy use and thereby to qualify for a reduced rate (20%) of payment under the Climate Change Levy.
Climate Change Levy	A levy imposed on non-domestic users of gas and electricity since 1.4.2001 and collected by utilities on behalf of HM Customs & Revenue. Organisations can claim exemption from the Levy for electricity from Renewables or Good Quality CHP.
CO_2	Carbon Dioxide, the main greenhouse gas, formed by the combustion of all fossil fuels.
Co-firing	The inclusion of proportion of biomass alongside coal being burnt in a power station.
Combined Heat & Power	Unlike conventional methods of electricity generation, a plant in which some of the waste heat generated is used for industrial processes or heating and hot water in buildings. The heat used in this way displaces heat that would otherwise have to be supplied by burning additional fuel and so leads directly to a reduction in emissions.
Community Heating	Residential Community Heating (RCH) is the centralised supply of heat, for space heating and domestic hot water.
Community Renewables Initiative (CRI)	Government-supported programme to provide advice and support for the development of community-based renewable energy projects; offered in North Yorkshire through YREN.
Contraction & Convergence	A concept and tool for managing CO_2 emissions, initially proposed by the Global Commons Institute, under which all countries will work towards a common level of per capita emissions by 2050.
Demand Side Management (DSM)	Programmes (such as installing energy efficiency measures) that are designed to reduce demand for energy, often implemented to avoid creating new generation capacity or extending an electricity grid.
DER	Domestic Emissions Rate – see under TER, below.
DG-TREN	The European Union's Directorate for Transport and Energy.
Distributed Generation	The inclusion of a large number of relatively small electricity generating plants (typically from renewables, but also including CHP or fuel cell units) on an electricity grid network.
Eaga	Formerly the Energy Action Grants Agency, a private company responsible for administering the Government's WarmFront grants programme in North Yorkshire.
Eco House	A demonstration house showing low-energy and other environmental features. Examples have been built at Leicester, Bristol, Middlesbrough and elsewhere.
EcoHomes	The version of the Building Research Establishment Environmental Assessment Method used for domestic dwellings. Assessment can be at four levels, and is sometimes used to set standards for new developments. Includes credits for carbon emissions, renewable energy and other factors.

EEAC	Energy Efficiency Advice Centre (qv).
EEAS	Energy Efficiency Accreditation Scheme (qv).
Emissions Trading	The exchange of permits to emit CO_2 by large organisations, generally on a public exchange such as the IPE in London. Under the EU Emissions Trading Scheme (ETS), each country creates a National Allocation Plan, which is then split between sectors and the largest firms in those sectors. Companies that make CO_2 savings in excess of their requirements can sell permits or companies that have failed to meet their targets, thereby allowing least-cost reductions to the overall limit.
Energy Action Plan	A route map offering local authorities and others a clear and cost-effective way of reducing energy consumption and associated CO_2 emissions.
Energy Bus	A mobile display unit (often a converted PSV, hence its name) that can be taken to events and schools to demonstrate issues surrounding sustainable energy.
Energy Conservation	The reduction of energy consumed, usually by changing habits or patterns of use, and not requiring significant financial investment.
Energy Conservation Authority (ECA)	The body with statutory requirement to report to Government on energy savings under the Home Energy Conservation Act, 1995. In North Yorkshire the ECAs are the local authorities and City of York.
Energy Efficiency	The creation of greater utility (more heat, light or power) for each unit of energy consumed; typically requiring investment (eg. in better designed equipment or through adding insulation to buildings).
Energy Efficiency Accreditation Scheme	A scheme operated by the Carbon Trust certifying reductions in specific energy consumption and energy management policies and procedures, through an award valid for three years.
Energy Efficiency Advice Centre	An independent centre, largely funded by the Energy Saving Trust, offering advice to domestic consumers on energy efficiency and conservation. Likely to be superseded by Sustainable Energy Centres with a wider remit (including transport and renewables). The centre for York and North Yorkshire is based in York.
Energy Efficiency Commitment	Requirement placed upon gas and electricity companies to make a certain level of energy savings (expressed in GWh/annum) from their customers, and overseen by Ofgem.
Energy Hierarchy	A logical order in which sustainable energy systems should be introduced, starting with using less energy by avoiding waste, then using energy efficiently, generating energy from renewable resources and finally requiring any remaining energy to be produced from the least polluting sources of fossil fuels.
Energy Performance of Buildings Directive	EU Directive that will require energy labelling of buildings at time of change of ownership or tenure, with more regular and public reporting for public buildings.
Energy Policy	A set of principles designed to lead to a secure and reliable supply of energy, at an acceptable price, with a maximum acceptable level of environmental damage or risk. May be set at a national, regional, county or local level.
Energy Saving Trust	An independent Government-funded company working to increase energy efficiency, principally in the domestic and transport sectors.
Energy Services Company	See ESCO, below.
ESCO	AnEnergy Services Company that sells services from energy (heat, light, power, etc.) rather than the energy itself. ESCOs should then invest in technology to produce these services most energy efficiently in order to maximise their profit, but ESCOs have proved difficult to establish in the UK.
EST	The Energy Saving Trust (qv).
ETS	The EU Emissions Trading Scheme (qv).

Fossil Fuels	Fuel sources created from fossil remains of plants stored underground for millions of years, and now extracted. The principal fossil fuels are coal, oil and natural gas. All fossil fuels produce carbon dioxide (and water) when burnt, and so contribute to global climate change.
Fuel Cells	A relatively efficient, but very expensive, way of generating electricity through the direct combination of hydrogen (or a hydrogen-rich fuel such as methanol) with oxygen from the air. Seen by some as a likely future form of power for both vehicles and static applications.
Fuel Poverty	A household suffering from fuel poverty cannot afford to heat its home to an adequate level without using an excessive level (above 10%) of household income.
GHG	Greenhouse Gas (qv).
Global Climate Change	A process of changes to weather patterns and temperatures largely caused by the emissions of certain "greenhouse gases" by mankind, principally associated with burning fossils fuels (qv).
Global Warming	Older term for Global Climate Change, now deprecated as although average temperatures will rise across the world, regional variations may include significant drops, eg. if climate change causes the Gulf Stream to change direction. Warming does not also imply a forecast increase in the number of storms or damaging floods.
Good Quality CHP	Combined Heat & Power (qv) that meets both a Quality Index and a Power Efficiency threshold and so qualifies for exemption under the Climate Change Levy (qv). Although self-certified, for CCL exemption, organisations must seek approval from the CHPQA programme administered by Defra.
Greenhouse Gases	The six main gases contributing to Global Climate Change (qv). So called because they collect in the upper atmosphere and prevent some of the energy from being re-transmitted into space, analogously with the way that glass in a greenhouse traps in solar energy. The gases are, in order of global impact, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride (SF_6).
Ground Source Heat Pump	A device used to extract low-grade heat stored in the ground (and replenished by the sun shining on its surface) and used to heat water, typically for use in central heating systems.
GSHP	Ground Source Heat Pump (see above).
HECA	Home Energy Conservation Act (see below).
Home Energy Conservation Act	The Home Energy Conservation Act 1995 requires local authorities to report to Government on the achievement of energy efficiency gains in their districts over the period 1995-2010.
Hydrogen Economy	A proposed future where hydrogen (in liquid or comp form) will become the principal energy carrier. Hydrogen will be generated cleanly from sea water using renewable energy, and then recombined in fuel cells to provide electricity to power vehicles or for domestic or industrial use.
IEA	International Energy Agency, headquartered in Paris. Source of data on national CO_2 emissions, as well as maintenance of strategic energy reserves.
Intelligent Energy for Europe	Programme run by the European Commission's DG-TREN encouraging energy efficiency, renewable and sustainable transport systems.
IPCC	Intergovernmental Panel of Climate Change; responsible for assessing much of the science behind global climate change and making recommendation to member governments.
Joule (J)	SI unit of Energy (1J = 1 kg m/s^2). The Joule is a small unit, so commonly expressed as MJ (million J), GJ (10^9J) or TJ (10^{12}J). For energy consumption the kWh is often used instead of the Joule; 1kWh = 3,600,000J)

Kilowatt Hour (kWh)	The most commonly used unit of energy for domestic applications, used for sale of both gas and electricity. As with Joules, larger units are also needed such as MWh (1,000 kWh) or GWh (1,000,000 kWh). See also Watt for units of power.
Kyoto	International conference (1996) leading to agreement and Protocol requiring signatories (industrialised countries only) to commit themselves to reducing CO_2 emissions by defined percentage levels over the period 1990-2010/12. The UK should meet its Kyoto commitments; most other countries will not.
Land Use Consultants	The UK's first multi-disciplinary environmental consultancy, responsible for these guidelines in partnership with the National Energy Foundation.
Local Strategic Partnership	Local Strategic Partnerships (LSPs) are non-statutory, multi-agency bodies, matching local authority boundaries, which aim to bring together at a local level the different parts of the public, private, community and voluntary sectors. LSPs have an important role in developing an communicating energy policies leading to an Energy Action Plan.
LPG	Liquified Petroleum Gas, a fossil fuel used off-grid for heating, and also as a marginally cleaner alternative to petrol in vehicles.
LUC	Land Use Consultants (qv).
LZC	Low and Zero Carbon energy sources, which are defined in the 2006 Draft Building Regulations Approved Documents as including "solar hot water, photovoltaic power, bio-fuels (eg. wood fuels and oil blends), combined heat and power (at the building or community levels) and heat pumps".
Market Transformation Programme	Defra funded programme to encourage the introduction of low-energy appliances in the UK, including compliance with EU standards and labelling requirements.
Micro-CHP	Very small scale Combined Heat and Power (qv), typically at the level of a single household or office building. Not cost-effective at present, but seen as an intermediate technology that may have a major role to play in reducing CO_2 emissions in the 2010-2025 period.
National Allocation Plan	Plan dividing up total CO_2 emissions permitted under the EU Emissions Trading Scheme between market sectors.
National Energy Foundation	Charity promoting sustainable energy that has co-authored this report with Land Use Consultants.
National Home Energy Rating Scheme	The UK's first domestic energy label, rating homes on a scale from 0 to 10. Based on BREDEM, the NHER is an energy-cost index that (unlike SAP) takes into account location factors (shelter, orientation, region) and lights and is widely used as a tool to combat fuel poverty.
NEA	NEA (National Energy Action) is a charity principally working to combat fuel poverty.
NEF	The National Energy Foundation (qv).
NHER	National Home Energy Rating Scheme (qv).
Offshore	Location for a number of prospective renewable energy sources, including wind (already cost-effective), tidal energy and wave energy. Hampered by high costs, but likely to become increasingly important for coastal communities.
Ofgem	The Government's Office for Global Energy Markets, regulates the gas and electricity industries as well as overseeing BETTA and the Energy Efficiency Commitment.
Photovoltaics	A means of direct electricity generation from the sun (or bright daylight). PV is generally based on silicon technology, either in crystalline or amorphous form, arranged as cells linked into modules, arranged as an array. One of the cleanest forms of energy, it suffers from a high capital cost.
PV	Photovoltaics (see above).

Renewable Energy	Collective terms (or renewables) for energy from natural unlimited sources. Generally taken to include wind, solar thermal, solar electric (PV), hydro-power, wave, tidal, biomass, biofuels, and ground source heat pumps. Energy from Waste is not generally regarded as renewable, although there is an area of overlap, for example in straw as a by-product of grain from food.
Renewables Obligation	The Renewables Obligation is the Government's main mechanism for supporting renewable energy. Introduced in April 2002, it requires licensed electricity suppliers to source specified percentages of the electricity they supply from renewable sources, set to increase each year from its current level of 4.9 per cent in 2004/05 to 10.4 per cent by 2010/11 and to reach 15.4 per cent by 2015/16.
RETSCREEN	RETSCREEN is a downloadable renewable energy model produced by the CANMET energy technology centre in Canada comprising modules able to calculate energy performance and cost-benefits for nine renewables.
RME	Rape Methyl Ester; commonly produced biofuel (qv).
ROC	Renewables Obligation Certificates can be sold by (small-scale) producers of renewable energy to larger companies to help the latter meet their renewables obligation.
Royal Commission on Environmental Pollution (RCEP)	An independent permanent body that in its 22nd report, Energy – the Changing Climate, set the scene for current UK energy policy, including the long-term focus on reducing CO_2 emissions by 60% by 2050.
SAP, the Standard Assessment Procedure	The Government's way of calculating the energy performance of dwellings, reported on a scale of 1-120 (SAP2001, soon to be replaced by a 1-100 scale in SAP2005). SAP ratings are required to be displayed on all new dwellings and provide one way of demonstrating compliance with Part L1 of Building Regulations.
Sequestration	A means of capturing carbon dioxide (for example from large power stations) and storing it underground, typically in old oil or gas fields. Sequestered CO_2 can also be used to enhance recovery from declining fossils fuels, and is only being used experimentally to lower atmospheric CO_2 levels.
Small-scale Hydro	Hydro-electric power that typically produces no more electricity than that used by a single building or small community, and may be retrofitted into an old mill run, or similar. Unlike large scale hydro developments, does not suffer from a need to flood land for new reservoirs.
Solar Thermal	Use of the sun's energy to provide useful heat. In the UK this is most commonly as Solar Water Heating (SWH) to provide domestic hot water, pre-heating for industrial use or swimming pool heating. Solar thermal is also used less commonly for space heating or cooling (through absorption units).
Sustainable Energy	A system of generating and using energy does that not adversely impact future generations, either through depletion of finite resources or the creation of pollution (including contribution to climate change).
SWH	Solar Water Heating (see under Solar Thermal).
TER	Target carbon dioxide Emission Rate, measuring CO_2 emissions per square metre of floor space for buildings. Introduced by the 2006 Building Regulations, it serves as the primary method pf compliance with those regulations for new buildings. In the domestic sector the TER is calculated using the SAP (qv), and in the non-domestic sector from the SBEM (Simplified Building Energy Model). In each sector the initial carbon emissions are adjusted by two factors including one giving credit for the use of low or zero carbon energy sources (LZC, qv). Having calculated the TER, this must then be compared with the actual DER (domestic emissions rate) or BER (Building CO_2 Emission Rate).
WarmFront	A large scale Government scheme to improve energy efficiency for low income, private sector households, with the aim of helping eliminate fuel poverty by 2012.

Waste, Energy from (EfW)	Energy generated from the combustion of household or commercial waste; not generally considered as a renewable source in the UK. Where possible, the organic elements of waste (which are potentially combustible) should be recycled (eg. paper) or composted, in preference to burning for energy.
Watt	SI unit of power; energy = power x time. As the Watt is a small unit, power station capacities (including renewable sources) are usually expressed in MW (million Watts) or kW. The suffix p is used to show peak output of variable renewable generators, so that a domestic PV array may be quoted as having an output of $5kW_p$. For sources such as CHP or solar thermal, the suffixes e for electric output and the for thermal output may be used.
YREN	Yorkshire Renewable Energy Network
Zero Carbon Development	A new building scheme that is designed to result in no new net CO_2 emissions, such as the BedZed development in London. This can be achieved by installing renewable energy features that over a year export as much energy to the Grid as is used from the Grid, or by contributing to a Carbon Offset Fund (qv) to achieve carbon neutrality.

Simple Table of Carbon Equivalences

Energy Source	Common Source Unit	CO_2 emissions	Carbon emissions	CO_2 emissions per delivered GWh (tonnes)
Grid Electricity	kWh	0.43kg	0.12kg	430
Natural Gas	kWh	0.19kg	0.05kg	190
Petrol	litre	2.31kg	0.63kg	260
Diesel oil (Gasoil)	litre	2.68kg	0.73kg	251
Domestic heating oil	litre	2.52kg	0.69kg	248
LPG	litre	1.51kg	0.41kg	213
Coal	tonne	2,419kg	660kg	506
Renewables	kWh	0kg	0kg	0

Source: Defra, Environment Reporting Guidelines June 1999, as amended. The Grid Electricity figures are based upon a forecast average for 1998-2000 as used for CCL and ETS purposes; it is fixed for the period to 2010, but is widely thought to underestimate real carbon emissions. The zero figure for renewables relates to on-site production, or to certified green electricity.

Some allowance could be made for fossil fuel inputs into production of biomass products, depending on the closeness of the source and method of production, but there are also transport emissions which can be very significant for some fossil fuels, such as natural gas produced from LNG (where much of the energy is used in compression and cooling) and in transporting cheap open cast coal from Australia.

For comparison purposes only, a figure is also given of carbon dioxide emissions for a standard unit of energy using typical calorific values for the fuel concerned.

TECHNICAL ANNEX A – CALCULATION OF MICRO-GENERATION POTENTIAL FOR 2010 AND 2021

The following tables detail the number of domestic and non-domestic properties in each District and the proportion on and off the gas grid and an estimate of the new build rates. These are then related to the estimated market penetration of each technology by 2010 and 2021 in each of the existing and new build sectors. The market penetration projections are based on feedback from the relevant trade bodies[24], experience of market development in other European Countries (especially those that have had active national or regional Government support such as Germany, Austria and Denmark) and NEF's knowledge of the sector.

Table A1: Property distribution – 2010

2010	Dwellings on gas network	Off gas network	New build by 2010	Non domestic on gas network	Off gas network	New build by 2010
Craven	16,139	8,174	1,138	470	1,547	31
Hambleton	27,790	8,519	1,950	505	1,825	33
Harrogate	56,778	6,139	3,413	1,632	2,993	106
Richmondshire	10,841	9,618	1,138	287	865	19
Ryedale	16,481	6,270	975	374	1,170	24
Scarborough	38,171	13,433	2,275	887	2,773	58
Selby	26,783	5,176	1,625	400	1,130	26
York	73,359	5,782	3,738	1,501	2,774	98
N Yorkshire	**266,342**	**63,111**	**16,250**	**6,056**	**10,802**	**394**

Table A2: Property distribution – 2021

2021	Dwellings on gas network	Off gas network	New build by 2021	Non domestic on gas network	Off gas network	New build by 2021
Craven	16,139	8,174	3,063	470	1,547	82
Hambleton	27,790	8,519	5,250	505	1,825	88
Harrogate	56,778	6,139	9,188	1,632	2,993	286
Richmondshire	10,841	9,618	3,063	287	865	50
Ryedale	16,481	6,270	2,625	374	1,170	65
Scarborough	38,171	13,433	6,125	887	2,773	155
Selby	26,783	5,176	4,375	400	1,130	70
York	73,359	5,782	10,063	1,501	2,774	263
N Yorkshire	**266,342**	**63,111**	**43,750**	**6,056**	**10,802**	**1,060**

The split between existing properties and new build is crucial in estimating market penetration, as the former can be influenced by planning guidelines and stiffer Building Regulations, whereas the latter are likely to respond to the Government's desire to encourage renewables mainly through grants and other incentives.

[24] Solar Trade Association, PV-UK – the British Photovoltaic Association, Ground Source Heat Pump Club, British Wind Energy Association, Renewable Power Association and the British Pellet Club.

There is no central database of properties with integrated renewable energy or microgeneration. The baseline is therefore open to some uncertainty, although there is little evidence that North Yorkshire districts vary much from the national average, except for a higher penetration of traditional biomass, associated with large areas off the gas network. By 2010, those technologies able to receive grants from Government programmes such as Clear-Skies (due to end in 2006) and its mooted successor for Low Carbon Buildings will have significantly increased penetration. New Build will be influenced by the new Building Regulation due to be brought into force for buildings approved after 1 April 2006; the move to a Total Carbon Dioxide Emission Rate (TER) as the primary means of compliance with Part L will encourage a focus on low carbon technologies. For non-domestic properties, the TER may be improved by the provision of low and zero carbon energy sources, which are defined in the current working draft[25] approved document L2A as including "solar hot water, photovoltaic power, bio-fuels (eg. wood fuels and oil blends), combined heat and power (at the building or community levels) and heat pumps".

Table A3: Penetration into market by 2010

	SWH	GSHP	Wood Heat	PV	Micro Wind
Domestic					
Existing on gas network	0.5%	0.01%	0.1%	0.05%	0.01%
Existing off gas network	2.0%	0.2%	0.5%	0.05%	0.01%
New Build	10.0%	10.0%	10.0%	2.0%	1.0%
Non Domestic					
Existing on gas network	0.2%	0.1%	0.1%	0.1%	0.1%
Existing off gas network	1.0%	0.5%	1.0%	0.1%	0.1%
New build	5.0%	5.0%	5.0%	3.0%	2.0%

To place some of these numbers into context, a 0.01% penetration for existing domestic properties (as in micro wind) represents just 33 homes by 2010, ie. an average of 6 homes per annum to receive this measure. Even 10% of new build homes (solar water heating) represents just 1625 homes. Implied numbers for micro wind are of course highly uncertain as although three products (Wind Save, Swift and Stealth Gen) have been launched onto the market in 2004-5, there is no data on likely take-up. Some of the marketing claims suggest that they could be financially attractive (and so might develop an early user base) but are thought to err on the optimistic side.

Table A4: Penetration into market by 2021

	SWH	GSHP	Wood Heat	PV	Micro Wind
Domestic					
Existing on gas network	2.0%	0.2%	0.2%	0.5%	0.5%
Existing off gas network	10.0%	3.0%	5.0%	0.5%	0.5%
New Build	50.0%	30.0%	20.0%	15.0%	5.0%
Non Domestic					
Existing on gas network	0.5%	0.5%	0.5%	1.0%	0.5%
Existing off gas network	3.0%	3.0%	5.0%	1.0%	0.5%
New build	25.0%	30.0%	20.0%	15.0%	5.0%

If the Government maintains its current policies, then all new properties built after the 2010 Building Regulations have come into force (which is likely to be some time in 2012) will require at least some form of microgeneration unless there are extenuating circumstances. Our view is that the method of choice of meeting these signposted regulations will be GSHP/processed wood heating systems (for

[25] The Building Regulations 2000, Conservation of Fuel and Power, Draft Approved Document L2A New buildings other than dwellings, Draft 2006 edition, published September 2005, TSO.

homes not on the gas network) or solar water heating (SWH) for homes using a gas central heating system. PV will be used in certain cases as the simplest (but more expensive) solution. In the non-domestic sector, solar water is less likely to be cost effective for many applications, and the overall penetration may be lower.

Table A5: Capacity and output

	SWH	GSHP	Wood Heat	PV	Micro Wind
Domestic					
Typical Capacity (kW)	2.5	5	10	2	1.5
Typical Output (kWh)	1,250	12,500	20,000	1,500	3,000
Non-domestic					
Typical Capacity (kW)	5	20	50	20	15
Typical Output (kWh)	2,500	50,000	100,000	15,000	40,000

We have used generally conservative assumptions about typical installed capacity and outputs, especially in the non-domestic sector as new properties in North Yorkshire are likely to be smaller than the UK average. **Solar Water Heating** is based on an average installed area of just over 3m^2 (domestic) 6.5m^2 (non-domestic), expressed in terms of capacity in kW_{th}. **Ground Source Heat Pump** is sized sufficient to heat a new property of around 100m^2/400m^2 floor area, built to 2006 Building Regulations. **Wood heat** capacity is somewhat higher, as these units are typically less tightly sized than GSHP, and focused on larger dwellings. Domestic **PV** is based an array that will generate $^1/_3$ of the annual electricity demand (using Ofgem's figures), requiring a £10,000 spend before grants at 2005 prices; in practice these are likely to fall significantly over the period to 2021. As before, the **Micro Wind** figures need to be treated with extra caution given the immaturity of the market, but are based on products currently available in the UK market. DTI considers any wind generator under 15kW to be a micro-generator, and we have assumed that the average non-domestic application will be approaching this figure, as it is likely to be the most cost-effective. At the domestic level, the newly available products typically claim a maximum output of 1.5kW, hence the figure used here.

2010 Potential Targets for Micro-Renewables

The next group of tables take the assumptions about property distribution (Table A1) and market penetration by technology (Table A3) with typical outputs (Table A5) to determine likely numbers of installations (Tables A6-A7), capacity (Table A8) and output (Table A9) for 2010.

Table A6: Number of domestic installations

2010	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	358	132	171	35	14
Hambleton	504	215	265	57	23
Harrogate	748	359	429	100	40
Richmondshire	360	134	173	33	13
Ryedale	305	112	145	31	12
Scarborough	687	258	333	71	28
Selby	400	176	215	48	19
York	856	393	476	114	45
N Yorkshire	**4,219**	**1,778**	**2,207**	**490**	**195**
Proportion of properties	*1.28%*	*0.54%*	*0.67%*	*0.15%*	*0.06%*

Although the figures above might look quite high, it should be borne in mind that in total that they only imply that one home in every 40 will have some sort of renewable energy feature incorporated, and that around a quarter of these will be using wood heating that would not be immediately obvious of a "drive-by" inspection. The largest category relates to Solar Water Heating which is being widely and actively marketed within the UK at present, and for which the annual number of installations is thought by the Solar Trade Association to have quadrupled over the past five years and to be continuing its exponential growth.

Table A7: Number of non-domestic installations

2010	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	18	10	17	3	3
Hambleton	21	11	20	3	3
Harrogate	38	22	37	8	7
Richmondshire	10	6	10	2	2
Ryedale	14	7	13	2	2
Scarborough	32	18	32	5	5
Selby	13	7	13	2	2
York	36	20	34	7	6
N Yorkshire	**140**	**80**	**134**	**29**	**25**
Proportion of properties	*0.83%*	*0.47%*	*0.79%*	*0.17%*	*0.15%*

By 2010, over half the installed capacity will be in connection with wood heating, with most of the rest attributable to Solar Water Heating and Ground Source Heat Pumps:

Table A8: Capacity MW (domestic and non domestic combined)

2010	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	0.98	0.85	2.58	0.13	0.06
Hambleton	1.37	1.30	3.67	0.18	0.08
Harrogate	2.06	2.23	6.13	0.36	0.16
Richmondshire	0.95	0.78	2.22	0.10	0.04
Ryedale	0.83	0.71	2.12	0.11	0.05
Scarborough	1.88	1.64	4.90	0.25	0.11
Selby	1.07	1.02	2.80	0.14	0.06
York	2.32	2.37	6.47	0.37	0.16
N Yorkshire	**11.25**	**10.48**	**28.76**	**1.55**	**0.66**

In output terms, the useful energy generated will be even more skewed towards the two main renewable heating options:

Table A9: Output GWh (domestic and non domestic combined)

2010	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	0.49	2.13	5.16	0.10	0.15
Hambleton	0.68	3.25	7.35	0.14	0.19
Harrogate	1.03	5.59	12.26	0.27	0.39
Richmondshire	0.48	1.95	4.44	0.08	0.10
Ryedale	0.42	1.77	4.24	0.08	0.12
Scarborough	0.94	4.11	9.81	0.19	0.28
Selby	0.53	2.56	5.60	0.11	0.14
York	1.16	5.92	12.93	0.28	0.38
N Yorkshire	**5.62**	**26.21**	**57.51**	**1.16**	**1.58**

2021 Potential Targets for Micro-Renewables

As in calculating figures for 2010, the next group of tables take the assumptions about property distribution (Table A2) and market penetration by technology (Table A4) with typical outputs (Table A5) to determine likely numbers of installations (Tables A10-A11), capacity (Table A12) and output (Table A13) for 2021.

Table A10: Number of domestic installations

2021	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	2,671	1,196	1,053	581	275
Hambleton	4,033	1,886	1,532	969	444
Harrogate	6,343	3,054	2,258	1,693	774
Richmondshire	2,710	1,229	1,115	562	255
Ryedale	2,269	1,009	871	508	245
Scarborough	5,169	2,317	1,973	1,177	564
Selby	3,241	1,521	1,187	816	379
York	7,077	3,339	2,448	1,905	899
N Yorkshire	**33,513**	**15,551**	**12,438**	**8,210**	**3,835**
Proportion of properties	*10.2%*	*4.7%*	*3.8%*	*2.5%*	*1.2%*

Solar Water Heating will remain the most widespread technology in terms of simple numbers of installations for the domestic sector, although it is likely to be overtaken by the main space heating technologies in the non-domestic sector. Ground Source Heat Pumps are expected to make the greatest proportionate increase of the main technologies, as their benefits become more widely recognised (they are, for example, already considered a mainstream technology in Sweden, where the slightly harsher winters have historically justified the additional installation costs). As before, the largest uncertainty surrounds micro wind, as the technology currently least well developed.

Table A11: Number of non-domestic installations

2021	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	69	73	96	33	14
Hambleton	79	84	111	37	16
Harrogate	169	184	215	89	37
Richmondshire	40	42	55	19	8
Ryedale	53	57	73	25	11
Scarborough	126	134	174	60	26
Selby	53	57	73	26	11
York	156	170	199	82	35
N Yorkshire	**619**	**672**	**782**	**328**	**137**
Proportion of properties	*3.7%*	*4.0%*	*4.6%*	*1.9%*	*0.8%*

Total installed capacity is likely to reach almost 375MW by 2021. Two-thirds will still be attributable to the two main space heating technologies, although direct electricity generation (PV and wind) may be approaching 10% for the first time. The average capacity and output figures will not change significantly from those in Table A5, even though there may be some improvements to unit efficiencies.

Table A12: Capacity MW (domestic and non domestic combined)

2021	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	7.03	7.45	15.34	1.81	0.62
Hambleton	10.48	11.11	20.89	2.67	0.91
Harrogate	16.70	18.94	33.33	5.17	1.72
Richmondshire	6.97	6.99	13.89	1.50	0.51
Ryedale	5.94	6.17	12.39	1.52	0.53
Scarborough	13.56	14.27	28.44	3.55	1.24
Selby	8.37	8.74	15.50	2.15	0.74
York	18.47	20.09	34.42	5.45	1.87
N Yorkshire	**86.88**	**91.20**	**163.50**	**22.97**	**7.81**

The greater utilisation of heating systems will however mean that output will remain dominated by the two heating technologies, together providing an estimated 550GWh of useful energy for North Yorkshire:

Table A13: Output GWh (domestic and non domestic combined)

2021	SWH	GSHP	Wood Heat	PV	Micro Wind
Craven	3.51	18.62	30.68	1.36	1.39
Hambleton	5.24	27.77	41.78	2.00	1.98
Harrogate	8.35	47.36	66.65	3.88	3.82
Richmondshire	3.49	17.48	27.77	1.13	1.10
Ryedale	2.97	15.44	24.78	1.14	1.17
Scarborough	6.78	35.67	56.87	2.66	2.74
Selby	4.18	21.86	31.00	1.61	1.58
York	9.24	50.21	68.84	4.09	4.08
N Yorkshire	**43.44**	**228.00**	**327.00**	**17.23**	**17.00**

By 2021 it is possible that North Yorkshire will be beginning to see additional technologies that are still at an experimental stage:

- **Air source heat pumps** – which work in a similar manner to room air conditioners in reverse. These have lower coefficients of performance than ground source units, but can be more easily retrofitted into existing homes. A pilot study has been undertaken in the county, including a sheltered accommodation unit in Scarborough, and has the possibility for replication.
- **Solar Air Heating** – often linked to whole house ventilation systems, at least one system (Nu-aire) is currently being marketed on the UK market. These systems may have a significant penetration by 2021, primarily in the new build markets (both domestic and commercial).
- **Micro-CHP** – which has been treated for these guidelines as an energy efficiency measure unless it uses a biomass energy input. Although biomass fuelled systems are available in Europe, their low penetration and relatively high capital costs makes them unlikely to have a material impact in the UK before 2021.
- **Fuel cells** (and the hydrogen economy) – these are linked as to be considered a low carbon technology, fuel cells have to run from hydrogen that has itself been generated from a renewable source (typically electrolysis of water, using PV or wind-generated electricity). Very high capital costs, coupled with significant unresolved R+D issues make it highly unlikely that there will be more than a few demonstration systems (such as those already in place at Woking and Beacon Farm, Loughborough) in the UK before 2021.