



Biomass Action Plan

Buckinghamshire & Chiltern Hills



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1. Executive summary

The green economy of Buckinghamshire can grow by increasing the use of biomass energy. By increasing the use of biomass across Buckinghamshire and the Chiltern Hills we can help grow a local green economy. This will benefit woodland owners by providing a market for their wood whilst providing an incentive for owners of currently unmanaged woods, to bring their woodlands into management for the benefit of biodiversity. The growth of the biomass market will further benefit installers, plumbers and forestry intermediates, while providing considerable savings on fuel cost.

This document has been produced by the TIMBER project, a partnership set up under the European initiative “POWER Programme: Low Carbon Economies (INTERREG IVC)”. In Buckinghamshire a strong stakeholder group of both policy makers and practitioners has shaped the Biomass Action Plan.

In order to achieve the aims set out in this plan, tables of actions have been provided making it easy for stakeholders to identify where they can act. This plan sets out the actions needed from local authorities, estate and property managers, to achieve the vision above.

Illustration Acknowledgements and Copyright

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2. Aims and Objectives

The green economy of Buckinghamshire can grow by increasing the use of biomass energy across Buckinghamshire and the Chiltern Hills. This will help cut carbon emissions across the county and will secure a local source of energy.

The green economy will be strengthened through local building service contractors increasing their skills in installation and maintenance of biomass boilers. Woodland owners and managers will see an increased demand for wood for fuel, bringing them a better return from their woodlands. Biodiversity will benefit from the increased area of woodlands coming into sustainable management across the county.

This biomass action plan provide a framework in which biomass energy provides a local, sustainable, cost-effective and secure source of energy. It should maximise benefits to residents, business and the environment with the following aims:

- Developing a local **Green Economy** by supporting and expanding biomass related industry.
- Supporting **Sustainable Forestry** by bringing unmanaged woodlands back into management by providing a viable source of income.
- Increasing the **Demand** for biomass energy, ensuring we meet national Renewable Energy targets.
- Increasing the **Supply** of local biomass to ensure a stable, reliable and uninterrupted energy supply.

3. Background to the TIMBER Project

The TIMBER (Tools for Integrated Management of Biomass Energy Resources) project is a European initiative developed within the framework of the “POWER Programme: Low Carbon Economies (INTERREG IVC)” whose main objective is to design a standard model for the regional development of sustainable and renewable energy based on biomass resources.

The TIMBER partnership consists of five organisations: the municipality of Boxel in close cooperation with Streekraad Groene Woud; the Energy Agency of Cadiz in Andalucía, the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences in the Malopolska region, the Office of Regional Planning Stockholm County Council and ngame solutions in the UK.

In Buckinghamshire the TIMBER project has researched the aspirations, current & future wood fuel capacity and capability of landowners and forestry contractors. The aim of which has been to assess what might be done to increase the amount of timber being extracted from local forests in conjunction with creating an increase in the demand for woodfuel.

4. Biomass Energy Options

There is an urgent need for an overhaul of the energy infrastructure in the UK. There is a wide range of renewable energy technologies which can be implemented, including wind, sun and biomass derived energy.

Biomass is carbon based organic material from living organisms. This plan concerns itself with biomass for energy generation. This includes direct utilisation of biomass for energy, through the combustion of wood to produce heat, and the conversion of biomass into energy products, such as biofuel. Figure 1 below illustrates several of the technologies developed for deriving energy from biomass.

At present 90% of the UK's energy needs are met by fossil fuels¹ which are non-renewable. Their combustion is a main factor in the increase of CO₂ in the atmosphere. Biomass can play a significant part in reducing net emissions of carbon dioxide. It is renewable and is theoretically a carbon neutral fuel as the carbon emissions released during use as a fuel can be offset by the carbon capture during growth. However there are small amounts of carbon dioxide produced during the manufacture and transport of woodfuel (a tiny percentage of the final product). Therefore production and utilisation need to be as closely linked as possible.

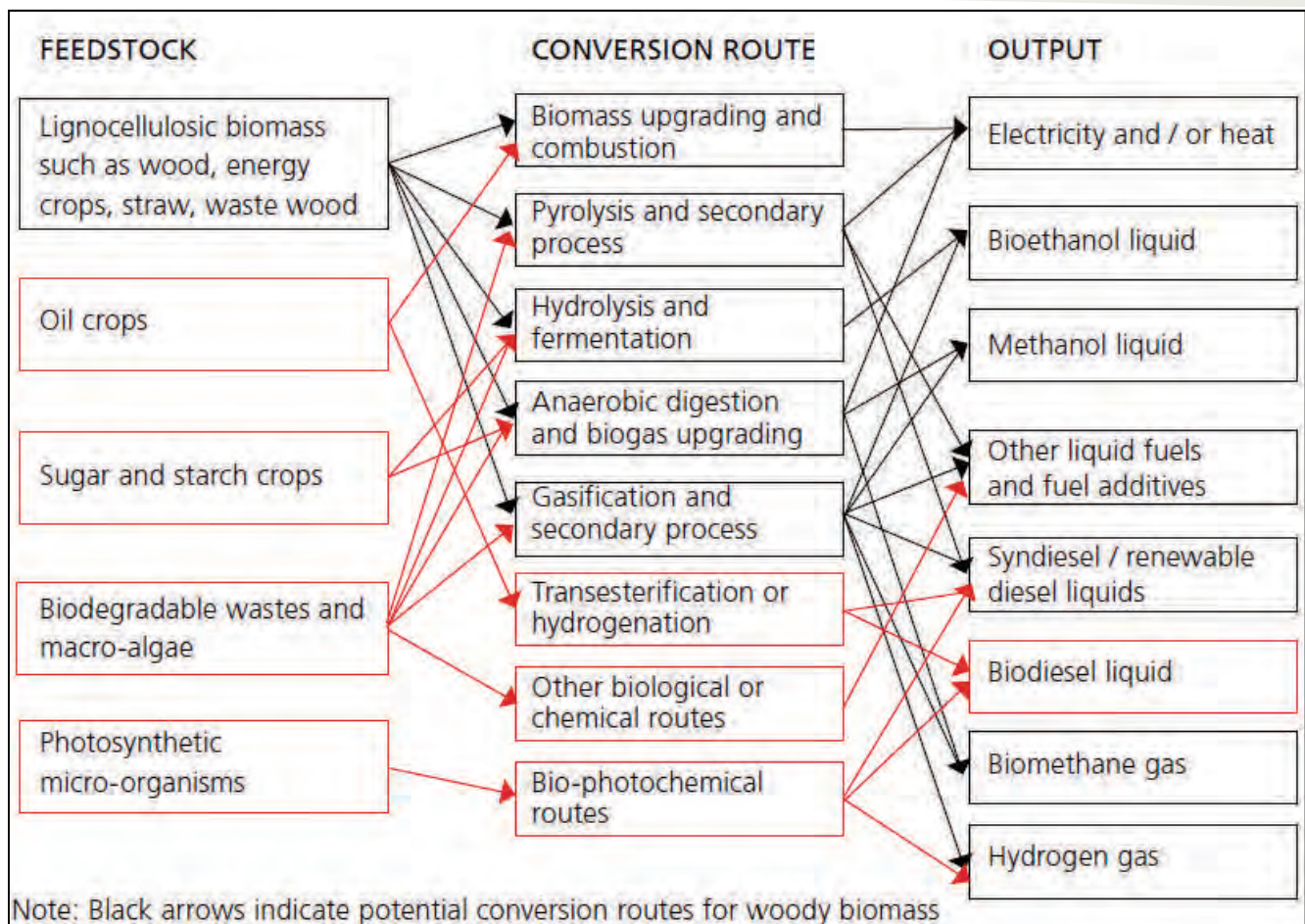


Figure 1. Basic biomass energy feedstock's, conversion routes and outputs²

1 UK Biomass Strategy 2007

2 Macqueen, D. and Korhaliller, S. (2011) Bundles of energy: The case for renewable biomass energy, Natural Resource Issues No. 24. IIED, London

Options for the conversion of biomass into energy are constantly evolving and some are considered more suitable for Buckinghamshire and the Chilterns Hills than others. Table 1 below provide an overview of the technologies considered relevant to the area and summarise the current status of use.

Conversion Technology	Biomass Type	Example of fuel used	Main Product	End Use	Status in Buckinghamshire
Combustion	Dry	Wood logs, pellets or chips	Heat	Heat and electricity	Commercial and Domestic. Currently in use in Bucks
Co-Firing	Dry	Agro-forestry residues	Heat/ electricity	Heat and electricity	Mainly utilised in power stations. None in Bucks
Gasification	Dry	Wood chip, pellet and solid waste	Syngas	Heat, electricity and transport fuels	Demonstration stage. Currently not being considered for waste management
CHP	Dry or Gas	Straw, forest residues, waste	Heat and electricity	Combined use of heat and electric power	Commercial (medium to large scale). None in Bucks currently
Anaerobic Digestion	Wet	Vegetable waste, sewage or manure	Biogas	Heat and electricity	Commercial. Being considered for waste management in Bucks
Etherification	Oily Crop	Oilseed rape	Biodiesel	Heat, electricity and transport fuels	Commercial. None currently in Bucks but Biodiesel being produced through transesterification.

Table 1. Biomass Technologies in Buckinghamshire³

In this action plan we focus on combustion. Buckinghamshire and the Chiltern Hills currently are in the early stages of biomass energy development. Wood fuel for combustion is therefore, at present, the best option for achieving the aims of this plan. The technology is robust and proven, and there is a large area of currently under-managed woodland for supply of woodchip.

Despite the focus on combustion it is recognised that Anaerobic Digestion (AD) present good opportunities to achieve carbon reduction and creation of renewable energy as set out in both County Council and District Council policies. Anaerobic digestion is a process where microorganisms break down organic material in the absence of oxygen resulting in the production of biogas. AD is employed in the management of organic waste and the development of AD plants in the county is currently being procured in order to deal with food waste. Construction of one such plan is at present underway at Westcott Venture Park, north of Aylesbury, which is expected fully functional by early 2012.

Combustion

One of the simplest ways to produce energy from biomass is to burn it. Wood chip, wood pellets, logs and straw can all effectively be burned to produce heat or electricity at a range of scales, from small domestic wood boilers to large scale district heating systems.

Over one third of the UK's energy consumption is used for heat but currently less than 1% is renewable heat sourced from biomass. The use of renewable heat is expected to increase with the introduction of the Renewable Heat Incentive.

Buckinghamshire has a large potential for the installation of biomass boilers for the production of heat, and the demand and supply of this sector is discussed in more detail on the following pages.



5. Biomass Energy Policy Drivers

Estimations suggest that oil is likely to run out in the next 40 years if we continue to consume it at the current rate⁴. There is also a drive to cut carbon emissions in order to reduce the impact of climate change. This has led to various policies seeking to lower our current dependence on fossil fuels and increase the uptake of renewable energy resources.

In 2007 renewable energies covered 13.1% of global primary energy supply and 17.9% of global electricity production. To increase this share the EU's **Renewables Directive (2008)** agreed to source 20% of the EU's energy from renewable energy sources by 2020.

The UK's **Climate Change Act (2008)** seeks to help the transition towards a low-carbon economy. This includes a legally binding target of an 80% cut in greenhouse gas emissions by 2050, a reduction in emissions of at least 34% by 2020 and 50% by 2027 compared to the 1990 baseline.

The Government white paper '**UK Low Carbon Transition Plan: national strategy for climate and energy**' (2009) is a low carbon transition plan to 2020. It aims to deliver emission cuts of 18% on 2008 levels by 2020. This includes policies to produce around 30% of our electricity from renewables by 2020.

The **UK Fuel Poverty Strategy (2001)** aims that by 2016 no person in England should have to live in fuel poverty. Fuel poverty is defined by a household which spends more than 10% of its income on fuel. Changing to lower cost biomass fuels can help contribute to these targets.

The **Renewable Energy Strategy (2009)** sets a target of 15% of energy generation from renewable sources by 2020. In 2008 only 2.3% of UK energy was generated from renewable resources. In Buckinghamshire this number was only 1.57%. This represents a seven-fold increase in UK renewable energy consumption from 2008 levels, but is achievable with determination, as some EU Member States are already at 25%.

Table 2 below illustrates the national target applied to Buckinghamshire and shows the required increase in renewable energy generation to meet the national contribution.

Year	% Renewable	MWh	Increase from 2008 Levels (MWh)
2011 - 2012	4%	516,398	313,506
2013 - 2014	5.4%	697,137	494,245
2015 - 2016	7.5%	968,246	765,354
2017 - 2018	10.20%	1,316,815	1,113,923
2019 - 2020	15%	1,936,492	1,733,600

Table 2. National Renewable Energy Strategy targets applied to Buckinghamshire⁵

⁴ <http://www.imeche.org/knowledge/themes/energy/energy-supply/fossil-energy/when-will-oil-run-out>

⁵ Calculations by Buckinghamshire County Council

The **Carbon Reduction Commitment** (recently renamed the CRC Energy Efficiency Scheme) came into force in April 2010. This is the UK's first mandatory carbon trading scheme. It is compulsory for organisations that consume over 6,000 MWh per year of electricity. The primary focus of the scheme is to reduce emissions in non-energy intensive sectors in the UK.

Details of the **Renewable Heat Incentive** were published by government in March 2011. It is the first financial support scheme to encourage the uptake of renewable heat. It will provide long-term financial support to renewable heat installations, providing a payment per kWh of heat produced from renewable sources for 20 years. In the first year, long-term tariff support will be targeted in the non-domestic sectors, at the big heat users – the industrial, business and public sector. There will be support of around £15 million through the Renewable Heat Premium Payment for domestic users in this phase and the second phase of the RHI scheme will see it expanded to include more technologies as well as support for households.

The **UK Biomass Strategy (2007)** is intended to realise a major expansion in the supply and use of biomass. It aims to source an additional 1 million dry tonnes of wood per annum from unmanaged woodland and increase the amount of perennial energy crops produced in the UK.

The **Woodfuel Strategy for England (2007)** states that a further 2 million tonnes of wood can be utilised by 2020. It notes that the greatest contribution of biomass can be through local heat generation.

The **Woodfuel Implementation Plan (2011)** outlines how woodfuel can be promoted by increasing wood supply by bringing more privately owned woodlands into active management, encouraging use of woodfuel in high quality, efficient wood heat systems, and helping rural based businesses increase their capacity to develop a robust woodfuel industry.

The Benefits of Biomass to Buckinghamshire

Besides counting toward the targets set out in national policy, the adoption of increased levels of biomass in Buckinghamshire will bring numerous benefits. By utilising a local woodfuel source such as biomass we can achieve an increase in the number of woodlands receiving active management, thereby providing a source of income for woodland owners while benefitting biodiversity. Overall, the forestry sector will benefit economically from an increase in the demand for woodfuel, as it is envisaged more employees will be crucial in order to guarantee supply. The same goes for installers of woodfuel systems, where a marked rise in the number of suitably qualified people will be required. This will help build a much needed green economy set up around local production and supply. From a consumer's perspective, it being domestic, industrial or public sector there are strong economic incentives associated with the installation and use of renewable energy systems. The saving in fuel cost alone currently provides a strong driver, particularly with the Government's introduction of the Renewable Heat Incentive.

6. Local Context

Buckinghamshire's population make up nearly half a million people, one third of who live in rural areas. The county has a rich heritage and landscape. Ancient parkland, chalk grassland and beech woodland are just a few of the habitats making up Buckinghamshire's rich natural environment, which play an important role in making the area a prime location to live. Over a quarter of the county is included within the Chiltern Area of Outstanding Natural Beauty (AONB) and a further third is covered by the Metropolitan Green Belt.

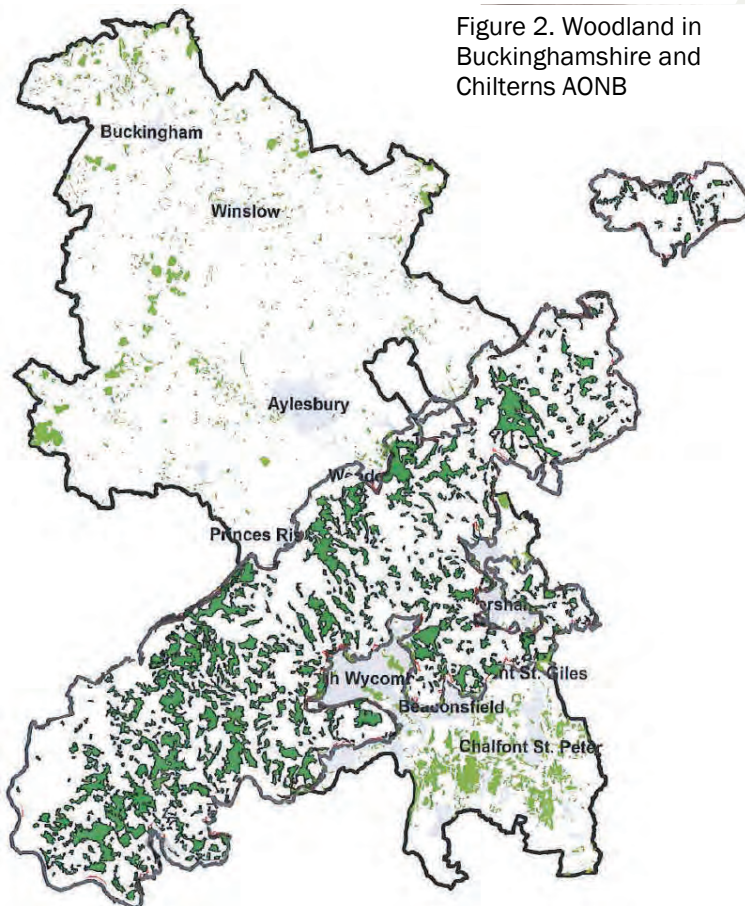


Figure 2. Woodland in Buckinghamshire and Chilterns AONB

This study, although focussed on Buckinghamshire also encompasses the Chilterns AONB which overlaps Oxfordshire, Hertfordshire and Bedfordshire.

9.4% of Buckinghamshire's area is woodland (approximately 17,573 ha). The Chilterns AONB has an overall woodland cover of 21% (nearly 17,400 hectares), much of which is dominated by beech high forest. Within the Chilterns AONB there are approximately 450 woodland owners, with 75% of the woodland resource being privately owned. Woodland cover outside the Chilterns AONB is sparser, with 8900ha spread over the rest of the county. The least wooded part of Buckinghamshire is the Vale of Aylesbury, where woodland cover comprises only 6% area.

Gas Connection

Figure 3 shows the percentage of households connected to gas in Buckinghamshire. The majority of the rural north Buckinghamshire lacks gas connections, as well as some parts of the Chilterns AONB.

Connection to gas will be a factor in whether households or industry decide to utilise biomass for heat. The largest saving can be achieved when installing biomass boilers in areas with no gas connection. The change from oil or electricity to biomass can bring large financial savings. A 50% saving can be achieved per kwh when substituting oil with wood chip, and 75% when replacing electricity with wood chip.

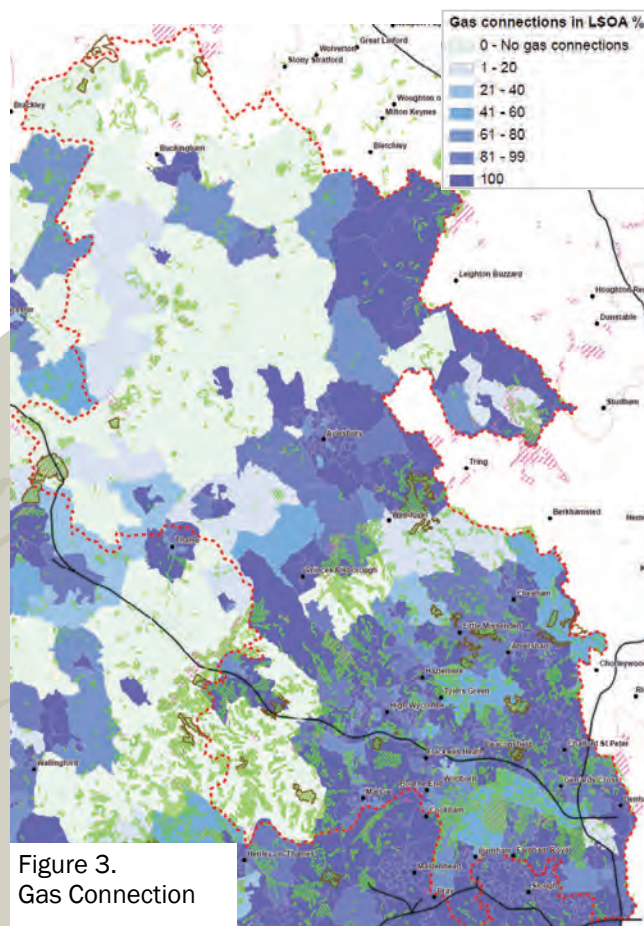


Figure 3. Gas Connection

Local Context –Energy

The per capita energy demand/consumption in Buckinghamshire is well above the UK average. A total of 12909.9 GWh was consumed in 2008 by Buckinghamshire’s industry, commercial and domestic sectors, including road transport and rail. The breakdown of consumption by fuel type can be seen in the Table 3. It is evident that petroleum products make up the majority of energy use.

Table 3. DECC statistics of final energy consumption for Industry, Commercial Domestic and Transport/Rail in Buckinghamshire in 2008 (GWh)⁶.

	Coal	Manufactured fuels	Petroleum products	Natural gas	Electricity	Renewables & waste	Total
Totals 2008	75.6	13.3	6,277.5	4,390.1	2,117.6	35.8	12,909.9

The estimated level of renewable energy generation in Buckinghamshire was 1.57% of final energy consumption in 2008. This includes landfill and sewage gas, and biomass currently make up an only small percentage of the overall renewable energy generation.

Energy consumption is varied across the project area, with Chiltern District having the highest domestic energy consumption per capita in the county. A full break down of the energy consumption per district area can be seen in table 4. The consumption of various fuel types also varies greatly across the county, with the north heavily dependant on oil due to a lack of gas connection.

Table 4. Energy consumption by district and sector 2008 (Gwh)⁷

District	Total	Industry & Commercial	Domestic	Transport
Aylesbury Vale	3800.52	962.87	1393.4	1427.33
Chiltern	2045.03	454.12	1004.01	583.49
South Bucks	3092.02	466.26	759.24	1861.5
Wycombe	3972.38	884.91	1559.16	1517.91
Totals	12909.95	2768.15	4715.81	5390.23

With the projected cost of oil prices reaching between £60 -£150 per barrel by 2030, the need for alternatives become increasingly pressing. The county has substantial potential to generate some of its own energy requirements from the burning of wood biomass for space heating.

Heating accounts for 50% of all energy needs. In the north of the county many buildings are heated using heating oil, the most expensive and price/market volatile fuel available. The recent introduction of The Renewable Heat Incentive scheme makes heating via biomass the most cost effective space heating method in the UK paying a revenue stream for 20 years.

By prioritising biomass as a fuel source the TIMBER partners will also fulfil many other desired outcomes: community leadership, lowering reliance on fossil fuels, supporting the green economy, lowering energy costs and establishing a new 20 year revenue stream.

⁶ http://www.decc.gov.uk/assets/decc/Statistics/regional/total_final/1094-total-subnatl-final-energy-cons-2005-2008.xls

⁷ http://www.decc.gov.uk/assets/decc/Statistics/regional/total_final/1094-total-subnatl-final-energy-cons-2005-2008.xls

7. Green Economy

Buckinghamshire is an affluent county with an economy worth an estimated £10 billion per annum. The average earning in 2009 was £29,252 - well above the UK average. A high percentage of the population is highly qualified and the county has a low unemployment rate (July 2011: 2%). However some areas are much less economically stable, particularly rural areas where the development of a sustainable green economy can deliver great benefits.

A Green Economy is one which is low carbon, resource efficient and socially inclusive.

UNEP 2011

Buckinghamshire businesses are recovering very slowly from the global recession of 2009, which destroyed 6% of UK GDP. Economic growth and job creation have been identified as a priority in Buckinghamshire. Any measure that reduces costs for a business improves competitiveness and therefore their ability to employ. Facilitating improvements in business energy usage and efficiency prevents financial waste, unnecessary CO₂ emissions and benefits the local supply chain.

Forestry Commission's Woodfuel Implementation Plan cites studies suggesting that a sustainable woodfuel supply chain could generate and support more than 15,000 jobs and add over £1billion gross value to the green economy in the UK. An increase in demand for biomass energy will stimulate a sustainable supply chain. This requires a skilled workforce including foresters, tree surgeons, hauliers, plumbers, certified installers and number of qualified advisors to support the emerging market.

Through this Biomass Action plan we set out actions which will help achieve the development of a healthy green economy across the project area. The development of a sustainable biomass resource through management of our woodlands, the installation and certification of biomass boilers, and plant and fuel storage development will all help achieve this aim.

We need to ensure support is available to develop the skills for a green economy supported by biomass. Local training institutions play an important role in ensuring the county is equipped with the right skills to take full advantage of these opportunities. Local colleges and schools need to ensure training is available for both young people and mature students to gain qualifications which set them up for successful careers in installation, manufacture or management of a biomass energy market.



Support is also required for people already working in this or related industries, including woodland owners and foresters aiming to be part of the supply chain. LEADER funding can assist with the purchase of equipment needed for manufacture of fuel. The Forestry Commission's Woodfuel Woodland Improvement Grant provides support to owners of undermanaged woodland for the improvement of infrastructure required for extraction (see section 12).

To ensure we can take full advantage of the economic benefits of a biomass energy market, local policies and plans need to support the installation and use of biomass energy. Several districts have already incorporated renewable energy policies into their local plans. We need to ensure continued support in order to grow the green economy.

Actions to build the Green Economy

In order to harness the full potential of the local Biomass Resources the partners in this project propose the following Actions:

What	Who
Address skill and knowledge shortage in relation to woodland management, production of fuel, and installation and management of wood fuel systems	Chilterns Woodland Project Forestry Commission Bucks Business First BRAG Educational Institutions Private sector
Promote and manage grant funds to support woodland management, rural businesses supplying woodfuel and installations using woodfuel	Ngage Forestry Commission
Ensure biomass is sourced as locally as possible to retain economic benefit in the local area	Local Authorities All users of fuel

Case Study

Buckinghamshire County Council

Buckinghamshire County Council (BCC) has installed a 500kW woodchip boiler at the new Cressex School. There are two further sites planning to installed woodchip boilers, and four existing biomass boilers. By gradually increasing the number of biomass boilers within Bucks we are developing the demand for locally supplied biomass fuel.

The experience of these installations has generally been very positive. However the experience of biomass is very different to what site teams have been used to and therefore an element of training has been required. Site teams have therefore become more confident in how to handle and maintain the biomass boilers.

Existing biomass sites are being served by local biomass fuel suppliers. Some installations have involved local Building Services contractors. This has up skilled local contractors, building their confidence with operating biomass installations. Local contractors will undertake maintenance, with training provided by the main biomass contractor to ensure future maintenance requirements can be met by local contractors. The local green economy is being built through developing both local biomass fuel supply chains and widening expertise of Building Services contractors in dealing with installations.



8. Sustainable Forestry

The production of biomass must take place in a sustainable manner. One of the main objectives of this plan is to help achieve sustainable woodland management across the area. The UK Biomass Strategy has set out to source an additional 1 million dry tonnes of wood per annum from currently unmanaged woodland in England. In the Chilterns Hills, where most of Buckinghamshire's woodland resource is located, the majority of woods (75%) are privately owned. There are approximately 450 woodland owners, nearly half of whom own woods of less than 20ha. Many of these woodlands are under managed and the market for woodfuel provides an incentive for woodland management.

Lack of management is contributing to a decline in the biodiversity of our woodlands. Bringing undermanaged woodlands into active management can benefit a range of flora and fauna, including rare and threatened species. By ensuring woodland is made up of several phases - new planting, clear ground, mature trees and scrub, more species will be present thereby increasing the biodiversity of the woodland.

By supporting owners in managing their woodlands sustainably for woodfuel we also help build a new market for wood and timber. While many woodlands are left unmanaged the quality of their standing timber has deteriorated. The woodfuel market provides a perfect use for this as fuel through chipping. The improved quality of woodland in the future will allow access to higher value markets for timber. In the Chilterns AONB, many people have strong feelings about the management of woodlands. Individual and small areas of trees can be felled and replanted throughout the woodland ensuring overall canopy is maintained. The Forestry Commission regulates the management of woodland according to the UK Forestry Standard.



A recent survey by the Forestry Commission found that 47% of people asked in England agree that using wood for fuel is better for climate change than using fuels such as coal and gas. However, 37 % of people considered that using woodfuel makes climate change worse because it releases carbon dioxide. This illustrates the challenges associated with actively managing woodland for woodfuel and requires a sustained effort by all to ensure the benefits of woodfuel is widely understood.

In areas of the county with lower woodland cover there are opportunities to encourage the creation of new woodlands in appropriate locations. New woodlands can provide a wide range of benefits to both the landowner and surrounding communities - including a wider range of habitats for biodiversity and, where access is provided, opportunities for local communities to get out and enjoy the countryside. As well as being managed in future for a range of timber products, including woodfuel, they sequester carbon. Through the Woodland Carbon Code it is now possible to attract investors in carbon - increasing income streams for the land managers and helping reduce the carbon emissions of the investor.

The Chilterns Woodland project visits over 30 woodland owners each year to offer advice or assistance. This is an example of support which helps achieve sustainable woodland management. We must ensure such projects can continue to operate and must work closely with them to achieve the aim of sustainable woodland management for woodfuel.

Actions to promote Sustainable Forestry

In order to harness the full potential of the local Biomass Resources the partners in this project propose the following Actions:

What	Who
Promote the creation of new woodland in appropriate sites	Forestry Commission Chilterns Conservation Board Voluntary bodies
Help people understand the benefits of Woodland Management, conveying the message that sustainably managed woodlands enhance biodiversity	Chilterns Conservation Board Forestry Commission Voluntary bodies
Advise and assist small woodland owners with production of management plans and encourage large woodland owners to produce management plans	Chilterns Woodland Project Groundwork Local NGO's Local forestry consultants

Case Study

Chilterns Woodland Project Ltd

The Chiltern Woodlands Project is a registered charity that has been working closely with local woodland owners since 1989. It promotes sustainable and sensitive management of the Chilterns woodlands. Training days and events demonstrate woodland craft and management practices and 1:1 advice is provided to owners.

The project is advising woodland owners on how to manage their woodlands for wood fuel. It is helping owners to realise sustainable woodland management from under-managed woods, providing the cash return necessary for thinning operations.

The project has been working with the owner of a 45 year old plantation of Scots pine and beech covering 3.5 hectares near Great Missenden, Bucks. Here the Project has drawn up a woodland management plan and is awaiting felling consent from the Forestry Commission to thin out about 50% of the pine, estimated at about 300 tonnes. More than half of the felled material is likely to be used for wood fuel. The better timber may be suitable for fencing bars. An issue is the access into the wood, which we hope to improve with help from Forestry Commission grants, and by finding a suitable location to load timber lorries. It is envisaged that in the next five years a start will be made on thinning the poorer broadleaved trees, mainly beech, for firewood for the log market.



9. Demand

Buckinghamshire's demand for energy is currently above the country average. The lack of gas in large parts of the county increases the potential for uptake of biomass energy. Fuel prices currently provide a strong incentive for the uptake of woodfuel; with the cost of wood chip currently 2.9p/kWh and oil and electricity at 5.8p/kWh and 12.0p/kWh respectively⁸.

To build a sustainable woodfuel industry, efforts must be focused on building demand. Demand-side pull has been a catalyst for growing the woodfuel industry elsewhere in England and this approach should prove successful in Buckinghamshire as well.

Buckinghamshire and the Chiltern Hills comprise a number of large private estates and public sector land owners who can play an important role in creating demand. There are strong incentives for large organisations to reduce its carbon foot print. The Carbon Reduction Commitment is one such incentive where organisations using more than 6,000MWh per year of electricity are part of a mandatory carbon emissions reporting and pricing scheme. Such organisations can achieve reductions in carbon emissions by replacing oil-fired boilers with woodfuel boilers.

A number of potentially positive Biomass initiatives are being driven out of council plans and activities. Wycombe District Council (WDC) commissioned SEA/RENUE to assess the feasibility of developing low carbon infrastructure and renewable energy installations in a number of regeneration sites and to set out the policies required to enable this development. Buckinghamshire County Council has adopted a policy to replace aging oil boilers with biomass boilers where feasible and has already installed a number across the county. In addition it has assessed its boilers and allocated a dedicated budget to support this replacement programme.

Such plans and commitments have a strong potential for stimulating the local biomass markets; early estimates suggest if just part of these plans come off, WDC would have an immediate requirement for 7500 tonnes of woodchip per annum.

A number of barriers have been identified in the creation of demand including :

- Fragmentations of existing supply chains, putting some people off installing biomass boilers.
- Lack of information about how to manage biomass systems
- Energy managers who are reluctant to use different technologies
- Lack of demonstration sites
- Lack of understanding about the financial incentives such as the Renewable Heat Incentive.



All partners can help address some of these issues through having agreed policies in place to replace aging boilers with biomass fuelled boilers where feasible. This will help to provide confidence to suppliers of the guaranteed uptake of their products and encourage private sector investment. Public sector and other large scale demand side organisations must use their experiences to provide support and ongoing information to the business and domestic sector about the benefits associated with using woodfuel.

Actions to stimulate Demand for Biomass Energy

In order to harness the full potential of local Biomass Resources the partners in this project propose the following Actions:

What	Who
Replace oil boilers with biomass boilers across estate where viable, and install biomass boilers in new build where practical	Local Authorities Developers
Woodchip boilers should be explored before pellet-feed boilers	Local Authorities Developers
Support initiatives and policies which seek to increase the use of sustainably sourced biomass in the county	Local Authorities
Promote best practise to end users and fuel providers, enhancing 'trust' in biomass as a fuel	Forestry Commission All
Work with woodland owners to manage their woodlands, to supply woodfuel and, where appropriate install biomass	Chilterns Conservation Board Forestry Commission Voluntary bodies

Case Study

Hughenden Manor Biomass Project

The National Trust has installed a 220kW woodchip boiler at Hughenden Manor – one of their flagship sites and regional offices. Existing oil fired boilers needed replacing, so a feasibility study examined alternative energy systems was commissioned.

It was important for the National Trust to ensure the energy system made use of the woodland resource on its Hughenden and Bradenham estates. Therefore a woodchip boiler system was decided upon as woodchip can be produced and supplied from their own woodland management operations. Wood will be stacked to dry on site and then chipped directly into an on-site barn for Drying.

The boiler has been operating since November 2010 with very few problems. The fuel delivery and feed system, a crucial part of boiler design, is working extremely well.

The change from oil has also helped the National Trust to reduce its energy bills, reduce pollutants in the sensitive Chilterns AONB, reduce carbon emissions and inform the public about renewable energy.



10. Supply

Buckinghamshire's woodland cover of approximately 18,000ha provides good opportunities for the production of wood fuel. Up to 33,000 m³/year of wood could be harvested in Buckinghamshire according to the Forestry Commission- although in practice there are many barriers to this currently happening. If this extraction rate was achieved, approximately 83GWh of energy could be produced.

There are three main types of woodfuel used in combustion, and demand is growing for all of these. The table below shows the types of biomass fuel, the general size of boiler that uses them and the impact that production of each type of fuel has on the local economy.

Type of woodfuel	Scale of use	Impact on local economy
Traditional logs	Used in open fires, woodburning stoves and small scale batch boilers up to 75kW. High handling costs reduce scale of use.	Currently very strong demand for logs is increasing the price and hence returns to woodland owners.
Woodchip	Used in automatic boilers from c50kW upwards to a few MW. Less energy dense than woodpellets so requires more space for storage but lower cost per kWh.	Difficulty of transporting and lack of flow mean that economically these are ideally used within 25-40miles of production.
Woodpellets	Used in the whole range of automatic boilers from small to industrial scale. More energy dense than woodchip but higher cost per kWh.	Production requirements for heat to dry pellets and pressure to shape them means this is a large scale industrial process.

To increase our supply of wood we need to understand the barriers currently in place. Research carried out by the TIMBER project found the primary reason for people in the Chilterns owning woodland to be for landscape/nature conservation, shooting and timber production. This indicates that lifestyle and amenity are often the primary reasons for ownership, as opposed to commercial interests. In fact the project found that woodland owners in the Chilterns currently harvest only 27% of the sustainable yield and that much of this is used for firewood. Many woodland owners believe that the economic viability of wood chip production is questionable. The challenges currently in place for the establishment of a sustainable woodfuel supply chain include a lack of desire to actively manage woodlands and the lack of harvesting and processing services. However research by Forest Fuels for the TIMBER project recommends building a strong demand side in order to drive supply. To ensure the supply side is properly supported in order to respond to the increase in demand a number of actions have been identified.

In order to maximise benefits to both producer and consumer, woodfuel production and use should be kept as local as possible with a robust supply chain. The production of wood chip currently holds the most promise for achieving the aims and objectives of this plan. Wood chip is the cheapest form of woodfuel but it is difficult to transport. Therefore it must be produced locally for it to be economically viable and minimise its carbon footprint. To ensure a robust supply chain, commercial woodfuel supply companies and processing facilities need to be encouraged in the county. They can work with woodland owners providing a market pull which will stimulate active management of woodlands. Woodland owners can get actively involved with woodfuel by either supplying a commercial fuel operator or by self supply (managing own woodlands for woodfuel and reducing on-site heating bills). Bodies with large scale demand, such as public sector organisations, must also ensure they work positively and closely with suppliers to encourage a local, sustainable woodfuel economy.

There are currently no wood pellet production plants in the Buckinghamshire. The closest pellet plant is at Andover. This plant has the capacity to produce 55,000 tonnes of pellets each year. Wood pellet production requires much more processing than woodchip and it occurs on an industrial scale. Transporting the fuel means there are limited economic advantages of using woodpellets to Buckinghamshire as a whole. If a pellet plant is constructed in Buckinghamshire, the production of this fuel can potentially act towards the objectives set out in this plan.

Actions to secure a strong supply of Biomass Energy

In order to harness the full potential of the local Biomass Resources the partners in this project propose the following Actions:

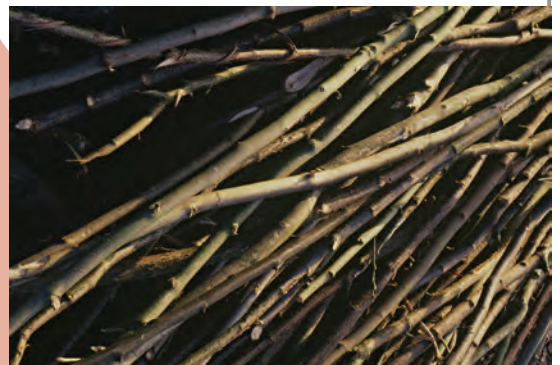
What	Who
Promote and manage grant funds to support woodland management, rural businesses supplying woodfuel and installations using woodfuel	Ngage Forestry Commission
Support and initiate the development of a woodfuel hub in the county and support future development of a woodfuel consortium	Private business Local Authorities Ngage
Support rural businesses to increase their capacity to develop a woodfuel industry	All Bucks Business First

Case Study Practicality Brown

As a local Landscape Contracting business started in 1981, Practicality Brown has been providing forestry related products and services to local land owners for over 30 years. Starting out as a provider of semi-mature trees and forest products the company has moved on over the years to respond to changes in the market. The company has over 25 years experience in the commercial production of woodchip for the amenity and fuel market.

Recently the company has responded to the raise in demand for woodchip and scaled up their business for the supply of high grade quality-controlled wood chip fuel. They have invested heavily in machinery for production of wood chip and are now capable of providing chip throughout the year from their core business of 'no burn forestry clearance'. They have invested in grading equipment, storage and moisture control to ensure a consistent quality of fuel, available throughout the year.

As a natural step in developing their business for supply of wood-chip they are actively looking to engage woodland owners to manage their woodlands of biomass production. By working closely with local woodland owners they can ensure a reliable supply of wood chip to biomass boilers and woodland owners are guaranteed a buyer for their product.



11. Overview of Actions

What	Who
Address skill and knowledge shortage in relation to woodland management, production of fuel, and installation and management of wood fuel systems	Chilterns Woodland Project Forestry Commission Bucks Business First BRAG Educational Institutions Private sector
Promote and manage grant funds to support woodland management, rural businesses supplying woodfuel and installations using woodfuel	Ngage Forestry Commission
Ensure biomass is sourced as locally as possible to retain economic benefit in the local area	Local Authorities All users of fuel
Promote the creation of new woodland in appropriate sites	Forestry Commission Chilterns Conservation Board Voluntary bodies
Help people understand the benefits of Woodland Management, conveying the message that sustainably managed woodlands enhance biodiversity	Chilterns Conservation Board Forestry Commission Voluntary bodies
Advise and assist small woodland owners with production of management plans and encourage large woodland owners to produce management plans	Chilterns Woodland Project Groundwork Local NGO's Local forestry consultants
Replace oil boilers with Biomass Boilers across estate where viable, and install biomass boilers in new build where practical	Local Authorities Developers
Woodchip boilers should be explored before pellet-feed boilers	Local Authorities Developers
Support initiatives and policies which seek to increase the use of sustainably sourced biomass in the county	Local Authorities
Promote best practise to end users and fuel providers, enhancing 'trust' in biomass as a fuel	Forestry Commission All
Work with woodland owners to manage their woodlands, to supply woodfuel and, where appropriate install biomass	Chilterns Conservation Board Forestry Commission Voluntary bodies
Support and initiate the development of a woodfuel hub in the county and support future development of a woodfuel consortium	Private business Local Authorities Ngage
Support rural businesses to increase their capacity to develop a woodfuel industry	All Bucks Business First

12. Grant Sources

Grant	What does it support?	Managed by
LEADER	Support for small rural businesses, including capital grants for equipment to add value to wood products.	Ngage
English Woodland Grant Scheme – including Wood-fuel Woodland Improvement Grants	Suite of grants for management and creation of woodland. Woodfuel Improvement Grant offers particular support for timber measurement and access to woodlands for management operations	Forestry Commission
Energy Crops Scheme	Grants to farmers for establishing miscanthus and short rotation coppice for their own energy use or to supply power stations.	Natural England
Renewable Heat Incentive	Financial support for the production of renewable heat. Focused on non-domestic installations in the first year of operation from September 2011.	Ofgem
Renewable Heat Premium Payment	Support for domestic properties installing renewable heat technologies in the first year of the RHI (until Oct 2012)	Energy Savings Trust
Woodland Carbon Code	Sets the standard for new woodland creation to be counted as sequestering carbon. Can help to attract carbon finance.	Forestry Commission and associated certification companies

Glossary

AONB: Area of outstanding Natural Beauty

CHP: Combined Heat and Power is a fuel-efficient process which utilises waste heat produced as a by-product of electricity generation.

Co-firing: The simultaneous combustion of biomass fuel with a base fuel such as coal.

Gwh: Gigawatt Hour (1 billion Watt hours)

Kwh: Kilowatt hour (1000 Watt hours)

Short Rotation Coppice: Coppice of high yield varieties of poplar and willow grown as a energy crop



POWER
Low Carbon Economies



European Union
European Regional Development Fund



INTERREG IVC
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REGIONS OF EUROPE SHARING SOLUTIONS

Appendices

Buckinghamshire & Chiltern Hills Biomass Action Plan



Appendix 1
Projected demand in Buckinghamshire

Appendix 2
Future Energy Trends

Appendix 3
List of contacts

Appendix 1

Projected demand in Buckinghamshire

VantagePoint

VantagePoint is a piece of software designed specifically for local and regional authorities to develop climate change mitigation strategies in a rigorous and authoritative manner. VantagePoint modelling includes a number of measures to reduce carbon emissions, including installation of renewable technologies such as solar PV, energy efficiency measures such as loft insulation and sustainable transport measures such as increased use of biofuels.

Using VantagePoint to Model Biomass Demand in Buckinghamshire

Buckinghamshire's woodland cover of approximately 18,000ha provides good opportunities for the production of wood fuel. The Forestry Commission has set a target of 33,000 m³/year harvested wood for Buckinghamshire, and if this extraction rate was achieved approximately 83GWh of energy could be produced, based on an average of 2,520kWh/m³, meeting 12% of projected biomass demand.

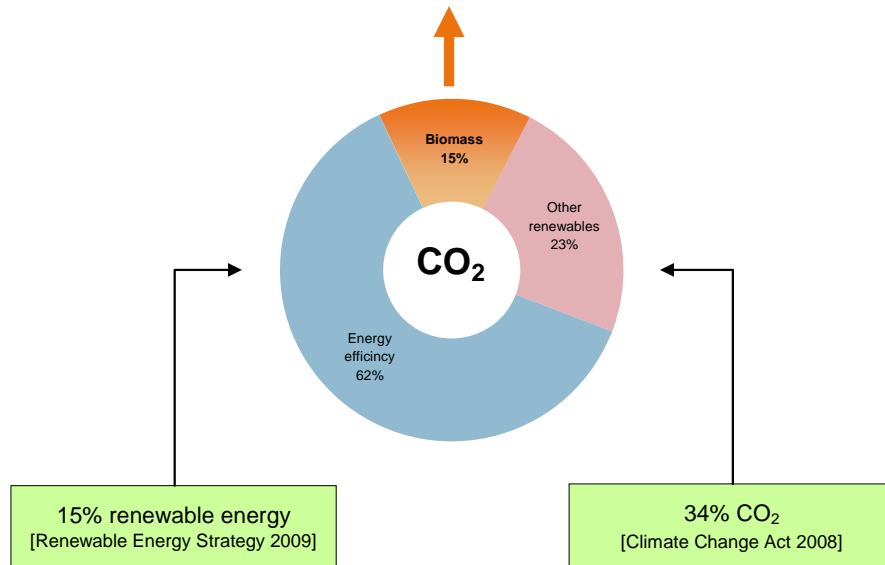
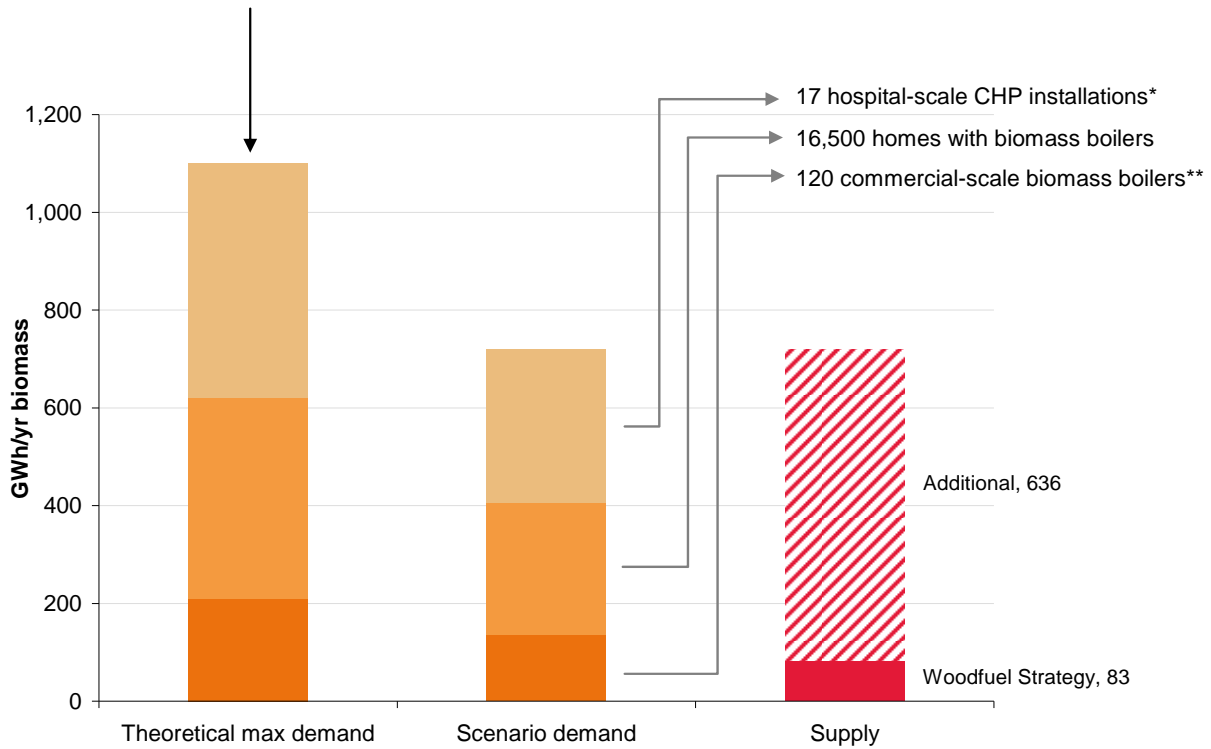
Modelling was carried out by Buckinghamshire County council using VantagePoint software to generate potential scenarios for meeting CO₂ reduction targets set out in the 2008 Climate Change Act, and renewable energy targets of 15% by 2020 set out in the 2009 Renewable Energy Strategy.

The maximum potential for renewable energy generation in Buckinghamshire was calculated, including the following 3 Biomass measures:

- **Biomass CHP = 13.41MW** A total of 13.41MW installed capacity of Biomass Combined Heat and Power (CHP) was considered a maximum realistic potential, using the DECC Heat map, given an uptake rate of 10% for the relevant sectors of which heat demand exceeded 10,000kW/km².
- **Biomass Boilers (Domestic) = 25,408 homes** A total of 25,408 homes in Buckinghamshire was considered as the maximum realistic potential for the number of homes that could have biomass boilers. This was calculated using VantagePoint software guidance which suggests that 30% of detached and semi-detached domestic properties could be suitable for biomass boilers.
- **Biomass Boilers (Non-domestic) = 36.32MW** A total of 36.32MW installed capacity of boilers for the non-domestic sector was considered a maximum realistic potential. This was comprised of 21.85MW as the potential for changing 182 oil boilers in BCC owned buildings to biomass boilers, and the remaining 14.47MW using the DECC Heat map, given an uptake rate of 10% for the relevant sectors of which heat demand exceeded 10,000 kW/km².

The demand generated from the above maximum potentials would equate to approximately 1099GWh per year. The VantagePoint software was then used to scale down the maximum potential, in order to generate an optimum scenario which would allow Buckinghamshire to achieve 15% renewable energy and CO₂ reduction targets simultaneously in the year 2020. This gives a projected uptake of technologies in Buckinghamshire by 2020, of which biomass contributes 15% towards CO₂ savings, equating to 720GWh of biomass demand.

Technology	Potential
CHP biomass	13.41 MWe
Biomass boilers (Domestic)	25,408 homes
Biomass boilers (Non-Domestic)	36.32 MWth

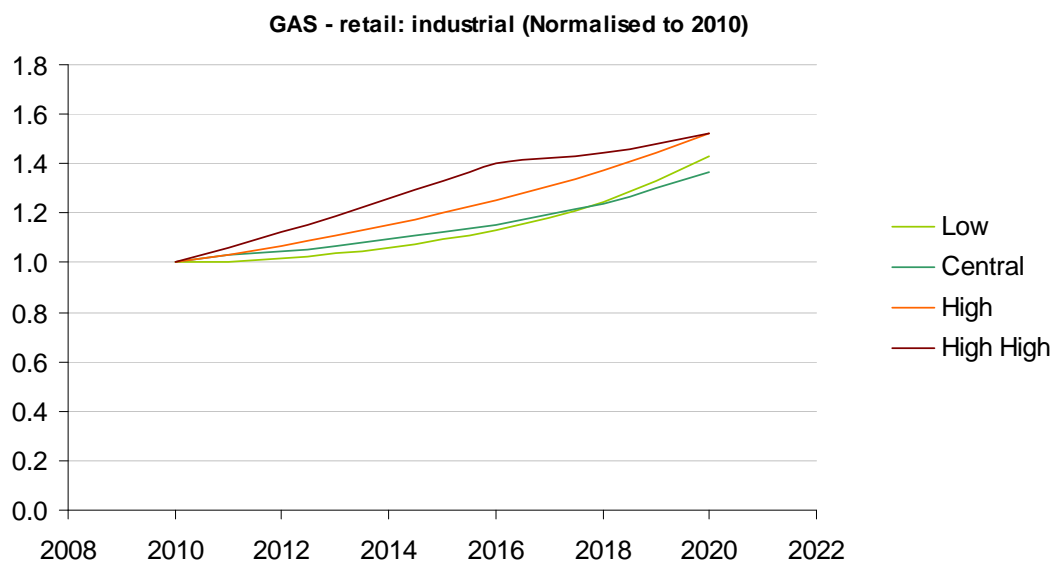
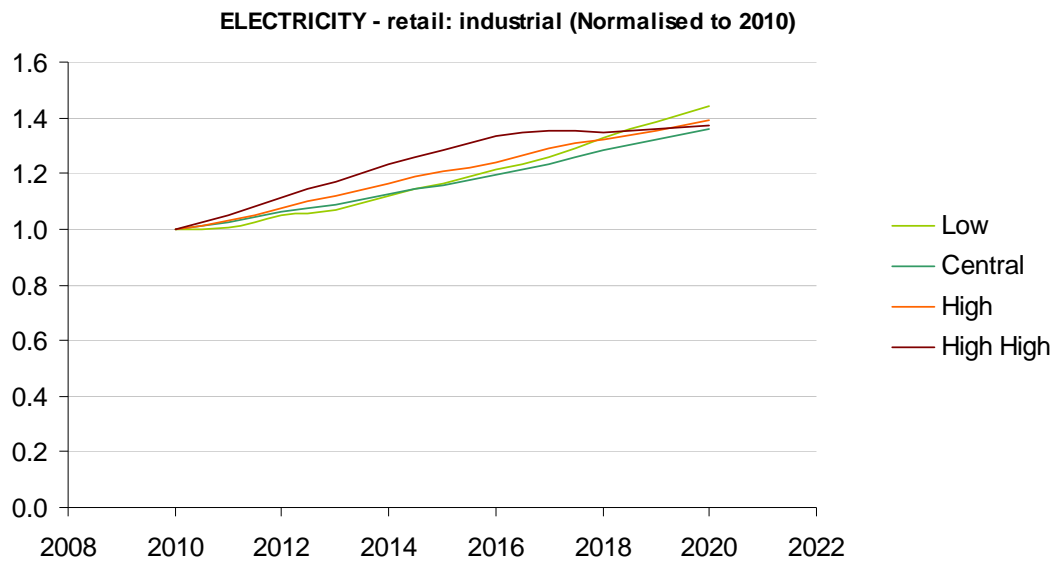


* Assumes 500 kW_e per CHP
 ** Assumes 200 kW_{th} per boiler

Figure 1 Illustrate the VantagePoint modelling outcomes for the scenario envisaged for Buckinghamshire.

Appendix 2 Future Energy Trends

The graphs below indicate projected changes in unit costs for gas and electricity compared to 2010 levels for the industrial sector¹. This shows that electricity unit costs can be expected to rise by approximately 40% by 2020 compared to 2010 prices. A similar trend can be expected for gas, but government scenarios provide a wider spread compared to electricity.



¹ DECC Inter-departmental Analysts Group, Valuation of energy use and greenhouse gas emissions for appraisal and evaluation

Appendix 3

List of contacts

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